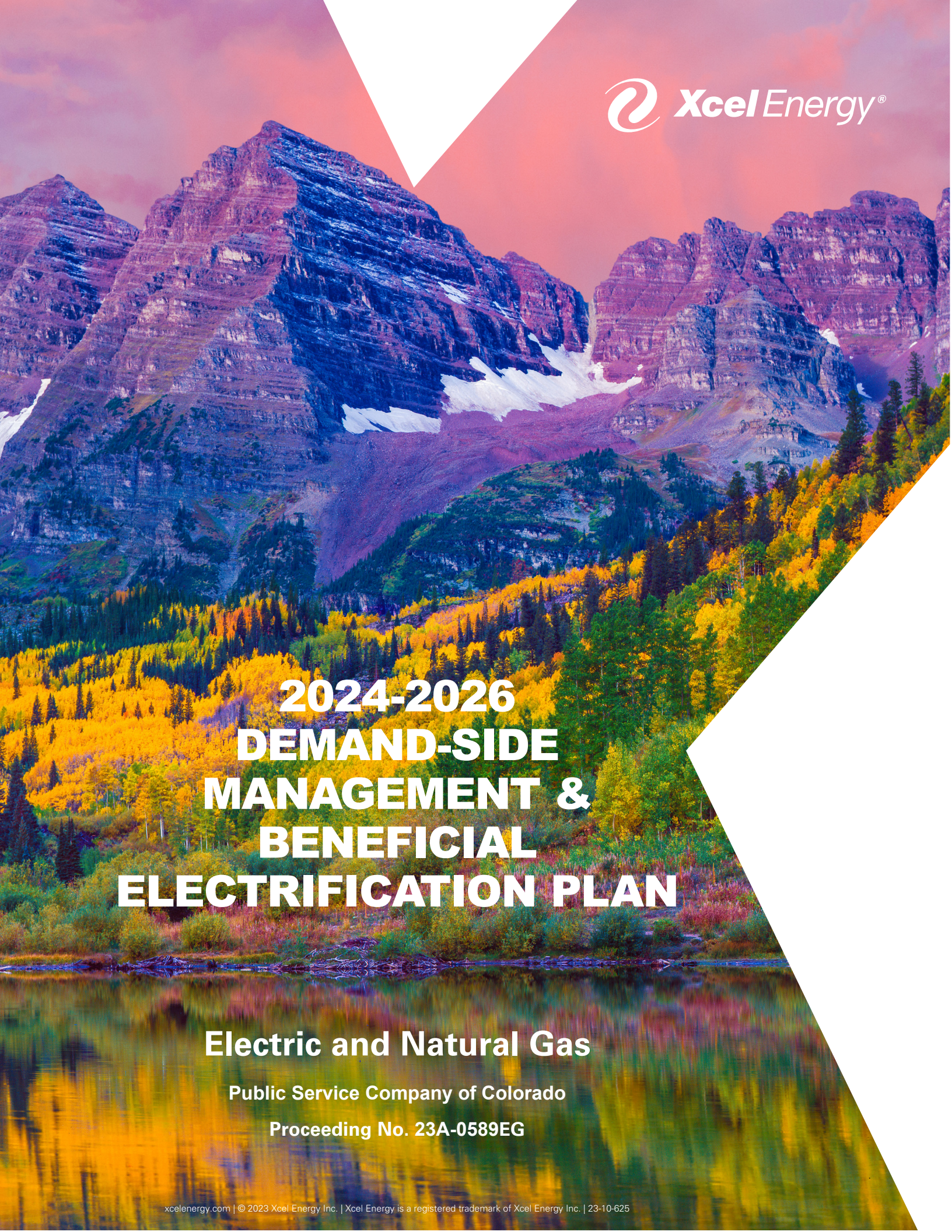


2024-2026 DEMAND-SIDE MANAGEMENT & BENEFICIAL ELECTRIFICATION PLAN

Electric and Natural Gas

Public Service Company of Colorado

Proceeding No. 23A-0589EG

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Document Layout

The Plan has four major sections, summarized below:

1. **Executive Summary** – provides a high-level overview of the strategic direction of the overall 2024-2026 Demand-Side Management and Beneficial Electrification Plan; provides program and product level forecasts and budgets; identifies budgets by cost category; and addresses customer participation.
2. **Program and Product Summaries** – provides a high-level summary of each program area followed by specifics of each product offering.
3. **Cost-Benefit Analyses** – provides the electric and natural gas Portfolio and Program cost-benefit analysis results for the Company's 2024-2026 Demand-Side Management and Beneficial Electrification offerings.
4. **Appendices** – presents a list of acronyms; key terms; product rankings; description of budget categories; avoided costs; natural gas Demand Side Management $/Therm and Acknowledgement of Lost Revenue methodology; electric load shape documentation; and the technical reference manual (deemed savings and forecast technical assumptions).

Executive Summary: Plan Overview

Public Service Company of Colorado ("Public Service" or "the Company") hereby submits this combined electric and natural gas 2024-2026 Demand-Side Management ("DSM") and Beneficial Electrification ("BE") Plan ("2024-2026 DSM & BE Plan" or "Plan") to the Colorado Public Utilities Commission ("Commission"). This Plan is the result of an extensive effort by the Company to assess market potential in our Colorado service territory and devise a plan to reach the Commission-approved annual energy savings goals by offering an inclusive and cost-effective DSM+BE portfolio, delivered to customers via proven marketing techniques.

The Company's 2024-2026 DSM & BE Plan is grounded in a continuance of preceding years' successful approaches, in combination with necessary adjustments made to improve the Company's existing DSM and BE offerings to reflect market shifts and integrate emerging technologies, while being responsive to the Commission's Decision in the 2022 DSM Strategic Issues Proceeding (Proceeding No. 22A-0309EG).[1] That decision resulted in the prioritization of beneficial electrification goals and budgets,[2] the addition of summer/winter electric demand response goals[3] with additional budget flexibility for beneficial electrification (20%), electric energy efficiency (20%), and natural gas energy efficiency (25%).[4]

This Plan meets the requirements of relevant Commission decisions and Rules,[5] while striving to maintain cost-effectiveness in a dynamic environment of volatile natural gas prices, increasing renewable energy generation, and increasingly stringent codes and standards. Additionally, this Plan addresses the legislative BE requirements set forth in Senate Bill 21-246 ("SB 21-246"). In the interests of building on successful implementation of current existing BE offerings made available through the Company's 2023 DSM & BE Plan, Public Service is filing this Plan as a combined DSM and BE Plan for calendar years 2024-2026.

To pursue the Commission-approved goals for its DSM portfolio (set forth in the 2022 DSM Strategic Issues proceeding), Public Service has developed the 2024-2026 DSM & BE Plan with the following key objectives in mind:

- Leaning in on Beneficial Electrification with new measures, additional advertising and promotion, and exploring adding new choices for non-retail (Gas Transport) customers.
- Expanding Demand Response programs in both summer and winter seasons and creating new product options for both electric and natural gas customers.
- Leveraging smart meter capabilities to offer customers greater insight and control over their energy.
- Aligning many of our incentives with the rebates, tax credits, and other incentives made available by federal programs including the Inflation Reduction Act.

[1] Decision No. C23-0413 (mailed June 22, 2023).
[2] *Id.* at 19, ¶ 52.
[3] *Id.* at 73, ¶ 180.
[4] *Id.* at 13, 19, 23 ¶¶ 35, 53, 62.
[5] Decision No. C11-0442 (mailed April 26, 2011); Decision No. C11-0645 (mailed June 14, 2011); Decision No. C14-0731 (mailed July 1, 2014); and Rules 4750 to 4760 of the Commission's Rules Regulating Gas Utilities and Pipeline Operators (the Gas DSM Rules).

Public Service is optimistic that successful implementation of this Plan will be attributable, at least in part, to active participation by stakeholders. These stakeholders include customers, the Colorado Energy Office, Commission Staff, the Utility Consumer Advocate, local governments, environmental and energy efficiency advocates, external consulting groups, efficient equipment manufacturers, distributors and vendors, installation contractors, customer advocates, and other interested stakeholders. Each of the Company's DSM and BE products offers its own opportunities for stakeholder involvement and feedback. In addition, Public Service will continue to host quarterly DSM Roundtable Meetings as a forum for open dialogue and discussion.[6]

2024-2026 DSM & BE Plan

In this filing, Public Service forecasts annual electric, natural gas and beneficial electrification energy savings and budgets. As a combined DSM and BE plan, the Company's forecasted budgets, achievements, and participation for the Company's BE offerings are included in these forecasts and are included within their parent DSM product forecast throughout the Plan. Cumulative demand reduction impacts expected from the Company's demand response ("DR") programs and pilots and compliance with Commission-approved DR goals are discussed in the Demand Response Program section of the Plan. Table 1 below provides a summary of the budgets, energy savings forecasts, and demand savings associated with the Company's overall portfolio of energy efficiency and DR programming with BE incorporated.

Table 1: 2024-2026 DSM & BE Plan Budgets & Forecasted Energy and Demand Savings

	Budget	Demand Savings Forecast (Gen kW)	Energy Savings Forecast (Gen kWh or Dth)
2024 – Electric			
Energy Efficiency Programs	$ 84,096,543	95,937	443,079,583
Energy Efficiency Indirect Program	$ 7,695,700	-	-
Total 2024 Electric EE	**$ 91,792,243**	**95,937**	**443,079,583**
Demand Response Program	$ 20,794,937	425,261	2,941,548
Demand Response Indirect Program	$ 2,084,716	-	-
Demand Management Approved in Other Proceedings	$ 560,000	208,046	-
Total 2024 Electric DR	**$ 23,439,653**	**633,307**	**2,941,548**
2024 Electric TOTAL	**$ 115,231,896**	**729,245**	**446,021,131**
2024 – Natural Gas			
Energy Efficiency Programs	$ 20,047,501	0	814,198
Energy Efficiency Indirect Program	$ 2,307,539	0	0
Total 2024 Natural Gas EE	**$ 22,355,040**	**0**	**814,198**
2024 – Beneficial Electrification			
Beneficial Electrification Programs	$ 10,072,752	0	257,268
Beneficial Electrification Indirect Program	$ 1,305,837	0	0
Total 2024 Natural Gas BE	**$ 11,378,589**	**0**	**257,268**
2024 Natural Gas TOTAL	**$ 33,733,629**	**0**	**1,071,466**
2024 TOTAL	**$ 148,965,525**	**729,245 kW**	**446,021,131 kWh 1,071,466 Dth**

[6] The quarterly DSM Roundtable meetings have been held since the 2009/2010 Plan. The meetings offer a chance for interested stakeholders to review and discuss DSM achievements and any programmatic changes with the Company.

2025 – Electric				
Energy Efficiency Programs	$	85,147,454	97,393	441,340,449
Energy Efficiency Indirect Program	$	7,887,743	-	-
Total 2025 Electric EE	**$**	**93,035,197**	**97,393**	**441,340,449**
Demand Response Program	$	21,898,262	446,219	3,274,646
Demand Response Indirect Program	$	2,081,678	-	-
Demand Management Approved in Other Proceedings	$	560,000	210,801	-
Total 2025 Electric DR	**$**	**24,539,939**	**657,020**	**3,274,646**
2025 Electric TOTAL	**$**	**117,575,136**	**754,413**	**444,615,094**
2025 – Natural Gas				
Energy Efficiency Programs	$	20,137,702	0	863,763
Energy Efficiency Indirect Program	$	2,221,189	0	0
Total 2025 Natural Gas EE	**$**	**22,358,890**	**0**	**863,763**
2025 – Beneficial Electrification				
Beneficial Electrification Programs	$	22,134,199	0	622,073
Beneficial Electrification Indirect Program	$	2,062,971	0	0
Total 2025 Natural Gas BE	**$**	**24,197,170**	**0**	**622,073**
2025 Natural Gas TOTAL	**$**	**46,556,060**	**0**	**1,485,836**
2025 TOTAL	**$**	**164,131,197**	**754,413 kW**	**444,615,094 kWh 1,485,836 Dth**
2026 – Electric				
Energy Efficiency Programs	$	85,333,144	99,849	445,248,567
Energy Efficiency Indirect Program	$	8,214,729	-	-
Total 2026 Electric EE	**$**	**93,547,872**	**99,849**	**445,248,567**
Demand Response Program	$	22,463,564	469,898	3,687,744
Demand Response Indirect Program	$	1,961,178	-	-
Demand Management Approved in Other Proceedings	$	560,000	212,699	-
Total 2026 Electric DR	**$**	**24,984,742**	**682,598**	**3,687,744**
2026 Electric TOTAL	**$**	**118,532,614**	**782,447**	**448,936,311**
2026 – Natural Gas				
Energy Efficiency Programs	$	20,156,921	0	903,118
Energy Efficiency Indirect Program	$	2,403,651	0	0
Total 2026 Natural Gas EE	**$**	**22,560,572**	**0**	**903,118**
2026 – Beneficial Electrification				
Beneficial Electrification Programs	$	41,590,656	0	1,179,077
Beneficial Electrification Indirect Program	$	2,337,009	0	0
Total 2026 Natural Gas BE	**$**	**43,927,664**	**0**	**1,179,077**
2026 Natural Gas TOTAL	**$**	**66,488,236**	**0**	**2,082,194**
2026 TOTAL	**$**	**185,020,850**	**782,447 kW**	**448,936,311 kWh 2,082,194 Dth**

Modifications in 2024-2026

While many of the DSM products included in the Plan are the same as those that have been implemented since 2009, products have naturally evolved since that time to improve cost-effectiveness, adapt to the marketplace, and incorporate increasing policy interest in BE. The evolution of products has been documented through previous DSM plans, as well as through the 60-Day Notice process first established in the 2009/2010 Plan Stipulation approved in Proceeding No. 08A-366EG, to afford the Company discretion to make mid-year changes to DSM plans to achieve the greatest level of energy savings.[7]

This year's Plan also reflects several additional noteworthy changes, including:

[7] Decision No. R08-1243. Per the Settlement Agreement, 60-/90-Day Notices are required for any proposal to add a new DSM product, reduce rebate levels, adopt new or discontinue existing measures, or change technical assumptions or eligibility requirements. Details of 60-Day Notices are posted at: https://www.xcelenergy.com/company/rates_and_regulations/filings/colorado_demand-side_management.

- Updated avoided costs and technical assumptions to reflect current data including use of EnCompass modeling for the avoided cost of energy.
- Modifications to its New Construction offering to include BE technologies.
- Modifications to its Lighting Efficiency offering to comply with Federal and State legislation.
- Modifications to its Commercial Rooftop Air Conditioning Units offering to include BE measures.
- Modifications to its New Construction offering to solely offer rebates on all-electric homes and the addition of a program to the Company's IQ portfolio.
- The phasing out or reduction of several electric and natural gas rebates and incentives.
- The addition of several new offerings, including to the following products:
    - All-Electric Affordable New Home Construction (pilot)
    - Heat Savers Mode – Product Development (pilot)
    - IQ Home Energy Squad
    - Tiered Geographic Prequalification program

Lastly, the Company further notes that SB 21-246 established several labor standards with respect to its BE offerings. Notably, the bill applies to "all necessary mechanical, plumbing, and electrical work performed in connection with a project undertaken pursuant to a beneficial electrification program … and for which a customer of an investor-owned electric utility applies for a rebate directly from the utility." The statute directs the Company to obtain (from the Colorado Department of Labor and Industry) and publish a Certified Contractor List. Public Service is aware of these provisions and will implement them as appropriate. More information will be made available on its DSM website at: https://www.xcelenergy.com/company/rates_and_regulations/filings/colorado_demand-side_management.

2024-2026 Energy and Demand Savings Forecasts by Program

Public Service continues to offer a full portfolio of electric and natural gas DSM and BE products and offerings that serve all customer segments. Public Service will market its energy efficiency and BE offerings to each customer segment based on the number of customers, relative size of each customer, and amount of conservation potential at a customer site.

The energy and demand savings forecasts and budgets for these programs are summarized below.

Business Electric and Gas Programs

Energy efficiency sales to the Business Programs are achieved through Public Service's Account Managers, end-use equipment vendors, and energy service companies ("ESCos"), as well as our Business Solutions Center. Proposed forecasts and budgets for the Business Program for 2024-2026 are:

	2024			2025			2026		
	Business Electric Program	**Business Natural Gas Program**	**Business Beneficial Electrification**	**Business Electric Program**	**Business Natural Gas Program**	**Business Beneficial Electrification**	**Business Electric Program**	**Business Natural Gas Program**	**Business Beneficial Electrification**
Budget	$49,934,844	$1,627,672	$1,990,124	$47,557,263	$1,579,121	$4,735,410	$43,836,097	$1,026,957	$9,774,235
Savings	63,480 Net Gen kW 319.8 Net Gen GWh	161,264 Dth	72,519 Dth	61,495 Net Gen kW 308.0 Net Gen GWh	146,975 Dth	160,311 Dth	58,969 Net Gen kW 296.0 Net Gen GWh	113,650 Dth	282,832 Dth

Although economies of scale enable the business segment to offer a comparably lower cost of DSM per unit of energy saved, business DSM has proven to be some of the most difficult savings to achieve over time. This is the case because business customers tend to require very short paybacks on investments and do not readily respond to traditional mass-market appeals. Further, on the natural gas side, most large customers, who present some of the largest energy efficiency potential, are gas transport customers who will neither pay into the Demand-Side Management Cost Adjustment ("DSMCA"), nor be eligible to participate in energy efficiency program offerings.[8]

Residential Electric and Gas Programs

Public Service has 1.3 million electric and 1.4 million natural gas customers in its residential market in Colorado.[9] The Residential Program includes single-family homes, town homes, apartments, and condominiums. Public Service developed its Plan to recognize that the residential market requires choices of conservation opportunities that accommodate various lifestyles, convenient participation, and information to make wise energy choices presented in useable and understandable forms and formats. The energy savings and demand forecasts and budgets for the Residential Program in 2024-2026 are:

	2024			2025			2026		
	Residential Electric Program	**Residential Natural Gas Program**	**Residential Beneficial Electrification**	**Residential Electric Program**	**Residential Natural Gas Program**	**Residential Beneficial Electrification**	**Residential Electric Program**	**Residential Natural Gas Program**	**Residential Beneficial Electrification**
Budget	$25,523,707	$10,488,837	$3,604,469	$27,837,510	$9,707,872	$10,885,935	$30,264,213	$10,069,612	$21,734,324
Savings	27,281 Net Gen kW 85.7 Net Gen GWh	534,480 Dth	161,862 Dth	30,427 Net Gen kW 94.7 Net Gen GWh	581,007 Dth	427,806 Dth	35,061 Net Gen kW 109.6 Net Gen GWh	650,926 Dth	841,916 Dth

[8] Consistent with the Commission's determination in Decision C23-0413, gas transport customers who receive retail electric service from the Company will be eligible to participate in Beneficial Electrification program offerings.

[9] Electric and natural gas customers as of January 2023.

Income Qualified ("IQ") Electric and Gas Programs

The primary objective of the IQ Program is to reduce energy consumption in IQ customers' homes and thereby reduce customer bills. The energy savings and demand forecasts and budgets for the IQ Program in 2024-2026 are:

	2024			2025			2026		
	IQ Electric Program	IQ Natural Gas Program	IQ Beneficial Electrification	IQ Electric Program	IQ Natural Gas Program	IQ Beneficial Electrification	IQ Electric Program	IQ Natural Gas Program	IQ Beneficial Electrification
Budget	$8,637,992	$7,930,992	$4,478,159	$9,752,681	$8,850,708	$6,512,853	$11,232,834	$9,060,352	$10,082,096
Savings	5,176 Net Gen kW 37.5 Net Gen GWh	118,455 Dth	22,887 Dth	5,470 Net Gen kW 38.6 Net Gen GWh	135,781 Dth	33,956 Dth	5,819 Net Gen kW 39.7 Net Gen GWh	138,541 Dth	54,329 Dth

Indirect Products and Services

The Company's Indirect Products and Services, for the most part, support the direct products in the DSM & BE portfolio. The Education/Market Transformation area includes seven customer-facing products for providing education, training, and product demonstration, and marketing DSM rebates and incentives. The Planning and Research area includes four services to support the DSM portfolio: Planning and Administration; Program Evaluation, Measurement, and Verification; Market Research; and Product Development. The Indirect Products and Services do not have savings forecasts. Proposed budgets for Indirect Products and Services in 2024-2026 are:

	2024			2025			2026		
	Indirect Electric Program	Indirect Natural Gas Program	Indirect Beneficial Electrification	Indirect Electric Program	Indirect Natural Gas Program	Indirect Beneficial Electrification	Indirect Electric Program	Indirect Natural Gas Program	Indirect Beneficial Electrification
Budget	$7,695,700	$2,307,539	$1,305,837	$7,887,743	$2,221,189	$2,062,971	$8,214,729	$2,403,651	$2,337,009

Market Transformation and Customer Education

In this Plan, Public Service is continuing to place increasing emphasis on programs and services that help to redefine the energy efficiency and beneficial electrification marketplace through market transformation and customer education. In the Company's experience, market transformation and customer education remain some of the lowest cost ways to influence customer decisions and behaviors for the long term.

Public Service defines market transformation as a strategy for influencing the adoption of new techniques or technologies by consumers. The objective is to overcome barriers within a market through coordinating tactics such as education, training, product demonstration, and marketing, often conducted in concert with rebates or other financial incentives.

Activities for which the Company will not attempt to measure savings have an assumed Modified Total Resource Cost ("mTRC") ratio of 1.0.[10]

[10] The mTRC test measures the net costs of a demand-side management program as a resource option based on the total costs of the program, including both the participants' and the utility's costs. The presumed mTRC of 1.0 for indirect market transformation programs was approved by the Commission in Decision No. C08-0560 at ¶ 141 (mailed June 5, 2008) and reaffirmed in Proceeding No. 10A-554EG by Decision No. C11-0442 at 39-40, ¶ 99 (mailed April 26, 2011).

Pilot Products

In Proceeding No. 07A-420E, the Commission distinguished pilots from existing or continuing DSM products. These would be products that are testing unproven delivery methods, markets, or technologies; and for any of these reasons, pilot products may not necessarily achieve an mTRC ratio equal to or greater than 1.0. For market transformation programs, such as pilots, for which the Company intends to claim savings to count against energy savings or demand reduction goals, the Commission requires detail on how the measurement and verification of such savings will be accomplished, and how those efforts are linked to credit for savings.[11]

Public Service plans to offer two pilots in 2024-2026 that are fully described within the Plan. These pilots include:

- All Electric Affordable New Home Construction
- Heat Savers Mode – Product Development

Public Service plans to evaluate and seek stakeholder feedback on the design of two pilots in 2024-2026. These pilots include:

- Residential Peak Time Rebate
- Commercial Battery Pay for Performance

Competitive Acquisition of DSM Resources: Third-Party Providers

As a result of the Commission's order in Proceeding No. 10A-554EG, Public Service is required to identify the specific products that are open to competitive bidding for implementation.[12] Additionally, Public Service is to set forth the specific criteria by which these bids will be evaluated.[13] Public Service evaluates all bids in two phases, the Pre-qualification phase and the Bid Evaluation phase. The Pre-qualification phase ensures that request for proposal ("RFP") respondents meet minimum requirements to conduct business on the Company's behalf. Respondents are evaluated on safety, financial health, terms and conditions adoption, and prior experience. These are also factors in the Bid Evaluation phase but have lower weightings due to the initial evaluation. This helps to ensure business risk to the Company is as low as possible.

The Bid Evaluation phase is based upon up to eight factors and is the phase where the risk of the supplier performing is weighed against the cost to perform. These factors and their weighting are detailed below. Weighting may be adjusted based on specific business needs.

[11] Decision No. C11-0442 at 39-40, ¶ 99 (mailed April 26, 2011).
[12] Decision No. C11-0442.
[13] *Id.* at 32-33, ¶ 81.

Table 2a: Bid Evaluation Factors and Weighting

Evaluation Factors	Explanation	Weighting
Cost	• Cost transparency • Total cost of ownership • Bid amount	45% - 65%
Ability To Perform	• Prior experience • Feasible plan • Quality of project team • Ability to meet schedule	30% - 50%
Safety	• Historical safety record	5% - 15%
Terms & Conditions	• Adherence to Xcel Energy standards	5% - 10%
Financial Health	• Pre-qualifier in RFP.	Pre-qual only
Diversity	• Firm's commitment to diversity and inclusion.	0% - 15%
Green Business Practices	• Firm's commitment to environmental sustainability.	0% - 15%
Project Specific Needs	• Dependent on project. *Examples:* field presence in jurisdiction, expertise with specific market segment, unique or proprietary software, etc.	0% - 15%

The table below identifies all products that utilize a third-party service and further identifies when which of these products may have new contracts bid or be sole-sourced. Contracts may be sole-sourced for a variety of reasons, such as the contracted party having unique access to market players or proprietary tools that another firm would not have. Public Service tracks and reports within its Annual DSM & BE Status Reports the administrative costs that are incurred when conducting RFPs and any additional costs for managing third-party providers, as required in Decision No. C11-0645.[14]

In compliance with the Commission's directives in Proceeding No. 22A-0315EG,[15] the Company is implementing changes to its RFP processes for products with third-party implementers. Public Service will provide blind evaluation or third-party independent evaluator oversight of bids to determine qualification of vendors. Public Service will also create a publicly accessible website through which procurements of third-party services are managed, third parties are notified of open opportunities, the schedule and requirements are communicated, and evaluation criteria for submitted bids are provided. Public Service will also issue an RFP prior to filing a multi-year DSM or BE plan to increase the role of third-party partnerships in implemented the business program.

[14] Proceeding No. 10A-554EG, Decision No. C11-0645 at 6-7, ¶ 14 (mailed April 26, 2011).
[15] Decision No. C23-0381 at 25-26, ¶¶ 78-80 (mailed June 8, 2023).

Table 2b: 2024-2026 Products with Third-Party Servicers

Product	Service Type	Sourcing Event Anticipated*	Contract Type (existing)
All-Electric Affordable New Home Construction	Program implementation Training facilitation Measurement & Verification support Promotion support	2024	N/A; new program in this plan. Will be jointly bid with Residential New Home Construction.
Business Education	Energy resources staffing vendor (event brand ambassadors)	2024	Competitive Bid (2021)
Business Energy Assessments	Program implementation - Building Assessment & Targeted Building Assessment	2026	Sole-Sourced (2023)[16]
	Program implementation - Commercial Streamlined Assessment	2024	Sole-Sourced (2023)
Business HVAC+R Systems	Program implementation - Midstream Cooling Vendor	2024	Sole-Sourced (2022)
	Engineering staff augmentation[17]	2027	Sole-Sourced (2023)
	Measurement & Verification support[18]	2024	Sole-Sourced (2023)
Compressed Air	Engineering staff augmentation	2027	Sole-Sourced (2023)
	Measurement & Verification support	2024	Sole-Sourced (2023)
Consumer Education	Energy Resources staffing vendor (event brand ambassadors)	2024	Competitive Bid (2021)
Custom Efficiency	Engineering staff augmentation[17]	2027	Sole-Sourced 2023
	Measurement & Verification support[18]	2024	Sole-Sourced (2023)
Data Center Efficiency	New Construction	2026	Sole-Sourced (2023)
	Engineering staff augmentation[17]	2027	Sole-Sourced (2023)
	Measurement & Verification support[18]	2024	Sole-Sourced (2023)

[16] Includes up to 5 vendors providing program implementation services.
[17] Business Portfolio-level contract for engineering staff augmentation.
[18] Business and Residential Portfolio-level contract for measurement & verification.

Energy Management Systems	Engineering staff augmentation[17]	2027	Sole-Sourced (2023)
	Measurement & Verification support[18]	2024	Sole-Sourced (2023)
Energy Management Systems (Empower Intelligence)	Remote Commissioning	2024	Sole-Sourced (2023)
Energy Efficient Showerhead	Product packaging and distribution	2026	Sole-Sourced (2020)
	eCommerce Platform	2026	Sole-Sourced 2023
Energy Savings Kit	Product packaging and distribution	2026	Competitive Bid (2023)
Home Energy Audits	Program Implementation	2025	Competitive Bid (2023)
Home Energy Insights	Program Implementation	2024	Competitive Bid (2019)
Home Energy Squad	Program Implementation	2025	Competitive Bid (2023)
Home Lighting & Recycling	Measurement & Verification support[18]	2024	Sole-Sourced (2023)
	eCommerce Platform	2026	Sole-Sourced 2023
	Program Implementation	2026	Sole-Sourced (2023)
Insulation & Air Sealing	Measurement & Verification support[18]	2024	Sole-Sourced (2023)
Lighting Efficiency	Program implemented and administrated including managing the network distributors that are part of the midstream network	2024	Sole-Sourced (2021)
	Program support for the Colorado account manager team	2024	Sole-Sourced (2022)
	Engineering staff augmentation[17]	2027	Sole-Sourced (2023)
	Measurement & Verification support[18]	2024	Sole-Sourced (2023)
Multi-Family Buildings Efficiency	Program Implementation and marketing support	2024	Competitive Bid (2023)
Multifamily Weatherization	Program Implementation and partnership, Measurement & Verification support	2026	Sole-Sourced (2023)

New Construction	Program Implementation- Energy Design Assistance[19]	2024	Competitive Bid (2015)
	Program Implementation - Energy Efficient Buildings	2024	Competitive Bid (2018)
	Measurement & Verification support[18]	2024	Sole-Sourced (2023)
Non-Profit	Program Implementation and partnership, M&V	2026	Sole-Sourced (2023)
Partners in Energy	Program Implementation and marketing support	2024	Competitive Bid (2022)
Refrigerator & Freezer Recycling	Program Implementation	2026	Sole-Sourced (2023)
	Measurement & Verification support[18]	2024	Sole-Sourced (2023)
Residential Battery Demand Response	Battery Dispatch Software	2024	Competitive Bid (2019)
	Evaluation, Measurement and Verification services	2026	Competitive Bid (2019)
Residential Demand Response (Saver's Switch & AC Rewards)	Software services	2024	Sole-Sourced (2020)
	Equipment Installation	2027	Competitive Bid (2021)
	Load control equipment	2024	Competitive Bid (2022)
	Measurement & Verification support	2024	Competitive Bid (2022)
Residential Demand Response (Smart Water Heaters)	Load control equipment	2024	Sole-Sourced (2021)
Residential Heating and Cooling	Midstream Vendor for Program Implementation	2024	N/A
	Laboratory & Field Heat Pump Equipment Study	Study ends in 2024	Sole-Sourced (2021)
	Measurement & Verification support[18]	2024	Sole-Sourced (2023)
	Measurement & Verification Heat Pumps	2026	Sole-Sourced (2023)
	Customer facing contractor database maintenance	2026	Sole-Sourced (2023)
	eCommerce Platform	2026	Sole-Sourced (2023)
Residential New Homes Construction	Program implementation, Training facilitation, Measurement & Verification support, Promotion support	2024	Competitive Bid (2020)

[19] The EDA implementer process offers an open pathway for energy modeling candidates aligned with the Settlement Agreement (Proceeding No. 22A-0315EG) to apply to become an approved Xcel Energy EDA Provider.

School Education Kits	Product packaging and distribution	2025	Sole-Sourced (2023)
Single-Family Weatherization	Program Implementation and partnership, Measurement & Verification support	2026	Sole-Sourced (2023)
Small Business Solutions	Program Implementation and partnership	2024	Sole-Sourced (2020)
	Engineering staff augmentation[17]	2027	Sole-Sourced (2023)
	Measurement & Verification support[18]	2024	Sole-Sourced (2023)
Small Commercial Building Controls	Software services	2024	Sole-Sourced (2020)
	Equipment Installation	2027	Competitive Bid (2021)
	Load control equipment	2024	Sole-Sourced (2020)
Strategic Energy Management	Program Implementation	2026	Competitive Bid (2023)
	Engineering staff augmentation[17]	2027	Sole-Sourced (2023)
	Measurement & Verification support[18]	2024	Sole-Sourced (2023)
Whole Home Efficiency	Advisory Services and Measurement & Verification support	2025	Competitive Bid (2023)

*Note: Dates reflect current estimates and are subject to change. Sourcing event may be conducted in anticipation of Commission approval of the 2024-2026 DSM & BE Plan; any awarded contracts will be modified or voided as needed to reflect the terms of the final approved Plan.

History of The Company's DSM and BE Activity in Colorado

Over the last 20 years, Public Service has entered into several regulatory settlements involving DSM in conjunction with its integrated resource/least-cost planning process. The following table identifies those significant to its DSM programming:

Table 3a: Regulatory Settlements Involving DSM and Resource Planning

Proceeding	Proceeding No.	Decision No.	Summary
1999 Integrated Resource Plan	00A-008E	C00-1057	• 124 MW (~21 MW) of DSM resources • $75 million
2003 Least Cost Resource Plan	04A-214E	C05-0049	• 320 MW (Avg. of 40 MW per year) • 800 GWh (Avg. of 100 GWh per year) • $196 million • 2006 – 2013
2008 CPCN at Fort St. Vrain Generation Station	07A-469E	C08-0369	• Expansion of ISOC and Saver's Switch programs • Initiation of Third-Party Demand Response Program
2011 Electric Resource Plan	11A-869E	C13-0094 & C13-0323	• Informed the methodologies and values for avoided costs

In addition, legislation and the regularly filed Strategic Issues proceedings at the Public Utilities Commission have addressed major policy issues for the Company's DSM and BE programs. The following table identifies the applicable legislation and proceedings:

Table 3b: Legislative and Regulatory Policy Directives for DSM

Proceeding	Proceeding No.	Decision No.	Summary
House Bill 07-1037	N/A	N/A	• Established intent of DSM programs • Established ten-year goals for energy and demand
2010 Strategic Issues	10A-554EG	C11-0442	• Established energy and demand savings goals • Established incentive mechanism • Defined program administration requirements

Proceeding	Proceeding No.	Decision No.	Summary
2013 Strategic Issues	13A-0686EG	C14-0731	• Increased energy and demand savings goals • Modified the incentive mechanism • Established budget cap
House Bill 17-1227	N/A	N/A	• Extended energy and demand savings goals though 2028
2017 Strategic Issues	17A-0462EG	C18-0417	• Increased energy savings goals and budget • Modified incentive mechanism • Grandfathering of ISOC customers
Senate Bill 19-236	N/A	N/A	• Established the valuation and application of the Social Cost of Carbon for Electric DSM
Senate Bill 21-246	N/A	N/A	• Established intent of BE programs • Established regulatory process to develop BE goals
Senate Bill 21-1238	N/A	N/A	• Established the valuation and application of the Social Cost of Carbon and the Social Cost of Methane for Gas DSM
Winter Storm Uri	21A-0192EG	C22-0512	• Required evaluation of economic-based and winter-specific Demand Response programs

Proceeding	Proceeding No.	Decision No.	Summary
2022 Strategic Issues	22A-0309EG	C23-0413 C23-0523	• Established energy savings goals and budgets • Established seasonal demand response goals • Ordered the development of additional advanced meter technology opportunities to fully optimize the grid infrastructure • Required the phase-out of certain appliances for non-IQ customers • Established IQ/DI budget spending percentages • Required non-IQ offerings in DI communities • Required an all-electric new construction project for affordable housing • Required reassessment of a demand response performance incentive mechanism • Required IRA cost-effectiveness analysis
House Bill 23-1161	N/A	N/A	• Established environmental standards for certain lighting products

The following Figures 1 and 2 below show Public Service's electric and natural gas savings and expenditures over the past 22 and 17 years, respectively.

Figure 1: Historical Electric Program Savings and Expenditures

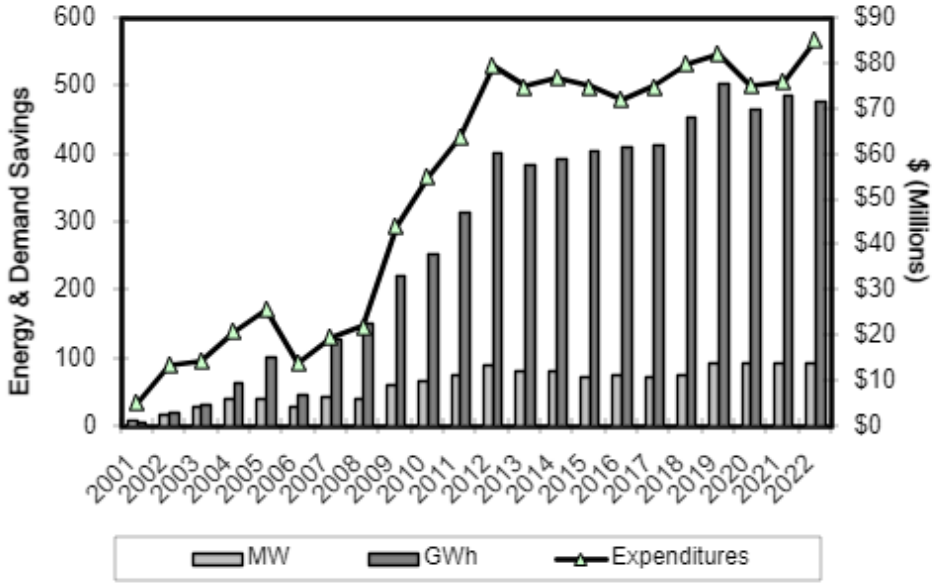
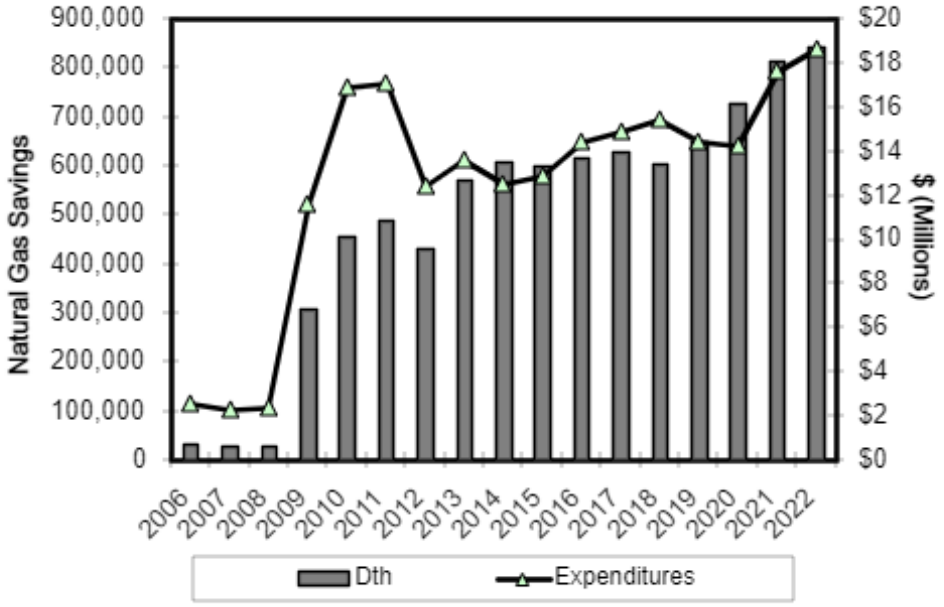


Figure 2: Historical Natural Gas Program Savings and Expenditures



Executive Summary: Electric DSM Tables

The following tables summarize the forecasted impacts of the Company's proposed electric DSM portfolio for 2024-2026, including anticipated expenditures, demand savings, energy savings, greenhouse gas emission estimates, mTRC test ratios, and costs by budget category.

Table 4a: Public Service's 2024 Electric DSM Budgets and Forecasts

2024	Electric Budget	Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Business Program						
Business Energy Assessments	$4,425,009	3,579	30,029,905	50,390	$7,896,230	1.60
Business HVAC+R Systems	$6,290,570	6,394	24,561,824	42,957	$15,893,248	2.10
Compressed Air Efficiency	$767,879	605	4,643,831	8,433	$2,086,985	2.30
Custom Efficiency	$521,768	412	2,012,911	3,555	$1,420,139	1.29
Data Center Efficiency	$1,165,109	1,636	10,072,929	19,380	$5,906,648	2.65
Energy Management Systems	$1,158,986	585	7,121,056	12,887	$731,191	1.21
LED Street Lighting	$0	0	1,322,140	2,853	$309,991	1.99
Lighting Efficiency	$12,284,445	14,768	81,010,367	139,816	$38,857,275	2.22
New Construction	$8,887,323	18,080	63,605,397	118,399	$100,785,221	4.03
Self Direct	$466,372	996	4,452,909	7,769	$1,765,757	1.64
Small Business Energy Solutions	$5,446,401	5,064	23,938,150	36,381	$9,718,599	1.85
Strategic Energy Management	$7,932,517	11,362	67,059,160	104,457	$30,969,911	2.54
General Advertising-Bus	$588,467					
Business Program Total	**$49,934,844**	**63,480**	**319,830,586**	**547,276**	**$215,752,728**	**2.53**
Residential Program						
Energy Efficient Showerhead	$152,187	96	1,189,102	1,804	$1,004,618	6.85
Home Energy Insights	$4,094,789	12,581	37,059,860	49,544	$11,052,236	3.70
Home Energy Squad	$4,800,374	1,285	8,131,378	14,030	$406,572	1.07
Home Lighting & Recycling	$1,591,110	391	5,807,282	10,178	$1,139,264	1.49
Insulation & Air Sealing	$734,626	832	1,033,459	1,997	-$509,310	0.86
Multi-Family Buildings Efficiency	$2,193,071	1,066	6,961,395	13,119	$2,381,808	1.50
Refrigerator & Freezer Recycling	$1,339,989	269	3,425,446	5,414	$280,820	1.21
Residential Heating & Cooling	$3,779,222	7,332	6,970,206	11,226	$8,791,814	1.53
Residential New Home Construction	$2,976,988	2,060	4,698,153	9,606	$5,277,265	1.72
School Education Kits	$2,753,654	1,301	9,751,384	17,897	$4,809,920	2.09
Whole Home Efficiency	$227,430	67	707,234	1,355	-$165,908	0.78
General Advertising-Res	$880,267			N/A		
Residential Program Total	**$25,523,707**	**27,281**	**85,734,899**	**136,169**	**$33,588,833**	**1.65**
Income Qualified Program						
All-Electric Affordable New Home Construction	$203,499	0	0	N/A	-$203,499	N/A
Energy Savings Kit	$417,648	224	2,528,633	4,310	$1,227,525	3.15
Income Qualified Home Energy Squad	$1,098,049	151	883,378	1,533	-$282,471	0.76
Multifamily Weatherization	$913,329	386	2,230,925	4,289	-$512,787	0.84
Non-Profit	$627,139	407	1,640,236	3,149	$389,723	1.20
Single-Family Weatherization	$3,282,187	2,097	15,228,529	31,140	$11,079,787	2.97
Tiered Geographic Prequalification	$2,096,140	1,911	15,002,399	30,724	$10,932,043	3.85
Income Qualified Program Total	**$8,637,992**	**5,176**	**37,514,099**	**75,146**	**$22,630,321**	**2.37**
Indirect Products & Services						
Education/Market Transformation						
Business Education	$186,341	0	0	0	$0	
Business Energy Analysis	$728,857	0	0	0	$0	
Community Energy Reporting	$37,052	0	0	0	$0	
Consumer Education	$1,074,955	0	0	0	$0	
Energy Benchmarking	$158,777	0	0	0	$0	
Home Energy Audit	$599,959	0	0	0	$0	
Partners in Energy	$1,472,060	0	0	0	$0	
Education/Market Transformation Total	**$4,258,003**	**0**	**0**	**0**	**$0**	
Planning and Research						
EE Market Research	$650,818	0	0	0	$0	
EE Evaluation, Measurement & Verification	$1,215,568	0	0	0	$0	
EE Planning & Administration	$646,298	0	0	0	$0	
EE Product Development	$925,014	0	0	0	$0	
EE Product Development Total	**$925,014**	**0**	**0**	**0**	**$0**	
EE Planning and Research Total	**$3,437,698**	**0**	**0**	**0**	**$0**	
EE Indirect Products & Services Total	**$7,695,700**	**0**	**0**	**0**	**$0**	
EE PORTFOLIO TOTAL	**$91,792,243**	**95,937**	**443,079,583**	**758,590**	**$264,964,766**	**2.22**

Table 4b: Public Service's 2024 Electric DSM Costs by Category

2024	Program Planning & Design	Administration & Program Delivery	Advertising & Promotion	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Business Program							
Business Energy Assessments	$ -	$ 1,483,264	$ 3,434	$ 2,938,311	$ -	$ -	$ 4,425,009
Business HVAC+R Systems	$ -	$ 1,641,313	$ 95,361	$ 4,488,834	$ -	$ 65,061	$ 6,290,570
Compressed Air Efficiency	$ -	$ 215,028	$ 54,000	$ 471,851	$ -	$ 27,000	$ 767,879
Custom Efficiency	$ -	$ 288,094	$ 54,117	$ 176,429	$ -	$ 3,128	$ 521,768
Data Center Efficiency	$ -	$ 222,728	$ 25,000	$ 902,381	$ -	$ 15,000	$ 1,165,109
Energy Management Systems	$ -	$ 850,799	$ 10,900	$ 297,287	$ -	$ -	$ 1,158,986
LED Street Lighting	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Lighting Efficiency	$ -	$ 3,512,973	$ 299,873	$ 8,457,254	$ -	$ 14,344	$ 12,284,445
New Construction	$ -	$ 3,727,728	$ 2,904	$ 4,687,914	$ -	$ 468,777	$ 8,887,323
Self Direct	$ -	$ 66,372	$ -	$ 400,000	$ -	$ -	$ 466,372
Small Business Solutions	$ -	$ 1,043,659	$ 19,763	$ 4,348,393	$ -	$ 34,585	$ 5,446,401
Strategic Energy Management	$ -	$ 1,881,437	$ 34,291	$ 5,536,800	$ -	$ 479,990	$ 7,932,517
General Advertising-Bus	$ -	$ 89,807	$ 498,659	$ -	$ -	$ -	$ 588,467
Business Program Total	**$ -**	**$ 15,023,203**	**$ 1,098,301**	**$ 32,705,454**	**$ -**	**$ 1,107,886**	**$ 49,934,844**
Residential Program							
Energy Efficient Showerhead	$ -	$ 73,194	$ 60,000	$ 18,993	$ -	$ -	$ 152,187
Home Energy Insights	$ -	$ 4,011,258	$ 63,532	$ -	$ -	$ 20,000	$ 4,094,789
Home Energy Squad	$ -	$ 1,533,916	$ 275,000	$ 1,021,749	$ 1,969,708	$ -	$ 4,800,374
Home Lighting & Recycling	$ -	$ 798,569	$ 126,000	$ 663,541	$ -	$ 3,000	$ 1,591,110
Insulation & Air Sealing	$ -	$ 45,331	$ -	$ 689,295	$ -	$ -	$ 734,626
Multi-Family Buildings Efficiency	$ -	$ 566,116	$ -	$ 1,626,955	$ -	$ -	$ 2,193,071
Refrigerator & Freezer Recycling	$ -	$ 1,024,989	$ 40,000	$ 265,000	$ -	$ 10,000	$ 1,339,989
Residential Heating & Cooling	$ -	$ 903,931	$ 70,880	$ 2,760,411	$ -	$ 44,000	$ 3,779,222
Residential New Home Construction	$ -	$ 245,056	$ 285,369	$ 2,446,564	$ -	$ -	$ 2,976,988
School Education Kits	$ -	$ 1,096,545	$ 5,000	$ 1,652,108	$ -	$ -	$ 2,753,654
Whole Home Efficiency	$ -	$ 64,100	$ 2,040	$ 144,967	$ -	$ 16,323	$ 227,430
General Advertising-Res	$ -	$ 73,500	$ 806,767	$ -	$ -	$ -	$ 880,267
Residential Program Total	**$ -**	**$ 10,436,505**	**$ 1,734,588**	**$ 11,289,582**	**$ 1,969,708**	**$ 93,323**	**$ 25,523,707**
Income Qualified Program							
All-Electric Affordable New Home	$ -	$ 78,499	$ 125,000	$ -	$ -	$ -	$ 203,499
Energy Savings Kit	$ -	$ 163,463	$ 100,000	$ 154,185	$ -	$ -	$ 417,648
Income Qualified Home Energy Squad	$ -	$ 354,778	$ 250,000	$ 232,470	$ 260,802	$ -	$ 1,098,049
Multifamily Weatherization	$ -	$ 168,619	$ 153,000	$ 561,110	$ -	$ 30,600	$ 913,329
Non-Profit	$ -	$ 178,692	$ 22,194	$ 383,298	$ -	$ 42,955	$ 627,139
Single-Family Weatherization	$ -	$ 173,787	$ 171,000	$ 2,802,401	$ -	$ 135,000	$ 3,282,187
Tiered Geographic Prequalification	$ -	$ 180,221	$ 257,970	$ 1,524,384	$ -	$ 133,565	$ 2,096,140
Income Qualified Program Total	**$ -**	**$ 1,298,058**	**$ 1,079,164**	**$ 5,657,847**	**$ 260,802**	**$ 342,121**	**$ 8,637,992**
Indirect Products & Services							
Education/Market Transformation							
Business Education	$ -	$ 57,784	$ 128,557	$ -	$ -	$ -	$ 186,341
Business Energy Analysis	$ -	$ 167,257	$ 19,200	$ 508,800	$ -	$ 33,600	$ 728,857
Community Energy Reporting	$ -	$ 37,052	$ -	$ -	$ -	$ -	$ 37,052
Consumer Education	$ -	$ 351,342	$ 723,614	$ -	$ -	$ -	$ 1,074,955
Energy Benchmarking	$ -	$ 158,777	$ -	$ -	$ -	$ -	$ 158,777
Home Energy Audit	$ -	$ 275,937	$ 36,842	$ 179,784	$ -	$ 107,395	$ 599,959
Partners in Energy	$ -	$ 1,458,582	$ 13,478	$ -	$ -	$ -	$ 1,472,060
Education/Market Transformation	**$ -**	**$ 2,506,732**	**$ 921,691**	**$ 688,584**	**$ -**	**$ 140,995**	**$ 4,258,003**
Planning and Research							
EE Market Research	$ -	$ 650,818	$ -	$ -	$ -	$ -	$ 650,818
EE Evaluation, Measurement & Verification	$ -	$ 133,952	$ -	$ -	$ -	$ 1,081,616	$ 1,215,568
EE Planning & Administration	$ -	$ 646,298	$ -	$ -	$ -	$ -	$ 646,298
EE Product Development	$ -	$ 860,479	$ -	$ -	$ -	$ 64,535	$ 925,014
EE Product Development Total	**$ -**	**$ 860,479**	**$ -**	**$ -**	**$ -**	**$ 64,535**	**$ 925,014**
EE Planning and Research Total	**$ -**	**$ 2,291,546**	**$ -**	**$ -**	**$ -**	**$ 1,146,151**	**$ 3,437,698**
EE Indirect Products & Services Total	**$ -**	**$ 4,798,278**	**$ 921,691**	**$ 688,584**	**$ -**	**$ 1,287,147**	**$ 7,695,700**
EE PORTFOLIO TOTAL	**$ -**	**$ 31,556,044**	**$ 4,833,744**	**$ 50,341,468**	**$ 2,230,510**	**$ 2,830,476**	**$ 91,792,243**

Table 4c: Public Service's 2025 Electric DSM Budgets and Forecasts

2025	Electric Budget	Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Business Program						
Business Energy Assessments	$3,948,925	3,579	30,029,905	38,349	$6,809,853	1.54
Business HVAC+R Systems	$7,562,948	8,209	30,897,894	41,350	$20,038,530	2.12
Compressed Air Efficiency	$894,611	734	5,654,420	7,980	$2,454,251	2.30
Custom Efficiency	$636,439	821	4,313,380	5,856	$3,308,344	1.33
Data Center Efficiency	$1,200,072	1,636	10,072,929	15,127	$5,601,021	2.55
Energy Management Systems	$1,293,437	770	7,689,676	10,793	$776,766	1.20
LED Street Lighting	$0	0	1,322,146	2,277	$265,668	1.85
Lighting Efficiency	$9,776,881	12,254	65,754,864	86,002	$30,772,245	2.34
New Construction	$8,215,317	16,909	59,682,599	86,177	$93,028,015	4.00
Self Direct	$468,363	996	4,452,909	5,948	$1,631,016	1.59
Small Business Energy Solutions	$5,051,772	3,935	18,264,621	20,612	$6,311,781	1.64
Strategic Energy Management	$8,028,116	11,652	69,902,960	83,877	$30,423,826	2.47
General Advertising-Bus	$480,381					
Business Program Total	**$47,557,263**	**61,495**	**308,038,303**	**404,348**	**$200,940,935**	**2.46**
Residential Program						
Energy Efficient Showerhead	$152,390	96	1,189,102	1,343	$959,401	6.58
Home Energy Insights	$4,167,511	12,895	38,707,204	48,776	$11,743,519	3.82
Home Energy Squad	$6,068,661	2,025	12,019,363	16,264	$1,506,936	1.20
Home Lighting & Recycling	$1,563,906	390	5,728,204	7,730	$951,393	1.42
Insulation & Air Sealing	$925,730	1,054	1,379,390	2,098	-$637,309	0.86
Multi-Family Buildings Efficiency	$2,190,170	1,066	6,961,395	10,217	$2,194,839	1.46
Refrigerator & Freezer Recycling	$1,401,253	297	3,782,848	4,450	$241,582	1.17
Residential Heating & Cooling	$4,964,684	9,541	11,108,046	15,507	$3,125,603	1.10
Residential New Home Construction	$2,723,862	1,681	3,277,173	4,929	$5,209,328	2.06
School Education Kits	$2,816,930	1,310	9,815,806	13,941	$4,499,634	2.00
Whole Home Efficiency	$232,077	72	711,913	1,070	-$190,839	0.76
General Advertising-Res	$630,337			N/A		
Residential Program Total	**$27,837,510**	**30,427**	**94,680,444**	**126,324**	**$28,973,750**	**1.43**
Income Qualified Program						
All-Electric Affordable New Home Construction	$203,904	0	0	N/A	-$203,904	N/A
Energy Savings Kit	$418,506	224	2,528,633	3,325	$1,146,891	3.00
Income Qualified Home Energy Squad	$1,996,251	349	1,973,307	2,641	-$258,134	0.88
Multifamily Weatherization	$918,826	433	2,172,571	3,266	-$898,808	0.77
Non-Profit	$685,872	432	1,662,413	2,494	$183,911	1.08
Single-Family Weatherization	$3,354,071	2,111	15,260,654	24,724	$10,627,948	2.84
Tiered Geographic Prequalification	$2,175,251	1,922	15,024,125	24,387	$10,449,447	3.63
Income Qualified Program Total	**$9,752,681**	**5,470**	**38,621,702**	**60,835**	**$21,047,352**	**2.12**
Indirect Products & Services						
Education/Market Transformation						
Business Education	$197,714	0	0	0	$0	
Business Energy Analysis	$730,741	0	0	0	$0	
Community Energy Reporting	$36,967	0	0	0	$0	
Consumer Education	$1,173,552	0	0	0	$0	
Energy Benchmarking	$190,573	0	0	0	$0	
Home Energy Audit	$722,658	0	0	0	$0	
Partners in Energy	$1,513,687	0	0	0	$0	
Education/Market Transformation Total	**$4,565,892**	**0**	**0**	**0**	**$0**	
Planning and Research						
EE Market Research	$496,770	0	0	0	$0	
EE Evaluation, Measurement & Verification	$1,208,879	0	0	0	$0	
EE Planning & Administration	$665,687	0	0	0	$0	
EE Product Development	$950,514	0	0	0	$0	
EE Product Development Total	**$950,514**	**0**	**0**	**0**	**$0**	
EE Planning and Research Total	**$3,321,851**	**0**	**0**	**0**	**$0**	
EE Indirect Products & Services Total	**$7,887,743**	**0**	**0**	**0**	**$0**	
EE PORTFOLIO TOTAL	**$93,035,197**	**97,393**	**441,340,449**	**591,508**	**$243,767,433**	**2.05**

Table 4d: Public Service's 2025 Electric DSM Costs by Category

2025	Program Planning & Design	Administration & Program Delivery	Advertising & Promotion	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Business Program							
Business Energy Assessments	$ -	$ 1,486,823	$ 3,434	$ 2,458,668	$ -	$ -	$ 3,948,925
Business HVAC+R Systems	$ -	$ 1,637,386	$ 94,192	$ 5,762,516	$ -	$ 68,854	$ 7,562,948
Compressed Air Efficiency	$ -	$ 230,659	$ 64,800	$ 566,752	$ -	$ 32,400	$ 894,611
Custom Efficiency	$ -	$ 211,373	$ 50,343	$ 371,813	$ -	$ 2,910	$ 636,439
Data Center Efficiency	$ -	$ 245,691	$ 32,500	$ 902,381	$ -	$ 19,500	$ 1,200,072
Energy Management Systems	$ -	$ 931,767	$ 11,490	$ 350,180	$ -	$ -	$ 1,293,437
LED Street Lighting	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Lighting Efficiency	$ -	$ 3,526,053	$ 112,168	$ 6,125,660	$ -	$ 13,000	$ 9,776,881
New Construction	$ -	$ 3,337,519	$ 2,744	$ 4,387,854	$ -	$ 487,201	$ 8,215,317
Self Direct	$ -	$ 68,363	$ -	$ 400,000	$ -	$ -	$ 468,363
Small Business Solutions	$ -	$ 1,029,283	$ 19,650	$ 3,968,451	$ -	$ 34,388	$ 5,051,772
Strategic Energy Management	$ -	$ 1,847,091	$ 33,181	$ 5,670,846	$ -	$ 476,998	$ 8,028,116
General Advertising-Bus	$ -	$ 75,512	$ 404,870	$ -	$ -	$ -	$ 480,381
Business Program Total	**$ -**	**$ 14,627,519**	**$ 829,371**	**$ 30,965,122**	**$ -**	**$ 1,135,250**	**$ 47,557,263**
Residential Program							
Energy Efficient Showerhead	$ -	$ 73,397	$ 60,000	$ 18,993	$ -	$ -	$ 152,390
Home Energy Insights	$ -	$ 4,037,511	$ 100,000	$ -	$ -	$ 30,000	$ 4,167,511
Home Energy Squad	$ -	$ 1,622,973	$ 275,000	$ 1,579,670	$ 2,591,018	$ -	$ 6,068,661
Home Lighting & Recycling	$ -	$ 767,973	$ 139,000	$ 653,933	$ -	$ 3,000	$ 1,563,906
Insulation & Air Sealing	$ -	$ 46,691	$ -	$ 879,039	$ -	$ -	$ 925,730
Multi-Family Buildings Efficiency	$ -	$ 569,659	$ -	$ 1,620,511	$ -	$ -	$ 2,190,170
Refrigerator & Freezer Recycling	$ -	$ 1,058,753	$ 40,000	$ 292,500	$ -	$ 10,000	$ 1,401,253
Residential Heating & Cooling	$ -	$ 707,152	$ 76,187	$ 4,149,819	$ -	$ 31,526	$ 4,964,684
Residential New Home Construction	$ -	$ 266,321	$ 244,525	$ 2,213,016	$ -	$ -	$ 2,723,862
School Education Kits	$ -	$ 1,148,903	$ 6,000	$ 1,662,028	$ -	$ -	$ 2,816,930
Whole Home Efficiency	$ -	$ 64,880	$ 2,043	$ 148,811	$ -	$ 16,343	$ 232,077
General Advertising-Res	$ -	$ 54,075	$ 576,262	$ -	$ -	$ -	$ 630,337
Residential Program Total	**$ -**	**$ 10,418,286**	**$ 1,519,018**	**$ 13,218,319**	**$ 2,591,018**	**$ 90,869**	**$ 27,837,510**
Income Qualified Program							
All-Electric Affordable New Home	$ -	$ 78,904	$ 125,000	$ -	$ -	$ -	$ 203,904
Energy Savings Kit	$ -	$ 164,323	$ 100,000	$ 154,183	$ -	$ -	$ 418,506
Income Qualified Home Energy Squad	$ -	$ 716,191	$ 245,000	$ 471,885	$ 563,175	$ -	$ 1,996,251
Multifamily Weatherization	$ -	$ 99,208	$ 19,807	$ 781,985	$ -	$ 17,826	$ 918,826
Non-Profit	$ -	$ 155,632	$ 18,894	$ 474,776	$ -	$ 36,570	$ 685,872
Single-Family Weatherization	$ -	$ 172,755	$ 168,387	$ 2,879,993	$ -	$ 132,937	$ 3,354,071
Tiered Geographic Prequalification	$ -	$ 167,822	$ 303,087	$ 1,581,082	$ -	$ 123,260	$ 2,175,251
Income Qualified Program Total	**$ -**	**$ 1,554,835**	**$ 980,175**	**$ 6,343,904**	**$ 563,175**	**$ 310,593**	**$ 9,752,681**
Indirect Products & Services							
Education/Market Transformation							
Business Education	$ -	$ 61,383	$ 136,331	$ -	$ -	$ -	$ 197,714
Business Energy Analysis	$ -	$ 163,096	$ 18,460	$ 516,880	$ -	$ 32,305	$ 730,741
Community Energy Reporting	$ -	$ 36,967	$ -	$ -	$ -	$ -	$ 36,967
Consumer Education	$ -	$ 366,584	$ 806,969	$ -	$ -	$ -	$ 1,173,552
Energy Benchmarking	$ -	$ 190,573	$ -	$ -	$ -	$ -	$ 190,573
Home Energy Audit	$ -	$ 359,169	$ 40,635	$ 176,259	$ -	$ 146,595	$ 722,658
Partners in Energy	$ -	$ 1,500,428	$ 13,259	$ -	$ -	$ -	$ 1,513,687
Education/Market Transformation	**$ -**	**$ 2,678,199**	**$ 1,015,654**	**$ 693,139**	**$ -**	**$ 178,900**	**$ 4,565,892**
Planning and Research							
EE Market Research	$ -	$ 496,770	$ -	$ -	$ -	$ -	$ 496,770
EE Evaluation, Measurement & Verification	$ -	$ 132,297	$ -	$ -	$ -	$ 1,076,583	$ 1,208,879
EE Planning & Administration	$ -	$ 665,687	$ -	$ -	$ -	$ -	$ 665,687
EE Product Development	$ -	$ 893,507	$ -	$ -	$ -	$ 57,007	$ 950,514
EE Product Development Total	**$ -**	**$ 893,507**	**$ -**	**$ -**	**$ -**	**$ 57,007**	**$ 950,514**
EE Planning and Research Total	**$ -**	**$ 2,188,260**	**$ -**	**$ -**	**$ -**	**$ 1,133,590**	**$ 3,321,851**
EE Indirect Products & Services Total	**$ -**	**$ 4,866,460**	**$ 1,015,654**	**$ 693,139**	**$ -**	**$ 1,312,490**	**$ 7,887,743**
EE PORTFOLIO TOTAL	**$ -**	**$ 31,467,100**	**$ 4,344,217**	**$ 51,220,484**	**$ 3,154,193**	**$ 2,849,202**	**$ 93,035,197**

Table 4e: Public Service's 2026 Electric DSM Budgets and Forecasts

2026	Electric Budget	Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Business Program						
Business Energy Assessments	$3,867,578	3,579	30,029,905	27,145	$5,724,451	1.46
Business HVAC+R Systems	$6,658,373	7,706	31,169,469	29,787	$17,615,873	1.97
Compressed Air Efficiency	$989,395	815	6,279,609	6,461	$2,532,461	2.19
Custom Efficiency	$429,622	412	2,012,911	1,960	$1,440,374	1.30
Data Center Efficiency	$1,065,342	1,500	8,970,397	9,980	$5,109,623	2.71
Energy Management Systems	$1,423,386	886	9,380,207	9,343	$497,639	1.11
LED Street Lighting	$0	0	1,322,146	1,727	$220,280	1.70
Lighting Efficiency	$7,768,340	10,290	52,370,951	46,511	$24,034,246	2.54
New Construction	$7,895,190	16,326	57,375,958	60,400	$89,512,790	4.01
Self Direct	$470,414	996	4,452,909	4,255	$1,499,139	1.54
Small Business Energy Solutions	$5,023,429	3,853	17,677,202	13,732	$5,513,903	1.53
Strategic Energy Management	$7,794,671	12,606	74,911,364	63,701	$31,668,986	2.48
General Advertising-Bus	$450,357					
Business Program Total	**$43,836,097**	**58,969**	**295,953,027**	**275,003**	**$184,919,408**	**2.47**
Residential Program						
Energy Efficient Showerhead	$157,631	122	1,504,213	1,153	$1,185,639	7.50
Home Energy Insights	$4,477,603	13,702	43,099,020	27,796	$10,626,135	3.37
Home Energy Squad	$5,030,029	2,066	12,561,090	12,260	$2,337,931	1.36
Home Lighting & Recycling	$1,557,455	390	5,678,832	5,477	$749,248	1.33
Insulation & Air Sealing	$1,327,624	1,528	2,041,038	2,291	-$952,468	0.86
Multi-Family Buildings Efficiency	$2,188,615	1,066	6,961,395	7,475	$2,004,114	1.42
Refrigerator & Freezer Recycling	$1,468,930	325	4,140,251	3,307	$160,395	1.11
Residential Heating & Cooling	$6,871,966	12,391	17,943,359	19,465	-$3,572,258	0.93
Residential New Home Construction	$3,738,880	2,075	5,078,774	5,843	$6,187,444	1.79
School Education Kits	$2,860,869	1,319	9,879,796	10,143	$4,187,547	1.92
Whole Home Efficiency	$223,491	77	717,165	791	-$205,122	0.74
General Advertising-Res	$361,120			N/A		
Residential Program Total	**$30,264,213**	**35,061**	**109,604,932**	**96,000**	**$22,347,485**	**1.25**
Income Qualified Program						
All-Electric Affordable New Home Construction	$512,709	35	126,111	160	-$278,192	0.69
Energy Savings Kit	$419,389	224	2,528,633	2,362	$1,059,191	2.85
Income Qualified Home Energy Squad	$2,462,581	462	2,706,748	2,614	-$253,825	0.91
Multifamily Weatherization	$1,383,603	560	2,287,487	2,536	-$1,995,891	0.65
Non-Profit	$846,009	480	1,706,363	1,885	-$233,378	0.92
Single-Family Weatherization	$3,404,759	2,125	15,293,617	18,555	$10,171,673	2.73
Tiered Geographic Prequalification	$2,203,783	1,933	15,041,650	18,296	$10,000,227	3.46
Income Qualified Program Total	**$11,232,834**	**5,819**	**39,690,608**	**46,407**	**$18,469,806**	**1.81**
Indirect Products & Services						
Education/Market Transformation						
Business Education	$206,957	0	0	0	$0	
Business Energy Analysis	$733,641	0	0	0	$0	
Community Energy Reporting	$37,165	0	0	0	$0	
Consumer Education	$1,228,451	0	0	0	$0	
Energy Benchmarking	$230,692	0	0	0	$0	
Home Energy Audit	$796,889	0	0	0	$0	
Partners in Energy	$1,561,313	0	0	0	$0	
Education/Market Transformation Total	**$4,795,109**	**0**	**0**	**0**	**$0**	
Planning and Research						
EE Market Research	$500,847	0	0	0	$0	
EE Evaluation, Measurement & Verification	$1,256,335	0	0	0	$0	
EE Planning & Administration	$685,658	0	0	0	$0	
EE Product Development	$976,780	0	0	0	$0	
EE Product Development Total	**$976,780**	**0**	**0**	**0**	**$0**	
EE Planning and Research Total	**$3,419,620**	**0**	**0**	**0**	**$0**	
EE Indirect Products & Services Total	**$8,214,729**	**0**	**0**	**0**	**$0**	
EE PORTFOLIO TOTAL	**$93,547,872**	**99,849**	**445,248,567**	**417,410**	**$218,218,858**	**1.88**

Table 4f: Public Service's 2026 Electric DSM Costs by Category

2026	Program Planning & Design	Administration & Program Delivery	Advertising & Promotion	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Business Program							
Business Energy Assessments	$ -	$ 1,454,874	$ 3,401	$ 2,409,303	$ -	$ -	$ 3,867,578
Business HVAC+R Systems	$ -	$ 1,081,034	$ 61,560	$ 5,467,780	$ -	$ 48,000	$ 6,658,373
Compressed Air Efficiency	$ -	$ 248,605	$ 76,400	$ 626,189	$ -	$ 38,200	$ 989,395
Custom Efficiency	$ -	$ 160,041	$ 46,710	$ 220,171	$ -	$ 2,700	$ 429,622
Data Center Efficiency	$ -	$ 262,249	$ 35,000	$ 748,093	$ -	$ 20,000	$ 1,065,342
Energy Management Systems	$ -	$ 1,021,185	$ 12,139	$ 390,063	$ -	$ -	$ 1,423,386
LED Street Lighting	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Lighting Efficiency	$ -	$ 3,405,118	$ 80,000	$ 4,271,686	$ -	$ 11,535	$ 7,768,340
New Construction	$ -	$ 3,356,423	$ 2,400	$ 4,088,863	$ -	$ 447,504	$ 7,895,190
Self Direct	$ -	$ 70,414	$ -	$ 400,000	$ -	$ -	$ 470,414
Small Business Solutions	$ -	$ 631,536	$ 19,400	$ 4,338,543	$ -	$ 33,950	$ 5,023,429
Strategic Energy Management	$ -	$ 1,461,071	$ 28,747	$ 5,880,494	$ -	$ 424,360	$ 7,794,671
General Advertising-Bus	$ -	$ 72,916	$ 377,441	$ -	$ -	$ -	$ 450,357
Business Program Total	**$ -**	**$ 13,225,465**	**$ 743,198**	**$ 28,841,185**	**$ -**	**$ 1,026,249**	**$ 43,836,097**
Residential Program							
Energy Efficient Showerhead	$ -	$ 73,605	$ 60,000	$ 24,026	$ -	$ -	$ 157,631
Home Energy Insights	$ -	$ 4,357,603	$ 100,000	$ -	$ -	$ 20,000	$ 4,477,603
Home Energy Squad	$ -	$ 1,541,148	$ 50,000	$ 1,488,881	$ 1,950,000	$ -	$ 5,030,029
Home Lighting & Recycling	$ -	$ 748,524	$ 159,500	$ 646,431	$ -	$ 3,000	$ 1,557,455
Insulation & Air Sealing	$ -	$ 48,092	$ -	$ 1,279,532	$ -	$ -	$ 1,327,624
Multi-Family Buildings Efficiency	$ -	$ 573,309	$ -	$ 1,615,307	$ -	$ -	$ 2,188,615
Refrigerator & Freezer Recycling	$ -	$ 1,098,930	$ 40,000	$ 320,000	$ -	$ 10,000	$ 1,468,930
Residential Heating & Cooling	$ -	$ 564,872	$ 62,000	$ 6,219,094	$ -	$ 26,000	$ 6,871,966
Residential New Home Construction	$ -	$ 118,773	$ 90,000	$ 3,530,107	$ -	$ -	$ 3,738,880
School Education Kits	$ -	$ 1,181,857	$ 7,000	$ 1,672,012	$ -	$ -	$ 2,860,869
Whole Home Efficiency	$ -	$ 56,194	$ 1,750	$ 151,547	$ -	$ 14,000	$ 223,491
General Advertising-Res	$ -	$ 31,827	$ 329,293	$ -	$ -	$ -	$ 361,120
Residential Program Total	**$ -**	**$ 10,394,734**	**$ 899,543**	**$ 16,946,936**	**$ 1,950,000**	**$ 73,000**	**$ 30,264,213**
Income Qualified Program							
All-Electric Affordable New Home	$ -	$ 62,792	$ 51,997	$ 397,920	$ -	$ -	$ 512,709
Energy Savings Kit	$ -	$ 165,208	$ 100,000	$ 154,181	$ -	$ -	$ 419,389
Income Qualified Home Energy Squad	$ -	$ 744,833	$ 275,000	$ 589,637	$ 853,112	$ -	$ 2,462,581
Multifamily Weatherization	$ -	$ 94,015	$ 17,681	$ 1,255,993	$ -	$ 15,913	$ 1,383,603
Non-Profit	$ -	$ 137,266	$ 18,777	$ 656,064	$ -	$ 33,902	$ 846,009
Single-Family Weatherization	$ -	$ 165,571	$ 159,836	$ 2,953,167	$ -	$ 126,186	$ 3,404,759
Tiered Geographic Prequalification	$ -	$ 156,012	$ 303,191	$ 1,631,043	$ -	$ 113,537	$ 2,203,783
Income Qualified Program Total	**$ -**	**$ 1,525,697**	**$ 926,481**	**$ 7,638,005**	**$ 853,112**	**$ 289,539**	**$ 11,232,834**
Indirect Products & Services							
Education/Market Transformation							
Business Education	$ -	$ 62,143	$ 144,814	$ -	$ -	$ -	$ 206,957
Business Energy Analysis	$ -	$ 161,506	$ 18,020	$ 522,580	$ -	$ 31,535	$ 733,641
Community Energy Reporting	$ -	$ 37,165	$ -	$ -	$ -	$ -	$ 37,165
Consumer Education	$ -	$ 413,494	$ 814,957	$ -	$ -	$ -	$ 1,228,451
Energy Benchmarking	$ -	$ 230,692	$ -	$ -	$ -	$ -	$ 230,692
Home Energy Audit	$ -	$ 395,542	$ 44,650	$ 174,307	$ -	$ 182,390	$ 796,889
Partners in Energy	$ -	$ 1,548,361	$ 12,952	$ -	$ -	$ -	$ 1,561,313
Education/Market Transformation	**$ -**	**$ 2,848,904**	**$ 1,035,393**	**$ 696,887**	**$ -**	**$ 213,925**	**$ 4,795,109**
Planning and Research							
EE Market Research	$ -	$ 500,847	$ -	$ -	$ -	$ -	$ 500,847
EE Evaluation, Measurement & Verification	$ -	$ 121,876	$ -	$ -	$ -	$ 1,134,458	$ 1,256,335
EE Planning & Administration	$ -	$ 685,658	$ -	$ -	$ -	$ -	$ 685,658
EE Product Development	$ -	$ 919,402	$ -	$ -	$ -	$ 57,378	$ 976,780
EE Product Development Total	**$ -**	**$ 919,402**	**$ -**	**$ -**	**$ -**	**$ 57,378**	**$ 976,780**
EE Planning and Research Total	**$ -**	**$ 2,227,784**	**$ -**	**$ -**	**$ -**	**$ 1,191,836**	**$ 3,419,620**
EE Indirect Products & Services Total	**$ -**	**$ 5,076,687**	**$ 1,035,393**	**$ 696,887**	**$ -**	**$ 1,405,761**	**$ 8,214,729**
EE PORTFOLIO TOTAL	**$ -**	**$ 30,222,584**	**$ 3,604,615**	**$ 54,123,014**	**$ 2,803,112**	**$ 2,794,548**	**$ 93,547,872**

Executive Summary: Natural Gas DSM Tables

The following tables summarize the forecasted impacts of the Company's proposed natural gas DSM portfolio for 2024-2026, including anticipated expenditures, energy savings, greenhouse gas emission estimates, mTRC test ratios, and costs by budget category.

Table 5a: Public Service's 2024 Natural Gas DSM Budgets and Forecasts

2024	Gas Budget	Net Annual Dth Savings	Net Targeted Peak Dth/hr Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	Gas mTRC Net Benefits	Gas mTRC Test Ratio
Business Program								
Business Energy Assessments	$64,750	8,958	4.4	138,355	6,272	34.5	$964,065	7.99
Business HVAC+R Systems	$375,440	24,674	11.1	65,721	28,281	155.4	$3,746,612	4.15
Custom Efficiency	$101,723	5,798	3.8	57,001	5,759	31.6	$706,782	3.05
Energy Management Systems	$85,871	8,131	1.3	94,686	5,137	28.2	$257,623	1.36
New Construction	$853,849	99,748	0.0	116,822	116,546	640.3	$28,632,061	9.06
Small Business Energy Solutions	$63,946	13,953	0.5	218,203	8,433	46.3	$2,738,119	18.81
General Advertising-Bus	$82,093				N/A	N/A	N/A	
Business Program Total	**$1,627,672**	**161,264**	**21.0**	**99,076**	**170,427**	**936.3**	**$36,963,170**	**6.99**
Residential Program								
Energy Efficient Showerhead	$563,106	49,571	0.1	88,032	28,959	159.1	$11,041,281	15.50
Home Energy Insights	$799,744	144,054	0.0	180,125	25,247	138.7	$3,685,790	5.61
Home Energy Squad	$3,182,756	24,047	3.0	7,555	14,267	78.4	-$284,071	0.92
Insulation & Air Sealing	$1,181,835	60,586	32.9	51,264	54,708	300.5	$3,937,531	1.64
Multi-Family Buildings Efficiency	$722,987	15,996	2.0	22,125	10,436	57.3	$2,384,027	3.10
Residential Heating & Cooling	$1,167,242	80,028	33.5	68,562	76,963	422.8	$8,193,074	2.52
Residential New Home Construction	$1,899,992	89,856	0.0	47,293	157,481	865.1	$17,078,473	2.89
School Education Kits	$741,537	69,916	0.1	94,285	40,845	224.4	$14,067,998	15.75
Whole Home Efficiency	$27,113	426	0.2	15,697	388	2.1	$16,885	1.32
General Advertising-Res	$202,524				N/A	N/A	-$202,524	
Residential Program Total	**$10,488,837**	**534,480**	**71.8**	**50,957**	**409,294**	**2,248.5**	**$59,918,465**	**3.14**
Income Qualified Program								
All-Electric Affordable New Home	$25,218	0	0.0	0	N/A	N/A	-$25,218	N/A
Energy Savings Kit	$161,906	7,559	0.7	46,687	3,958	21.7	$1,289,050	7.72
Income Qualified Home Energy Squad	$527,502	5,695	0.3	10,796	3,510	19.3	$266,151	1.46
Multifamily Weatherization	$271,762	10,104	6.9	37,181	11,618	63.8	$1,203,799	2.03
Non-Profit	$298,494	10,177	7.1	34,093	12,572	69.1	$1,550,416	2.78
Single-Family Weatherization	$5,014,219	60,060	23.3	11,978	55,690	305.9	$4,664,808	1.48
Tiered Geographic Prequalification	$1,631,890	24,860	8.3	15,234	22,194	121.9	$1,522,019	1.45
Income Qualified Program Total	**$7,930,992**	**118,455**	**46.7**	**14,936**	**109,542**	**601.8**	**$10,471,024**	**1.66**
Indirect Products & Services								
Education/Market Transformation								
Business Education	$25,805	0	0.0		0	0.0	$0	
Business Energy Analysis	$29,880	0	0.0		0	0.0	$0	
Community Energy Reporting	$38,258	0	0.0		0	0.0	$0	
Consumer Education	$77,661	0	0.0		0	0.0	$0	
Energy Benchmarking	$46,959	0	0.0		0	0.0	$0	
Home Energy Audit	$629,622	0	0.0		0	0.0	$0	
Partners in Energy	$167,491	0	0.0		0	0.0	$0	
Education/Market Transformation	**$1,015,676**	**0**	**0.0**		**0**	**0.0**	**$0**	
Planning and Research								
EE Market Research	$320,617	0	0.0		0	0.0	$0	
EE Evaluation, Measurement & Verification	$376,476	0	0.0		0	0.0	$0	
EE Planning & Administration	$145,572	0	0.0		0	0.0	$0	
EE Product Development	$449,199	0	0.0		0	0.0	$0	
EE Product Development Total	**$449,199**	**0**	**0.0**		**0**	**0.0**	**$0**	
EE Planning and Research Total	**$1,291,863**	**0**	**0.0**		**0**	**0.0**	**$0**	
EE Indirect Products & Services Total	**$2,307,539**	**0**	**0.0**		**0**	**0.0**	**$0**	
EE PORTFOLIO TOTAL	**$22,355,040**	**814,198**	**139.6**	**36,421**	**689,263**	**3,786.5**	**$105,335,761**	**3.01**

Table 5b: Public Service's 2024 Natural Gas DSM Costs by Category

2024	Program Planning & Design	Administration & Program Delivery	Advertising & Promotion	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Business Program							
Business Energy Assessments	$ -	$ 18,188	$ -	$ 46,562	$ -	$ -	$ 64,750
Business HVAC+R Systems	$ -	$ 97,881	$ 4,773	$ 270,915	$ -	$ 1,872	$ 375,440
Custom Efficiency	$ -	$ 24,780	$ 3,275	$ 73,384	$ -	$ 283	$ 101,723
Energy Management Systems	$ -	$ 1,756	$ -	$ 84,115	$ -	$ -	$ 85,871
New Construction	$ -	$ 306,964	$ -	$ 494,059	$ -	$ 52,826	$ 853,849
Small Business Energy Solutions	$ -	$ 16,623	$ 5,307	$ 42,016	$ -	$ -	$ 63,946
General Advertising-Bus	$ -	$ 10,193	$ 71,901	$ -	$ -	$ -	$ 82,093
Business Program Total	**$ -**	**$ 476,384**	**$ 85,256**	**$ 1,011,051**	**$ -**	**$ 54,981**	**$ 1,627,672**
Residential Program							
Energy Efficient Showerhead	$ -	$ 217,543	$ 150,000	$ 195,564	$ -	$ -	$ 563,106
Home Energy Insights	$ -	$ 739,744	$ 30,000	$ -	$ -	$ 30,000	$ 799,744
Home Energy Squad	$ -	$ 1,146,755	$ 95,000	$ 389,830	$ 1,551,171	$ -	$ 3,182,756
Insulation & Air Sealing	$ -	$ 32,027	$ -	$ 1,149,809	$ -	$ -	$ 1,181,835
Multi-Family Buildings Efficiency	$ -	$ 382,508	$ -	$ 340,479	$ -	$ -	$ 722,987
Residential Heating & Cooling	$ -	$ 297,441	$ 24,837	$ 834,616	$ -	$ 10,349	$ 1,167,242
Residential New Home Construction	$ -	$ 282,384	$ 278,212	$ 1,339,396	$ -	$ -	$ 1,899,992
School Education Kits	$ -	$ 527,058	$ 2,500	$ 211,980	$ -	$ -	$ 741,537
Whole Home Efficiency	$ -	$ 20,853	$ -	$ 6,260	$ -	$ -	$ 27,113
General Advertising-Res	$ -	$ 19,246	$ 183,278	$ -	$ -	$ -	$ 202,524
Residential Program Total	**$ -**	**$ 3,665,558**	**$ 763,827**	**$ 4,467,932**	**$ 1,551,171**	**$ 40,349**	**$ 10,488,837**
Income Qualified Program							
All-Electric Affordable New Home	$ -	$ 25,218	$ -	$ -	$ -	$ -	$ 25,218
Energy Savings Kit	$ -	$ 87,914	$ 44,000	$ 29,992	$ -	$ -	$ 161,906
Income Qualified Home Energy Squad	$ -	$ 212,755	$ 25,000	$ 117,492	$ 172,254	$ -	$ 527,502
Multifamily Weatherization	$ -	$ 36,819	$ 9,960	$ 219,648	$ -	$ 5,336	$ 271,762
Non-Profit	$ -	$ 54,415	$ 12,411	$ 219,847	$ -	$ 11,820	$ 298,494
Single-Family Weatherization	$ -	$ 168,254	$ 55,662	$ 4,683,061	$ -	$ 107,242	$ 5,014,219
Tiered Geographic Prequalification	$ -	$ 189,513	$ 273,131	$ 1,061,361	$ -	$ 107,885	$ 1,631,890
Income Qualified Program Total	**$ -**	**$ 774,890**	**$ 420,164**	**$ 6,331,401**	**$ 172,254**	**$ 232,283**	**$ 7,930,992**
Indirect Products & Services							
Education/Market Transformation							
Business Education	$ -	$ 5,281	$ 20,525	$ -	$ -	$ -	$ 25,805
Business Energy Analysis	$ -	$ 29,880	$ -	$ -	$ -	$ -	$ 29,880
Community Energy Reporting	$ -	$ 38,258	$ -	$ -	$ -	$ -	$ 38,258
Consumer Education	$ -	$ 13,420	$ 64,241	$ -	$ -	$ -	$ 77,661
Energy Benchmarking	$ -	$ 46,959	$ -	$ -	$ -	$ -	$ 46,959
Home Energy Audit	$ -	$ 230,710	$ -	$ 290,641	$ -	$ 108,271	$ 629,622
Partners in Energy	$ -	$ 164,946	$ 2,545	$ -	$ -	$ -	$ 167,491
Education/Market Transformation	**$ -**	**$ 529,453**	**$ 87,311**	**$ 290,641**	**$ -**	**$ 108,271**	**$ 1,015,676**
Planning and Research							
EE Market Research	$ -	$ 320,617	$ -	$ -	$ -	$ -	$ 320,617
EE Evaluation, Measurement & Verification	$ -	$ 35,639	$ -	$ -	$ -	$ 340,836	$ 376,476
EE Planning & Administration	$ -	$ 145,572	$ -	$ -	$ -	$ -	$ 145,572
EE Product Development	$ -	$ 409,071	$ -	$ -	$ -	$ 40,128	$ 449,199
EE Product Development Total	**$ -**	**$ 409,071**	**$ -**	**$ -**	**$ -**	**$ 40,128**	**$ 449,199**
EE Planning and Research Total	**$ -**	**$ 910,899**	**$ -**	**$ -**	**$ -**	**$ 380,964**	**$ 1,291,863**
EE Indirect Products & Services Total	**$ -**	**$ 1,440,352**	**$ 87,311**	**$ 290,641**	**$ -**	**$ 489,235**	**$ 2,307,539**
EE PORTFOLIO TOTAL	**$ -**	**$ 6,357,184**	**$ 1,356,558**	**$ 12,101,025**	**$ 1,723,425**	**$ 816,848**	**$ 22,355,040**

Table 5c: Public Service's 2025 Natural Gas DSM Budgets and Forecasts

2025	Gas Budget	Net Annual Dth Savings	Net Targeted Peak Dth/hr Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	Gas mTRC Net Benefits	Gas mTRC Test Ratio
Business Program								
Business Energy Assessments	$67,383	8,958	4.4	132,948	6,272	34.5	$994,151	8.06
Business HVAC+R Systems	$264,727	22,258	9.0	84,081	24,406	134.1	$3,290,628	4.14
Custom Efficiency	$178,849	8,283	5.4	46,314	8,226	45.2	$1,067,413	3.03
Energy Management Systems	$94,378	8,891	1.6	94,210	5,804	31.9	$371,124	1.50
New Construction	$844,738	84,631	0.0	100,186	98,882	543.2	$24,501,696	8.88
Small Business Energy Solutions	$59,916	13,953	0.5	232,879	8,433	46.3	$2,783,084	19.56
General Advertising-Bus	$69,131				N/A	N/A	N/A	
Business Program Total	**$1,579,121**	**146,975**	**20.8**	**93,074**	**152,023**	**835.1**	**$32,938,964**	**6.69**
Residential Program								
Energy Efficient Showerhead	$542,050	43,821	0.1	80,844	25,601	140.6	$9,839,959	14.70
Home Energy Insights	$1,270,660	219,535	0.0	172,772	38,476	211.4	$5,843,387	5.60
Home Energy Squad	$3,450,493	40,550	5.3	11,752	23,890	131.2	$1,151,238	1.28
Insulation & Air Sealing	$1,601,881	80,400	43.7	50,191	72,568	398.7	$5,357,994	1.64
Multi-Family Buildings Efficiency	$737,891	20,999	2.8	28,458	13,821	75.9	$3,398,503	3.75
Residential Heating & Cooling	$959,584	77,829	33.5	81,107	74,496	409.2	$8,612,139	2.75
Residential New Home Construction	$202,507	27,473	0.0	135,666	48,150	264.5	$7,602,018	38.54
School Education Kits	$761,283	69,974	0.1	91,916	40,879	224.6	$14,251,862	15.64
Whole Home Efficiency	$27,818	426	0.2	15,299	388	2.1	$18,039	1.34
General Advertising-Res	$153,705				N/A	N/A	-$153,705	
Residential Program Total	**$9,707,872**	**581,007**	**85.6**	**59,849**	**338,268**	**1,858.3**	**$55,921,433**	**3.55**
Income Qualified Program								
All-Electric Affordable New Home	$25,975	0	0.0	0	N/A	N/A	-$25,975	N/A
Energy Savings Kit	$162,551	7,559	0.7	46,502	3,958	21.7	$1,308,404	7.80
Income Qualified Home Energy Squad	$1,015,962	12,393	0.7	12,199	7,519	41.3	$769,087	1.70
Multifamily Weatherization	$330,056	12,903	8.8	39,094	14,427	79.3	$1,519,709	1.98
Non-Profit	$336,332	13,004	9.4	38,663	16,636	91.4	$2,206,358	3.09
Single-Family Weatherization	$5,003,576	60,060	23.3	12,003	55,690	305.9	$4,958,765	1.51
Tiered Geographic Prequalification	$1,976,256	29,862	10.1	15,110	27,360	150.3	$1,913,840	1.45
Income Qualified Program Total	**$8,850,708**	**135,781**	**52.9**	**15,341**	**125,590**	**689.9**	**$12,650,189**	**1.71**
Indirect Products & Services								
Education/Market Transformation								
Business Education	$26,835	0	0.0		0	0.0	$0	
Business Energy Analysis	$35,026	0	0.0		0	0.0	$0	
Community Energy Reporting	$39,369	0	0.0		0	0.0	$0	
Consumer Education	$87,931	0	0.0		0	0.0	$0	
Energy Benchmarking	$60,028	0	0.0		0	0.0	$0	
Home Energy Audit	$809,029	0	0.0		0	0.0	$0	
Partners in Energy	$177,006	0	0.0		0	0.0	$0	
Education/Market Transformation	**$1,235,224**	**0**	**0.0**		**0**	**0.0**	**$0**	
Planning and Research								
EE Market Research	$205,368	0	0.0		0	0.0	$0	
EE Evaluation, Measurement & Verification	$297,867	0	0.0		0	0.0	$0	
EE Planning & Administration	$149,939	0	0.0		0	0.0	$0	
EE Product Development	$332,790	0	0.0		0	0.0	$0	
EE Product Development Total	**$332,790**	**0**	**0.0**		**0**	**0.0**	**$0**	
EE Planning and Research Total	**$985,965**	**0**	**0.0**		**0**	**0.0**	**$0**	
EE Indirect Products & Services Total	**$2,221,189**	**0**	**0.0**		**0**	**0.0**	**$0**	
EE PORTFOLIO TOTAL	**$22,358,890**	**863,763**	**159.4**	**38,632**	**615,881**	**3,383.4**	**$99,576,106**	**3.08**

Table 5d: Public Service's 2025 Natural Gas DSM Costs by Category

2025	Program Planning & Design	Administration & Program Delivery	Advertising & Promotion	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Business Program							
Business Energy Assessments	$ -	$ 18,739	$ -	$ 48,644	$ -	$ -	$ 67,383
Business HVAC+R Systems	$ -	$ 74,838	$ 3,553	$ 184,942	$ -	$ 1,393	$ 264,727
Custom Efficiency	$ -	$ 20,652	$ 2,968	$ 154,900	$ -	$ 329	$ 178,849
Energy Management Systems	$ -	$ 1,761	$ -	$ 92,617	$ -	$ -	$ 94,378
New Construction	$ -	$ 392,874	$ -	$ 418,548	$ -	$ 33,316	$ 844,738
Small Business Energy Solutions	$ -	$ 13,633	$ 4,230	$ 42,053	$ -	$ -	$ 59,916
General Advertising-Bus	$ -	$ 8,841	$ 60,290	$ -	$ -	$ -	$ 69,131
Business Program Total	**$ -**	**$ 531,337**	**$ 71,042**	**$ 941,703**	**$ -**	**$ 35,039**	**$ 1,579,121**
Residential Program							
Energy Efficient Showerhead	$ -	$ 218,219	$ 150,000	$ 173,831	$ -	$ -	$ 542,050
Home Energy Insights	$ -	$ 1,200,660	$ 30,000	$ -	$ -	$ 40,000	$ 1,270,660
Home Energy Squad	$ -	$ 701,416	$ 60,000	$ 576,876	$ 2,112,201	$ -	$ 3,450,493
Insulation & Air Sealing	$ -	$ 32,988	$ -	$ 1,568,893	$ -	$ -	$ 1,601,881
Multi-Family Buildings Efficiency	$ -	$ 333,362	$ -	$ 404,529	$ -	$ -	$ 737,891
Residential Heating & Cooling	$ -	$ 142,650	$ 11,615	$ 800,851	$ -	$ 4,467	$ 959,584
Residential New Home Construction	$ -	$ 112,507	$ 90,000	$ -	$ -	$ -	$ 202,507
School Education Kits	$ -	$ 546,554	$ 2,750	$ 211,980	$ -	$ -	$ 761,283
Whole Home Efficiency	$ -	$ 21,542	$ -	$ 6,277	$ -	$ -	$ 27,818
General Advertising-Res	$ -	$ 14,607	$ 139,098	$ -	$ -	$ -	$ 153,705
Residential Program Total	**$ -**	**$ 3,324,504**	**$ 483,463**	**$ 3,743,237**	**$ 2,112,201**	**$ 44,467**	**$ 9,707,872**
Income Qualified Program							
All-Electric Affordable New Home	$ -	$ 25,975	$ -	$ -	$ -	$ -	$ 25,975
Energy Savings Kit	$ -	$ 88,557	$ 44,000	$ 29,994	$ -	$ -	$ 162,551
Income Qualified Home Energy Squad	$ -	$ 398,970	$ 30,000	$ 217,569	$ 369,423	$ -	$ 1,015,962
Multifamily Weatherization	$ -	$ 27,926	$ 7,481	$ 290,641	$ -	$ 4,008	$ 330,056
Non-Profit	$ -	$ 45,012	$ 9,912	$ 271,968	$ -	$ 9,440	$ 336,332
Single-Family Weatherization	$ -	$ 163,180	$ 53,759	$ 4,683,061	$ -	$ 103,576	$ 5,003,576
Tiered Geographic Prequalification	$ -	$ 180,456	$ 422,568	$ 1,270,885	$ -	$ 102,347	$ 1,976,256
Income Qualified Program Total	**$ -**	**$ 930,077**	**$ 567,721**	**$ 6,764,117**	**$ 369,423**	**$ 219,371**	**$ 8,850,708**
Indirect Products & Services							
Education/Market Transformation							
Business Education	$ -	$ 5,588	$ 21,248	$ -	$ -	$ -	$ 26,835
Business Energy Analysis	$ -	$ 35,026	$ -	$ -	$ -	$ -	$ 35,026
Community Energy Reporting	$ -	$ 39,369	$ -	$ -	$ -	$ -	$ 39,369
Consumer Education	$ -	$ 15,646	$ 72,285	$ -	$ -	$ -	$ 87,931
Energy Benchmarking	$ -	$ 60,028	$ -	$ -	$ -	$ -	$ 60,028
Home Energy Audit	$ -	$ 325,573	$ -	$ 286,708	$ -	$ 196,748	$ 809,029
Partners in Energy	$ -	$ 174,354	$ 2,652	$ -	$ -	$ -	$ 177,006
Education/Market Transformation	**$ -**	**$ 655,584**	**$ 96,185**	**$ 286,708**	**$ -**	**$ 196,748**	**$ 1,235,224**
Planning and Research							
EE Market Research	$ -	$ 205,368	$ -	$ -	$ -	$ -	$ 205,368
EE Evaluation, Measurement & Verification	$ -	$ 26,984	$ -	$ -	$ -	$ 270,883	$ 297,867
EE Planning & Administration	$ -	$ 149,939	$ -	$ -	$ -	$ -	$ 149,939
EE Product Development	$ -	$ 301,005	$ -	$ -	$ -	$ 31,785	$ 332,790
EE Product Development Total	**$ -**	**$ 301,005**	**$ -**	**$ -**	**$ -**	**$ 31,785**	**$ 332,790**
EE Planning and Research Total	**$ -**	**$ 683,296**	**$ -**	**$ -**	**$ -**	**$ 302,669**	**$ 985,965**
EE Indirect Products & Services Total	**$ -**	**$ 1,338,880**	**$ 96,185**	**$ 286,708**	**$ -**	**$ 499,416**	**$ 2,221,189**
EE PORTFOLIO TOTAL	**$ -**	**$ 6,124,798**	**$ 1,218,410**	**$ 11,735,765**	**$ 2,481,624**	**$ 798,293**	**$ 22,358,890**

Table 5e: Public Service's 2026 Natural Gas DSM Budgets and Forecasts

2026	Gas Budget	Net Annual Dth Savings	Net Targeted Peak Dth/hr Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	Gas mTRC Net Benefits	Gas mTRC Test Ratio
Business Program								
Business Energy Assessments	$69,954	8,958	4.4	128,061	6,272	34.5	$950,993	7.63
Business HVAC+R Systems	$240,090	20,534	7.3	85,528	22,142	121.6	$2,981,507	4.50
Custom Efficiency	$213,114	10,768	7.0	50,528	10,694	58.8	$1,325,600	3.00
Energy Management Systems	$95,200	9,080	1.6	95,381	5,946	32.7	$343,392	1.45
New Construction	$285,046	50,356	0.0	176,659	58,836	323.2	$14,338,181	10.12
Small Business Energy Solutions	$54,422	13,953	0.5	256,389	8,433	46.3	$2,720,196	19.87
General Advertising-Bus	$69,131				N/A	N/A	N/A	
Business Program Total	**$1,026,957**	**113,650**	**20.8**	**110,667**	**112,323**	**617.1**	**$22,590,738**	**6.38**
Residential Program								
Energy Efficient Showerhead	$563,257	48,819	0.1	86,672	28,520	156.7	$10,828,728	15.27
Home Energy Insights	$1,361,179	244,641	0.0	179,727	42,876	235.5	$2,256,242	2.66
Home Energy Squad	$3,119,592	37,748	4.8	12,100	22,204	122.0	$1,043,882	1.29
Insulation & Air Sealing	$2,220,203	116,153	61.4	52,316	105,442	579.3	$7,964,622	1.68
Multi-Family Buildings Efficiency	$749,120	26,054	3.8	34,780	17,366	95.4	$4,322,175	4.28
Residential Heating & Cooling	$892,054	77,829	33.5	87,247	74,496	409.2	$8,525,889	2.76
Residential New Home Construction	$223,693	29,227	0.0	130,657	51,223	281.4	$8,114,495	37.28
School Education Kits	$776,773	70,030	0.1	90,155	40,911	224.7	$13,990,827	15.15
Whole Home Efficiency	$28,042	426	0.2	15,176	388	2.1	$16,831	1.31
General Advertising-Res	$135,700				N/A	N/A	-$135,700	
Residential Program Total	**$10,069,612**	**650,926**	**103.9**	**64,643**	**383,428**	**2,106.4**	**$56,927,991**	**3.28**
Income Qualified Program								
All-Electric Affordable New Home	$26,754	0	0.0	0	N/A	N/A	-$26,754	N/A
Energy Savings Kit	$163,215	7,559	0.7	46,313	3,958	21.7	$1,279,172	7.62
Income Qualified Home Energy Squad	$1,200,303	14,225	0.9	11,851	8,610	47.3	$809,094	1.63
Multifamily Weatherization	$380,574	15,298	10.3	40,197	16,805	92.3	$1,699,833	1.90
Non-Profit	$370,276	15,493	11.0	41,843	19,859	109.1	$2,600,031	3.13
Single-Family Weatherization	$5,052,475	60,060	23.3	11,887	55,690	305.9	$4,792,217	1.49
Tiered Geographic Prequalification	$1,866,754	25,906	8.5	13,878	24,377	133.9	$1,478,137	1.37
Income Qualified Program Total	**$9,060,352**	**138,541**	**54.7**	**15,291**	**129,298**	**710.3**	**$12,631,730**	**1.69**
Indirect Products & Services								
Education/Market Transformation								
Business Education	$29,183	0	0.0		0	0.0	$0	
Business Energy Analysis	$40,177	0	0.0		0	0.0	$0	
Community Energy Reporting	$38,717	0	0.0		0	0.0	$0	
Consumer Education	$98,784	0	0.0		0	0.0	$0	
Energy Benchmarking	$78,763	0	0.0		0	0.0	$0	
Home Energy Audit	$905,674	0	0.0		0	0.0	$0	
Partners in Energy	$182,093	0	0.0		0	0.0	$0	
Education/Market Transformation	**$1,373,391**	**0**	**0.0**		**0**	**0.0**	**$0**	
Planning and Research								
EE Market Research	$178,607	0	0.0		0	0.0	$0	
EE Evaluation, Measurement & Verification	$416,262	0	0.0		0	0.0	$0	
EE Planning & Administration	$154,437	0	0.0		0	0.0	$0	
EE Product Development	$280,954	0	0.0		0	0.0	$0	
EE Product Development Total	**$280,954**	**0**	**0.0**		**0**	**0.0**	**$0**	
EE Planning and Research Total	**$1,030,260**	**0**	**0.0**		**0**	**0.0**	**$0**	
EE Indirect Products & Services Total	**$2,403,651**	**0**	**0.0**		**0**	**0.0**	**$0**	
EE PORTFOLIO TOTAL	**$22,560,572**	**903,118**	**179.3**	**40,031**	**625,049**	**3,433.7**	**$90,031,952**	**2.81**

Table 5f: Public Service's 2026 Natural Gas DSM Costs by Category

2026	Program Planning & Design	Administration & Program Delivery	Advertising & Promotion	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Business Program							
Business Energy Assessments	$ -	$ 19,289	$ -	$ 50,665	$ -	$ -	$ 69,954
Business HVAC+R Systems	$ -	$ 86,895	$ 4,018	$ 147,601	$ -	$ 1,576	$ 240,090
Custom Efficiency	$ -	$ 41,224	$ 2,783	$ 166,324	$ -	$ 2,783	$ 213,114
Energy Management Systems	$ -	$ 1,766	$ -	$ 93,434	$ -	$ -	$ 95,200
New Construction	$ -	$ 39,835	$ -	$ 238,347	$ -	$ 6,864	$ 285,046
Small Business Energy Solutions	$ -	$ 9,524	$ 2,871	$ 42,027	$ -	$ -	$ 54,422
General Advertising-Bus	$ -	$ 9,106	$ 60,025	$ -	$ -	$ -	$ 69,131
Business Program Total	**$ -**	**$ 207,639**	**$ 69,697**	**$ 738,399**	**$ -**	**$ 11,222**	**$ 1,026,957**
Residential Program							
Energy Efficient Showerhead	$ -	$ 218,916	$ 150,000	$ 194,342	$ -	$ -	$ 563,257
Home Energy Insights	$ -	$ 1,301,179	$ 30,000	$ -	$ -	$ 30,000	$ 1,361,179
Home Energy Squad	$ -	$ 827,768	$ 75,000	$ 428,517	$ 1,788,307	$ -	$ 3,119,592
Insulation & Air Sealing	$ -	$ 33,977	$ -	$ 2,186,226	$ -	$ -	$ 2,220,203
Multi-Family Buildings Efficiency	$ -	$ 294,243	$ -	$ 454,877	$ -	$ -	$ 749,120
Residential Heating & Cooling	$ -	$ 78,366	$ 6,505	$ 801,141	$ -	$ 6,041	$ 892,054
Residential New Home Construction	$ -	$ 133,693	$ 90,000	$ -	$ -	$ -	$ 223,693
School Education Kits	$ -	$ 561,793	$ 3,000	$ 211,980	$ -	$ -	$ 776,773
Whole Home Efficiency	$ -	$ 21,745	$ -	$ 6,297	$ -	$ -	$ 28,042
General Advertising-Res	$ -	$ 12,896	$ 122,804	$ -	$ -	$ -	$ 135,700
Residential Program Total	**$ -**	**$ 3,484,576**	**$ 477,309**	**$ 4,283,379**	**$ 1,788,307**	**$ 36,041**	**$ 10,069,612**
Income Qualified Program							
All-Electric Affordable New Home	$ -	$ 26,754	$ -	$ -	$ -	$ -	$ 26,754
Energy Savings Kit	$ -	$ 89,218	$ 44,000	$ 29,997	$ -	$ -	$ 163,215
Income Qualified Home Energy Squad	$ -	$ 478,106	$ 35,000	$ 249,293	$ 437,904	$ -	$ 1,200,303
Multifamily Weatherization	$ -	$ 20,430	$ 5,092	$ 352,325	$ -	$ 2,728	$ 380,574
Non-Profit	$ -	$ 32,853	$ 9,020	$ 319,730	$ -	$ 8,673	$ 370,276
Single-Family Weatherization	$ -	$ 165,660	$ 50,400	$ 4,739,311	$ -	$ 97,104	$ 5,052,475
Tiered Geographic Prequalification	$ -	$ 166,245	$ 447,952	$ 1,158,629	$ -	$ 93,927	$ 1,866,754
Income Qualified Program Total	**$ -**	**$ 979,267**	**$ 591,464**	**$ 6,849,284**	**$ 437,904**	**$ 202,432**	**$ 9,060,352**
Indirect Products & Services							
Education/Market Transformation							
Business Education	$ -	$ 5,949	$ 23,234	$ -	$ -	$ -	$ 29,183
Business Energy Analysis	$ -	$ 40,177	$ -	$ -	$ -	$ -	$ 40,177
Community Energy Reporting	$ -	$ 38,717	$ -	$ -	$ -	$ -	$ 38,717
Consumer Education	$ -	$ 17,889	$ 80,895	$ -	$ -	$ -	$ 98,784
Energy Benchmarking	$ -	$ 78,763	$ -	$ -	$ -	$ -	$ 78,763
Home Energy Audit	$ -	$ 364,689	$ -	$ 285,143	$ -	$ 255,842	$ 905,674
Partners in Energy	$ -	$ 179,404	$ 2,689	$ -	$ -	$ -	$ 182,093
Education/Market Transformation	**$ -**	**$ 725,588**	**$ 106,818**	**$ 285,143**	**$ -**	**$ 255,842**	**$ 1,373,391**
Planning and Research							
EE Market Research	$ -	$ 178,607	$ -	$ -	$ -	$ -	$ 178,607
EE Evaluation, Measurement & Verification	$ -	$ 43,068	$ -	$ -	$ -	$ 373,193	$ 416,262
EE Planning & Administration	$ -	$ 154,437	$ -	$ -	$ -	$ -	$ 154,437
EE Product Development	$ -	$ 248,860	$ -	$ -	$ -	$ 32,094	$ 280,954
EE Product Development Total	**$ -**	**$ 248,860**	**$ -**	**$ -**	**$ -**	**$ 32,094**	**$ 280,954**
EE Planning and Research Total	**$ -**	**$ 624,972**	**$ -**	**$ -**	**$ -**	**$ 405,287**	**$ 1,030,260**
EE Indirect Products & Services Total	**$ -**	**$ 1,350,561**	**$ 106,818**	**$ 285,143**	**$ -**	**$ 661,129**	**$ 2,403,651**
EE PORTFOLIO TOTAL	**$ -**	**$ 6,022,043**	**$ 1,245,288**	**$ 12,156,206**	**$ 2,226,211**	**$ 910,824**	**$ 22,560,572**

Executive Summary: Beneficial Electrification Tables

The following tables summarize the forecasted impacts of the Company's proposed BE portfolio for 2024-2026, including anticipated participation, expenditures, energy savings, greenhouse gas emission estimates, mTRC test ratios, and costs by budget category.

Table 6a: Public Service's 2024 BE Budgets and Forecast

2024	Participants	Budget	EE Net Gen kW	Net Generator kWh	Net Annual Other Fuels Dth Savings	Net Annual Dth Savings	Net Targeted Peak Dth/hr Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	mTRC Test Net Benefits (WACC)	mTRC Test Ratio
Business Program												
Business Energy Assessments	16	$258,377	0	-805,651	2,109	10,087	6.5	93,653	10,727	64.74	$105,672	1.05
Business HVAC+R Systems	159	$425,359	-128	-1,677,595	1,100	17,967	2.3	89,607	13,887	82.62	$781,956	1.39
Custom Efficiency	33	$343,250	0	-1,617,360	642	23,841	15.4	185,093	25,800	153.03	$979,879	1.25
New Construction	23	$563,000	-1,211	-3,923,544	0	16,282	0.0	60,644	11,687	104.51	$2,504,903	1.35
Self Direct	3	$10,352	0	-72,690	183	917	0.6	212,584	1,213	5.89	$33,703	1.20
Small Business Energy Solutions	53	$148,014	0	-185,942	0	3,425	0.0	44,411	3,621	21.98	$270,961	1.55
Strategic Energy Management	7	$225,441	0	-496,717	7,519	0	0.0	0	-624	N/A	-$1,174,334	0.11
General Advertising-Bus	N/A	$16,330	0	0	0	0	0.0	0	N/A	N/A		
Business Program Total	**294**	**$1,990,124**	**-1,339**	**-8,779,500**	**11,554**	**72,519**	**24.9**	**87,820**	**66,311**	**432.78**	**$3,486,409**	**1.20**
Residential Program												
Residential Heating & Cooling	3,454	$3,120,663	0	-17,417,719	0	153,125	9.5	91,778	126,768	880.62	-$9,196,914	0.76
Residential New Home Construction	-	$373,165	0	-895,687	0	6,586	32.7	33,783	9,703	63.41	$1,186,365	1.97
Whole Home Efficiency	51	$82,017	0	-196,653	0	2,151	0.4	68,038	1,830	12.18	-$149,743	0.74
General Advertising-Res	N/A	$28,624	0	0	0	0	0.0	0	N/A	N/A		
Residential Program Total	**3,505**	**$3,604,469**	**0**	**-18,510,060**	**0**	**161,862**	**42.6**	**84,938**	**138,301**	**956.21**	**-$8,188,916**	**0.79**
Income Qualified Program												
All-Electric Affordable New Home Construction	-	$0	0	0	0	0	0.0		N/A	N/A	$0	N/A
Multifamily Weatherization	60	$952,354	0	-490,662	0	5,012	0.0	10,181	3,182	22.28	-$2,031,480	0.42
Non-Profit	110	$455,375	0	-192,638	0	2,034	0.0	9,851	1,288	8.95	-$855,375	0.41
Single-Family Weatherization	517	$2,590,035	0	-1,543,384	0	13,582	0.0	10,600	10,858	75.91	$206,643	1.04
Tiered Geographic Prequalification	69	$480,394	0	-230,625	0	2,259	0.0	10,019	1,735	11.99	-$245,672	0.75
Income Qualified Program Total	**756**	**$4,478,159**	**0**	**-2,457,308**	**0**	**22,887**	**0.1**	**10,377**	**17,063**	**119.12**	**-$2,925,884**	**0.72**
Indirect Products & Services												
Education/Market Transformation												
Business Education	N/A	$42,573	0	0	0	0	0.0	0	N/A	N/A		
Business Energy Analysis	N/A	$30,369	0	0	0	0	0.0		N/A	N/A		
Community Energy Reporting	N/A	$27,665	0	0	0	0	0.0	0	N/A	N/A		
Consumer Education	N/A	$164,686	0	0	0	0	0.0	0	N/A	N/A		
Energy Benchmarking	N/A	$13,060	0	0	0	0	0.0		N/A	N/A		
Home Energy Audit	N/A	$99,857	0	0	0	0	0.0	0	N/A	N/A		
Partners in Energy	N/A	$65,088	0	0	0	0	0.0	0	N/A	N/A		
Education/Market Transformation Total	**N/A**	**$443,298**	**0**	**0**	**0**	**0**	**0.0**	**0**	**N/A**	**N/A**		
Planning and Research												
EE Market Research	N/A	$237,479	0	0	0	0	0.0	0	N/A	N/A		
EE Evaluation, Measurement & Verification	N/A	$201,973	0	0	0	0	0.0	0	N/A	N/A		
EE Planning & Administration	N/A	$162,577	0	0	0	0	0.0	0	N/A	N/A		
EE Product Development	N/A	$260,511	0	0	0	0	0.0	0	N/A	N/A		
EE Product Development Total	**N/A**	**$260,511**	**0**	**0**	**0**	**0**	**0.0**	**0**	**N/A**	**N/A**		
EE Planning and Research Total	**N/A**	**$862,540**	**0**	**0**	**0**	**0**	**0.0**	**0**	**N/A**	**N/A**		
EE Indirect Products & Services Total	**N/A**	**$1,305,837**	**0**	**0**	**0**	**0**	**0.0**	**0**	**N/A**	**N/A**		
EE PORTFOLIO TOTAL	**4,555**	**$11,378,589**	**-1,339**	**-29,746,869**	**11,554**	**257,268**	**67.6**	**45,957**	**221,675**	**1,508.11**	**-$8,875,260**	**0.87**

Table 6b: Public Service's 2024 BE Costs by Category

2024	Program Planning & Design	Administration & Program Delivery	Advertising & Promotion	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Business Program							
Business Energy Assessments	$ -	$ 90,778	$ 146	$ 167,453	$ -	$ -	$ 258,377
Business HVAC+R Systems	$ -	$ 235,897	$ 12,666	$ 169,730	$ -	$ 7,067	$ 425,359
Custom Efficiency	$ -	$ 94,862	$ 17,008	$ 230,341	$ -	$ 1,038	$ 343,250
New Construction	$ -	$ 220,054	$ 96	$ 310,704	$ -	$ 32,145	$ 563,000
Self Direct	$ -	$ -	$ -	$ 10,352	$ -	$ -	$ 10,352
Small Business Energy Solutions	$ -	$ 27,210	$ 4,930	$ 115,459	$ -	$ 415	$ 148,014
Strategic Energy Management	$ -	$ 78,433	$ 1,429	$ 125,568	$ -	$ 20,010	$ 225,441
General Advertising-Bus	$ -	$ 2,369	$ 13,961	$ -	$ -	$ -	$ 16,330
Business Program Total	**$ -**	**$ 749,604**	**$ 50,237**	**$ 1,129,608**	**$ -**	**$ 60,675**	**$ 1,990,124**
Residential Program							
Residential Heating & Cooling	$ -	$ 647,082	$ 52,883	$ 2,395,047	$ -	$ 25,651	$ 3,120,663
Residential New Home Construction	$ -	$ 34,679	$ 36,419	$ 302,068	$ -	$ -	$ 373,165
Whole Home Efficiency	$ -	$ 17,925	$ 460	$ 59,955	$ -	$ 3,677	$ 82,017
General Advertising-Res	$ -	$ 2,513	$ 26,111	$ -	$ -	$ -	$ 28,624
Residential Program Total	**$ -**	**$ 702,199**	**$ 115,872**	**$ 2,757,070**	**$ -**	**$ 29,328**	**$ 3,604,469**
Income Qualified Program							
All-Electric Affordable New Home	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Multifamily Weatherization	$ -	$ 96,448	$ 45,040	$ 795,802	$ -	$ 15,064	$ 952,354
Non-Profit	$ -	$ 108,562	$ 17,395	$ 304,194	$ -	$ 25,224	$ 455,375
Single-Family Weatherization	$ -	$ 32,422	$ 23,338	$ 2,510,918	$ -	$ 23,358	$ 2,590,035
Tiered Geographic Prequalification	$ -	$ 35,728	$ 51,274	$ 369,242	$ -	$ 24,150	$ 480,394
Income Qualified Program Total	**$ -**	**$ 273,159**	**$ 137,048**	**$ 3,980,155**	**$ -**	**$ 87,796**	**$ 4,478,159**
Indirect Products & Services							
Education/Market Transformation							
Business Education	$ -	$ 12,045	$ 30,528	$ -	$ -	$ -	$ 42,573
Business Energy Analysis	$ -	$ 6,969	$ 800	$ 21,200	$ -	$ 1,400	$ 30,369
Community Energy Reporting	$ -	$ 27,665	$ -	$ -	$ -	$ -	$ 27,665
Consumer Education	$ -	$ 44,038	$ 120,647	$ -	$ -	$ -	$ 164,686
Energy Benchmarking	$ -	$ 13,060	$ -	$ -	$ -	$ -	$ 13,060
Home Energy Audit	$ -	$ 41,398	$ 3,158	$ 37,767	$ -	$ 17,534	$ 99,857
Partners in Energy	$ -	$ 64,312	$ 777	$ -	$ -	$ -	$ 65,088
Education/Market Transformation	**$ -**	**$ 209,487**	**$ 155,910**	**$ 58,967**	**$ -**	**$ 18,934**	**$ 443,298**
Planning and Research							
Market Research	$ -	$ 237,479	$ -	$ -	$ -	$ -	$ 237,479
Evaluation, Measurement & Verification	$ -	$ 19,505	$ -	$ -	$ -	$ 182,467	$ 201,973
Planning & Administration	$ -	$ 162,577	$ -	$ -	$ -	$ -	$ 162,577
Product Development	$ -	$ 240,174	$ -	$ -	$ -	$ 20,337	$ 260,511
Product Development Total	**$ -**	**$ 240,174**	**$ -**	**$ -**	**$ -**	**$ 20,337**	**$ 260,511**
Planning and Research Total	**$ -**	**$ 659,735**	**$ -**	**$ -**	**$ -**	**$ 202,805**	**$ 862,540**
Indirect Products & Services Total	**$ -**	**$ 869,222**	**$ 155,910**	**$ 58,967**	**$ -**	**$ 221,738**	**$ 1,305,837**
BE PORTFOLIO TOTAL	**$ -**	**$ 2,594,184**	**$ 459,067**	**$ 7,925,800**	**$ -**	**$ 399,538**	**$ 11,378,589**

Table 6c: Public Service's 2025 BE Budgets and Forecasts

2025	Participants	Budget	EE Net Gen kW	Net Generator kWh	Net Annual Other Fuels Dth Savings	Net Annual Dth Savings	Net Targeted Peak Dth/hr Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	mTRC Test Net Benefits (WACC)	mTRC Test Ratio
Business Program												
Business Energy Assessments	16	$241,911	0	-805,651	2,109	10,087	6.5	90,439	11,059	64.74	$193,887	1.10
Business HVAC+R Systems	688	$1,086,247	-150	-4,424,678	5,502	50,360	8.4	97,988	53,497	282.51	$3,939,403	1.63
Custom Efficiency	75	$806,945	0	-3,458,848	1,926	50,434	32.6	186,386	56,728	323.72	$2,411,369	1.29
New Construction	40	$1,595,751	-3,250	-10,512,680	0	43,240	0.0	52,234	35,250	277.54	$7,076,559	1.37
Self Direct	3	$10,352	0	-72,690	183	917	0.6	212,584	1,243	5.89	$42,372	1.25
Small Business Energy Solutions	87	$217,229	0	-279,214	0	5,273	0.0	47,475	5,709	33.85	$525,381	1.78
Strategic Energy Management	13	$639,597	0	-2,441,184	36,954	0	0.0	0	-3,005	N/A	-$5,463,253	0.08
General Advertising-Bus	N/A	$137,378	0	0	0	0	0.0	0	N/A	N/A		
Business Program Total	**922**	**$4,735,410**	**-3,401**	**-21,994,946**	**46,674**	**160,311**	**48.1**	**79,007**	**160,483**	**988.25**	**$8,588,341**	**1.20**
Residential Program												
Residential Heating & Cooling	8,152	$8,929,296	0	-45,478,345	0	405,936	28.0	90,988	349,815	2,299.30	-$31,837,884	0.71
Residential New Home Construction	-	$1,515,396	0	-2,601,122	0	18,949	95.6	20,244	29,025	182.44	$3,168,456	1.79
Whole Home Efficiency	64	$105,225	0	-256,127	0	2,922	0.6	67,589	2,618	16.56	-$176,723	0.77
General Advertising-Res	N/A	$336,018	0	0	0	0	0.0	0	N/A	N/A		
Residential Program Total	**8,216**	**$10,885,935**	**0**	**-48,335,594**	**0**	**427,806**	**124.3**	**77,691**	**381,457**	**2,498.30**	**-$29,182,170**	**0.75**
Income Qualified Program												
All-Electric Affordable New Home Construction	-	$0	0	0	0	0	0.0		N/A	N/A	$0	N/A
Multifamily Weatherization	80	$1,841,974	0	-979,251	0	10,066	0.0	11,119	6,787	44.64	-$3,923,317	0.44
Non-Profit	220	$815,636	0	-385,275	0	4,069	0.0	10,816	2,734	17.90	-$1,584,383	0.43
Single-Family Weatherization	567	$2,966,385	0	-1,752,514	0	15,518	0.1	10,547	13,141	86.67	$194,119	1.04
Tiered Geographic Prequalification	124	$888,857	0	-444,872	0	4,303	0.1	10,109	3,543	23.20	-$458,403	0.76
Income Qualified Program Total	**991**	**$6,512,853**	**0**	**-3,561,912**	**0**	**33,956**	**0.1**	**10,683**	**26,205**	**172.40**	**-$5,771,983**	**0.66**
Indirect Products & Services												
Education/Market Transformation												
Business Education	N/A	$41,780	0	0	0	0	0.0	0	N/A	N/A		
Business Energy Analysis	N/A	$60,961	0	0	0	0	0.0		N/A	N/A		
Community Energy Reporting	N/A	$37,266	0	0	0	0	0.0	0	N/A	N/A		
Consumer Education	N/A	$185,383	0	0	0	0	0.0	0	N/A	N/A		
Energy Benchmarking	N/A	$22,120	0	0	0	0	0.0		N/A	N/A		
Home Energy Audit	N/A	$151,818	0	0	0	0	0.0	0	N/A	N/A		
Partners in Energy	N/A	$106,722	0	0	0	0	0.0	0	N/A	N/A		
Education/Market Transformation Total	**N/A**	**$606,050**	**0**	**0**	**0**	**0**	**0.0**	**0**	**N/A**	**N/A**		
Planning and Research												
EE Market Research	N/A	$423,726	0	0	0	0	0.0	0	N/A	N/A		
EE Evaluation, Measurement & Verification	N/A	$375,030	0	0	0	0	0.0	0	N/A	N/A		
EE Planning & Administration	N/A	$167,454	0	0	0	0	0.0	0	N/A	N/A		
EE Product Development	N/A	$490,711	0	0	0	0	0.0	0	N/A	N/A		
EE Product Development Total	**N/A**	**$490,711**	**0**	**0**	**0**	**0**	**0.0**	**0**	**N/A**	**N/A**		
EE Planning and Research Total	**N/A**	**$1,456,920**	**0**	**0**	**0**	**0**	**0.0**	**0**	**N/A**	**N/A**		
EE Indirect Products & Services Total	**N/A**	**$2,062,971**	**0**	**0**	**0**	**0**	**0.0**	**0**	**N/A**	**N/A**		
EE PORTFOLIO TOTAL	**10,129**	**$24,197,170**	**-3,401**	**-73,892,452**	**46,674**	**622,073**	**172.5**	**53,283**	**568,145**	**3,658.95**	**-$28,340,437**	**0.84**

Table 6d: Public Service's 2025 BE Costs by Category

2025	Program Planning & Design	Administration & Program Delivery	Advertising & Promotion	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Business Program							
Business Energy Assessments	$ -	$ 91,751	$ 146	$ 150,014	$ -	$ -	$ 241,911
Business HVAC+R Systems	$ -	$ 286,147	$ 15,055	$ 776,292	$ -	$ 8,753	$ 1,086,247
Custom Efficiency	$ -	$ 253,205	$ 57,589	$ 492,602	$ -	$ 3,548	$ 806,945
New Construction	$ -	$ 696,982	$ 256	$ 820,323	$ -	$ 78,190	$ 1,595,751
Self Direct	$ -	$ -	$ -	$ 10,352	$ -	$ -	$ 10,352
Small Business Energy Solutions	$ -	$ 36,919	$ 6,120	$ 173,578	$ -	$ 612	$ 217,229
Strategic Energy Management	$ -	$ 147,157	$ 2,644	$ 451,794	$ -	$ 38,002	$ 639,597
General Advertising-Bus	$ -	$ 21,088	$ 116,290	$ -	$ -	$ -	$ 137,378
Business Program Total	**$ -**	**$ 1,533,249**	**$ 198,100**	**$ 2,874,955**	**$ -**	**$ 129,106**	**$ 4,735,410**
Residential Program							
Residential Heating & Cooling	$ -	$ 1,294,349	$ 122,198	$ 7,463,742	$ -	$ 49,007	$ 8,929,296
Residential New Home Construction	$ -	$ 322,937	$ 265,475	$ 926,984	$ -	$ -	$ 1,515,396
Whole Home Efficiency	$ -	$ 18,043	$ 457	$ 83,069	$ -	$ 3,657	$ 105,225
General Advertising-Res	$ -	$ 29,435	$ 306,583	$ -	$ -	$ -	$ 336,018
Residential Program Total	**$ -**	**$ 1,664,764**	**$ 694,713**	**$ 8,473,795**	**$ -**	**$ 52,664**	**$ 10,885,935**
Income Qualified Program							
All-Electric Affordable New Home	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Multifamily Weatherization	$ -	$ 177,734	$ 40,712	$ 1,594,362	$ -	$ 29,166	$ 1,841,974
Non-Profit	$ -	$ 150,065	$ 23,193	$ 608,388	$ -	$ 33,990	$ 815,636
Single-Family Weatherization	$ -	$ 41,118	$ 27,854	$ 2,868,326	$ -	$ 29,087	$ 2,966,385
Tiered Geographic Prequalification	$ -	$ 59,775	$ 120,471	$ 668,619	$ -	$ 39,993	$ 888,857
Income Qualified Program Total	**$ -**	**$ 428,692**	**$ 212,231**	**$ 5,739,694**	**$ -**	**$ 132,237**	**$ 6,512,853**
Indirect Products & Services							
Education/Market Transformation							
Business Education	$ -	$ 11,854	$ 29,925	$ -	$ -	$ -	$ 41,780
Business Energy Analysis	$ -	$ 13,606	$ 1,540	$ 43,120	$ -	$ 2,695	$ 60,961
Community Energy Reporting	$ -	$ 37,266	$ -	$ -	$ -	$ -	$ 37,266
Consumer Education	$ -	$ 49,451	$ 135,932	$ -	$ -	$ -	$ 185,383
Energy Benchmarking	$ -	$ 22,120	$ -	$ -	$ -	$ -	$ 22,120
Home Energy Audit	$ -	$ 68,438	$ 4,365	$ 45,226	$ -	$ 33,790	$ 151,818
Partners in Energy	$ -	$ 105,593	$ 1,129	$ -	$ -	$ -	$ 106,722
Education/Market Transformation	**$ -**	**$ 308,328**	**$ 172,892**	**$ 88,346**	**$ -**	**$ 36,485**	**$ 606,050**
Planning and Research							
Market Research	$ -	$ 423,726	$ -	$ -	$ -	$ -	$ 423,726
Evaluation, Measurement & Verification	$ -	$ 35,428	$ -	$ -	$ -	$ 339,601	$ 375,030
Planning & Administration	$ -	$ 167,454	$ -	$ -	$ -	$ -	$ 167,454
Product Development	$ -	$ 454,503	$ -	$ -	$ -	$ 36,208	$ 490,711
Product Development Total	**$ -**	**$ 454,503**	**$ -**	**$ -**	**$ -**	**$ 36,208**	**$ 490,711**
Planning and Research Total	**$ -**	**$ 1,081,111**	**$ -**	**$ -**	**$ -**	**$ 375,809**	**$ 1,456,920**
Indirect Products & Services Total	**$ -**	**$ 1,389,440**	**$ 172,892**	**$ 88,346**	**$ -**	**$ 412,294**	**$ 2,062,971**
BE PORTFOLIO TOTAL	**$ -**	**$ 5,016,145**	**$ 1,277,935**	**$ 17,176,790**	**$ -**	**$ 726,300**	**$ 24,197,170**

Table 6e: Public Service's 2026 BE Budgets and Forecasts

2026	Participants	Budget	EE Net Gen kW	Net Generator kWh	Net Annual Other Fuels Dth Savings	Net Annual Dth Savings	Net Targeted Peak Dth/hr Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	mTRC Test Net Benefits (WACC)	mTRC Test Ratio
Business Program												
Business Energy Assessments	16	$258,331	0	-805,651	2,109	10,087	6.5	87,395	11,371	64.74	$166,792	1.08
Business HVAC+R Systems	1,254	$2,618,191	-203	-7,683,961	5,502	79,452	8.8	83,062	83,190	454.88	$5,288,939	1.50
Custom Efficiency	141	$1,594,406	0	-6,911,639	2,843	101,785	65.9	169,600	115,821	653.32	$4,736,822	1.29
New Construction	60	$2,936,073	-5,771	-18,860,768	0	81,082	0.0	67,948	74,729	520.44	$12,705,872	1.37
Self Direct	3	$10,352	0	-72,690	183	917	0.6	212,584	1,271	5.89	$40,834	1.25
Small Business Energy Solutions	146	$383,284	0	-519,403	0	9,510	0.0	48,413	10,482	61.04	$794,509	1.59
Strategic Energy Management	22	$1,806,196	0	-7,281,148	110,221	0	0.0	0	-7,060	N/A	-$16,039,050	0.08
General Advertising-Bus	N/A	$167,402	0	0	0	0	0.0	0	N/A	N/A		
Business Program Total	**1,642**	**$9,774,235**	**-5,974**	**-42,135,261**	**120,858**	**282,832**	**81.8**	**78,542**	**289,804**	**1,760.31**	**$7,527,316**	**1.09**
Residential Program												
Residential Heating & Cooling	15,229	$17,715,404	0	-88,085,806	0	791,552	50.8	89,830	711,065	4,447.01	-$68,042,611	0.69
Residential New Home Construction	-	$3,238,978	0	-6,373,317	0	46,532	233.8	28,427	73,967	448.01	$8,377,998	1.90
Whole Home Efficiency	78	$147,796	0	-323,846	0	3,832	0.9	66,621	3,601	21.84	-$222,279	0.78
General Advertising-Res	N/A	$632,146	0	0	0	0	0.0	0	N/A	N/A		
Residential Program Total	**15,307**	**$21,734,324**	**0**	**-94,782,970**	**0**	**841,916**	**285.5**	**79,452**	**788,634**	**4,916.86**	**-$60,519,038**	**0.74**
Income Qualified Program												
All-Electric Affordable New Home Construction	-	$402,862	0	-249,762	0	2,215	11.4	12,581	3,584	21.32	$242,400	1.27
Multifamily Weatherization	121	$3,458,820	0	-1,945,963	0	20,027	0.0	11,695	14,254	88.76	-$7,567,399	0.44
Non-Profit	434	$1,472,968	0	-763,069	0	8,037	0.0	11,532	5,698	35.38	-$2,983,812	0.44
Single-Family Weatherization	620	$3,388,527	0	-1,964,078	0	17,485	0.1	10,399	15,542	97.35	$84,157	1.01
Tiered Geographic Prequalification	186	$1,358,920	0	-677,998	0	6,565	0.1	9,811	5,661	35.30	-$684,892	0.76
Income Qualified Program Total	**1,361**	**$10,082,096**	**0**	**-5,600,870**	**0**	**54,329**	**11.7**	**11,006**	**44,739**	**278.12**	**-$10,909,548**	**0.62**
Indirect Products & Services												
Education/Market Transformation												
Business Education	N/A	$52,505	0	0	0	0	0.0	0	N/A	N/A		
Business Energy Analysis	N/A	$80,611	0	0	0	0	0.0		N/A	N/A		
Community Energy Reporting	N/A	$42,728	0	0	0	0	0.0	0	N/A	N/A		
Consumer Education	N/A	$217,634	0	0	0	0	0.0	0	N/A	N/A		
Energy Benchmarking	N/A	$35,082	0	0	0	0	0.0		N/A	N/A		
Home Energy Audit	N/A	$183,964	0	0	0	0	0.0	0	N/A	N/A		
Partners in Energy	N/A	$168,463	0	0	0	0	0.0	0	N/A	N/A		
Education/Market Transformation Total	**N/A**	**$780,987**	**0**	**0**	**0**	**0**	**0.0**	**0**	**N/A**	**N/A**		
Planning and Research												
EE Market Research	N/A	$568,418	0	0	0	0	0.0	0	N/A	N/A		
EE Evaluation, Measurement & Verification	N/A	$358,374	0	0	0	0	0.0	0	N/A	N/A		
EE Planning & Administration	N/A	$172,477	0	0	0	0	0.0	0	N/A	N/A		
EE Product Development	N/A	$456,752	0	0	0	0	0.0	0	N/A	N/A		
EE Product Development Total	**N/A**	**$456,752**	**0**	**0**	**0**	**0**	**0.0**	**0**	**N/A**	**N/A**		
EE Planning and Research Total	**N/A**	**$1,556,021**	**0**	**0**	**0**	**0**	**0.0**	**0**	**N/A**	**N/A**		
EE Indirect Products & Services Total	**N/A**	**$2,337,009**	**0**	**0**	**0**	**0**	**0.0**	**0**	**N/A**	**N/A**		
EE PORTFOLIO TOTAL	**18,310**	**$43,927,664**	**-5,974**	**-142,519,101**	**120,858**	**1,179,077**	**378.9**	**59,134**	**1,123,177**	**6,955.29**	**-$66,132,115**	**0.81**

Table 6f: Public Service's 2026 BE Costs by Category

2026	Program Planning & Design	Administration & Program Delivery	Advertising & Promotion	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Business Program							
Business Energy Assessments	$ -	$ 105,794	$ 179	$ 152,358	$ -	$ -	$ 258,331
Business HVAC+R Systems	$ -	$ 854,391	$ 47,222	$ 1,682,153	$ -	$ 34,424	$ 2,618,191
Custom Efficiency	$ -	$ 480,341	$ 116,207	$ 984,341	$ -	$ 13,517	$ 1,594,406
New Construction	$ -	$ 1,182,108	$ 600	$ 1,582,388	$ -	$ 170,977	$ 2,936,073
Self Direct	$ -	$ -	$ -	$ 10,352	$ -	$ -	$ 10,352
Small Business Energy Solutions	$ -	$ 43,174	$ 7,729	$ 331,331	$ -	$ 1,050	$ 383,284
Strategic Energy Management	$ -	$ 365,268	$ 7,187	$ 1,327,652	$ -	$ 106,090	$ 1,806,196
General Advertising-Bus	$ -	$ 26,582	$ 140,820	$ -	$ -	$ -	$ 167,402
Business Program Total	**$ -**	**$ 3,057,658**	**$ 319,943**	**$ 6,070,576**	**$ -**	**$ 326,059**	**$ 9,774,235**
Residential Program							
Residential Heating & Cooling	$ -	$ 1,612,180	$ 156,495	$ 15,848,770	$ -	$ 97,959	$ 17,715,404
Residential New Home Construction	$ -	$ 589,085	$ 420,000	$ 2,229,893	$ -	$ -	$ 3,238,978
Whole Home Efficiency	$ -	$ 28,159	$ 750	$ 112,888	$ -	$ 6,000	$ 147,796
General Advertising-Res	$ -	$ 56,338	$ 575,808	$ -	$ -	$ -	$ 632,146
Residential Program Total	**$ -**	**$ 2,285,762**	**$ 1,153,053**	**$ 18,191,550**	**$ -**	**$ 103,959**	**$ 21,734,324**
Income Qualified Program							
All-Electric Affordable New Home	$ -	$ 27,779	$ 23,003	$ 352,080	$ -	$ -	$ 402,862
Multifamily Weatherization	$ -	$ 210,594	$ 45,227	$ 3,170,640	$ -	$ 32,359	$ 3,458,820
Non-Profit	$ -	$ 187,752	$ 34,203	$ 1,203,589	$ -	$ 47,424	$ 1,472,968
Single-Family Weatherization	$ -	$ 62,801	$ 39,764	$ 3,243,651	$ -	$ 42,310	$ 3,388,527
Tiered Geographic Prequalification	$ -	$ 88,464	$ 200,733	$ 1,011,586	$ -	$ 58,136	$ 1,358,920
Income Qualified Program Total	**$ -**	**$ 577,390**	**$ 342,931**	**$ 8,981,546**	**$ -**	**$ 180,229**	**$ 10,082,096**
Indirect Products & Services							
Education/Market Transformation							
Business Education	$ -	$ 14,675	$ 37,830	$ -	$ -	$ -	$ 52,505
Business Energy Analysis	$ -	$ 17,746	$ 1,980	$ 57,420	$ -	$ 3,465	$ 80,611
Community Energy Reporting	$ -	$ 42,728	$ -	$ -	$ -	$ -	$ 42,728
Consumer Education	$ -	$ 63,264	$ 154,370	$ -	$ -	$ -	$ 217,634
Energy Benchmarking	$ -	$ 35,082	$ -	$ -	$ -	$ -	$ 35,082
Home Energy Audit	$ -	$ 83,022	$ 5,350	$ 48,743	$ -	$ 46,849	$ 183,964
Partners in Energy	$ -	$ 166,825	$ 1,639	$ -	$ -	$ -	$ 168,463
Education/Market Transformation	**$ -**	**$ 423,342**	**$ 201,169**	**$ 106,163**	**$ -**	**$ 50,314**	**$ 780,987**
Planning and Research							
Market Research	$ -	$ 568,418	$ -	$ -	$ -	$ -	$ 568,418
Evaluation, Measurement & Verification	$ -	$ 35,546	$ -	$ -	$ -	$ 322,828	$ 358,374
Planning & Administration	$ -	$ 172,477	$ -	$ -	$ -	$ -	$ 172,477
Product Development	$ -	$ 421,223	$ -	$ -	$ -	$ 35,528	$ 456,752
Product Development Total	**$ -**	**$ 421,223**	**$ -**	**$ -**	**$ -**	**$ 35,528**	**$ 456,752**
Planning and Research Total	**$ -**	**$ 1,197,665**	**$ -**	**$ -**	**$ -**	**$ 358,356**	**$ 1,556,021**
Indirect Products & Services Total	**$ -**	**$ 1,621,007**	**$ 201,169**	**$ 106,163**	**$ -**	**$ 408,670**	**$ 2,337,009**
BE PORTFOLIO TOTAL	**$ -**	**$ 7,541,816**	**$ 2,017,097**	**$ 33,349,835**	**$ -**	**$ 1,018,917**	**$ 43,927,664**

Executive Summary: Demand Response Tables

The following tables summarize the forecasted impacts of the Company's proposed DR portfolio for 2024-2026, including anticipated expenditures, demand response savings, energy savings, greenhouse gas emission estimates, mTRC test ratios, and costs by budget category.

Table 7a: Public Service's 2024 DR Budgets and Forecast

2024	Electric Budget	Incremental Net Generator kW	Total Cumulative Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Demand Response Program							
Critical Peak Pricing	$431,257	8,667	36,213	1,552,945	718	$6,590,574	N/A
Electric Vehicle Critical Peak Pricing	$106,308	789	873	0	N/A	$59,780	N/A
Peak Day Partners	$525,337	1,743	23,000	515,586	238	$4,326,777	N/A
Peak Partner Rewards	$1,599,142	22,345	34,317	655,154	592	$12,450,481	N/A
Residential Battery Demand Response	$293,322	433	583	33,113	49	$96,011	1.33
Residential Demand Response	$17,357,312	31,114	328,267	171,459	264	$39,860,229	3.29
Small Commercial Building Controls	$482,259	834	2,008	13,291	20	$251,727	1.44
DR Program Total	**$20,794,937**	**65,925**	**425,261**	**2,941,548**	**1,881**	**$63,635,579**	**4.06**
Planning and Research							
DR Planning & Administration	$290,000	0	0	0	N/A		
DR Program Evaluations	$296,613	0	0	0	N/A		
DR Product Development	$1,498,103	0	0	0	N/A		
DR Planning and Research Total	**$2,084,716**	**0**	**0**	**0**	**N/A**		
Demand Management Approved in Other Proceedings							
Electric Vehicle Optimization	$0	1,639	1,639	0	435	$347,858	N/A
Interruptible Service Option Credit	$560,000	4,833	206,408	0	N/A	N/A	N/A
Demand Management Other Total	**$560,000**	**6,472**	**208,046**	**0**	**435**	**$347,858**	N/A
DR PORTFOLIO TOTAL	**$23,439,653**	**72,397**	**633,307**	**2,941,548**	**2,316**	**61,898,720**	**3.69**

Table 7b: Public Service's 2024 DR Costs by Category

2024	Program Planning & Design	Administration & Program Delivery	Advertising & Promotion	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Demand Response Program							
Critical Peak Pricing	$ -	$ 366,257	$ 65,000	$ -	$ -	$ -	$ 431,257
Electric Vehicle Critical Peak Pricing	$ -	$ 86,308	$ 5,000	$ -	$ 15,000	$ -	$ 106,308
Peak Day Partners	$ -	$ 52,500	$ 25,000	$ 432,837	$ 15,000	$ -	$ 525,337
Peak Partner Rewards	$ -	$ 389,596	$ 65,000	$ 1,144,546	$ -	$ -	$ 1,599,142
Residential Battery Demand Response	$ -	$ 205,322	$ 10,000	$ -	$ -	$ 78,000	$ 293,322
Residential Demand Response	$ -	$ 6,268,600	$ 823,000	$ 10,094,712	$ -	$ 171,000	$ 17,357,312
Small Commercial Building Controls	$ -	$ 319,998	$ 57,500	$ 84,761	$ -	$ 20,000	$ 482,259
DR Program Total	**$ -**	**$ 7,688,582**	**$ 1,050,500**	**$ 11,756,855**	**$ 30,000**	**$ 269,000**	**$ 20,794,937**
Planning and Research							
DR Planning & Administration	$ -	$ 290,000	$ -	$ -	$ -	$ -	$ 290,000
DR Program Evaluations	$ -	$ 21,613	$ -	$ -	$ -	$ 275,000	$ 296,613
DR Product Development	$ -	$ 1,298,103	$ -	$ -	$ -	$ 200,000	$ 1,498,103
DR Planning and Research Total	**$ -**	**$ 1,609,716**	**$ -**	**$ -**	**$ -**	**$ 475,000**	**$ 2,084,716**
Demand Management Approved in Other Proceedings							
Electric Vehicle Optimization	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Interruptible Service Option Credit	$ -	$ 560,000	$ -	$ -	$ -	$ -	$ 560,000
Demand Management Other Total	**$ -**	**$ 560,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 560,000**
DR PORTFOLIO TOTAL	**$ -**	**$ 9,858,298**	**$ 1,050,500**	**$ 11,756,855**	**$ 30,000**	**$ 744,000**	**$ 23,439,653**

Table 7c: Public Service's 2025 DR Budgets and Forecast

2025	Electric Budget	Incremental Net Generator kW	Total Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Demand Response Program							
Critical Peak Pricing	$437,977	4,081	40,294	1,727,959	762	$7,560,750	N/A
Electric Vehicle Critical Peak Pricing	$107,397	312	1,185	0	N/A	$122,516	N/A
Peak Day Partners	$565,475	2,000	25,000	560,420	247	$4,814,132	N/A
Peak Partner Rewards	$1,749,467	3,995	38,311	731,402	497	$14,206,122	N/A
Residential Battery Demand Response	$327,949	433	1,016	33,113	38	$67,536	1.21
Residential Demand Response	$18,004,442	29,870	335,394	173,616	199	$39,006,108	3.16
Small Commercial Building Controls	$705,555	3,020	5,020	48,135	55	$2,003,452	2.98
DR Program Total	**$21,898,262**	**43,710**	**446,219**	**3,274,646**	**1,797**	**$67,780,616**	**4.08**
Planning and Research							
DR Planning & Administration	$221,200	0	0	0	N/A		
DR Program Evaluations	$341,232	0	0	0	N/A		
DR Product Development	$1,519,246	0	0	0	N/A		
DR Planning and Research Total	**$2,081,678**	**0**	**0**	**0**	**N/A**		
Demand Management Approved in Other Proceedings							
Electric Vehicle Optimization	$0	3,739	3,739	0	1,028	$810,868	N/A
Interruptible Service Option Credit	$560,000	654	207,062	0	N/A	N/A	N/A
Demand Management Other Total	**$560,000**	**4,393**	**210,801**	**0**	**1,028**	**$810,868**	N/A
DR PORTFOLIO TOTAL	**$24,539,939**	**48,104**	**657,020**	**3,274,646**	**2,825**	**$66,509,806**	**3.73**

Table 7d: Public Service's 2025 DR Costs by Category

2025	Program Planning & Design	Administration & Program Delivery	Advertising & Promotion	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Demand Response Program							
Critical Peak Pricing	$ -	$ 372,977	$ 65,000	$ -	$ -	$ -	$ 437,977
Electric Vehicle Critical Peak Pricing	$ -	$ 87,397	$ 5,000	$ -	$ 15,000	$ -	$ 107,397
Peak Day Partners	$ -	$ 55,000	$ 25,000	$ 470,475	$ 15,000	$ -	$ 565,475
Peak Partner Rewards	$ -	$ 406,716	$ 65,000	$ 1,277,751	$ -	$ -	$ 1,749,467
Residential Battery Demand Response	$ -	$ 257,949	$ 10,000	$ -	$ -	$ 60,000	$ 327,949
Residential Demand Response	$ -	$ 6,933,600	$ 823,000	$ 10,076,842	$ -	$ 171,000	$ 18,004,442
Small Commercial Building Controls	$ -	$ 321,084	$ 57,500	$ 306,971	$ -	$ 20,000	$ 705,555
DR Program Total	**$ -**	**$ 8,434,723**	**$ 1,050,500**	**$ 12,132,039**	**$ 30,000**	**$ 251,000**	**$ 21,898,262**
Planning and Research							
DR Planning & Administration	$ -	$ 221,200	$ -	$ -	$ -	$ -	$ 221,200
DR Program Evaluations	$ -	$ 26,232	$ -	$ -	$ -	$ 315,000	$ 341,232
DR Product Development	$ -	$ 1,319,246	$ -	$ -	$ -	$ 200,000	$ 1,519,246
DR Planning and Research Total	**$ -**	**$ 1,566,678**	**$ -**	**$ -**	**$ -**	**$ 515,000**	**$ 2,081,678**
Demand Management Approved in Other Proceedings							
Electric Vehicle Optimization	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Interruptible Service Option Credit	$ -	$ 560,000	$ -	$ -	$ -	$ -	$ 560,000
Demand Management Other Total	**$ -**	**$ 560,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 560,000**
DR PORTFOLIO TOTAL	**$ -**	**$ 10,561,401**	**$ 1,050,500**	**$ 12,132,039**	**$ 30,000**	**$ 766,000**	**$ 24,539,939**

Table 7e: Public Service's 2026 DR Budgets and Forecast

2026	Electric Budget	Incremental Net Generator kW	Total Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Demand Response Program							
Critical Peak Pricing	$469,898	5,829	46,123	1,977,936	471	$8,783,998	N/A
Electric Vehicle Critical Peak Pricing	$108,519	312	1,497	0	N/A	$187,706	N/A
Peak Day Partners	$643,251	4,000	29,000	650,087	155	$5,683,017	N/A
Peak Partner Rewards	$1,941,286	4,782	43,093	822,694	340	$16,280,968	N/A
Residential Battery Demand Response	$378,337	520	1,536	39,735	32	$102,870	1.27
Residential Demand Response	$18,385,637	28,625	342,380	175,774	136	$38,365,642	3.08
Small Commercial Building Controls	$536,636	1,350	6,270	21,517	17	$696,997	2.03
DR Program Total	**$22,463,564**	**45,418**	**469,898**	**3,687,744**	**1,151**	**$70,101,197**	**4.14**
Planning and Research							
DR Planning & Administration	$67,436	0	0	0	N/A		
DR Program Evaluations	$352,869	0	0	0	N/A		
DR Product Development	$1,540,873	0	0	0	N/A		
DR Planning and Research Total	**$1,961,178**	**0**	**0**	**0**	**N/A**		
Demand Management Approved in Other Proceedings							
Electric Vehicle Optimization	$0	4,656	4,656	0	1,256	$1,029,634	N/A
Interruptible Service Option Credit	$560,000	981	208,043	0	N/A	N/A	N/A
Demand Management Other Total	**$560,000**	**5,637**	**212,699**	**0**	**1,256**	**$1,029,634**	N/A
DR PORTFOLIO TOTAL	**$24,984,742**	**51,055**	**682,598**	**3,687,744**	**2,408**	**$69,169,654**	**3.81**

Table 7f: Public Service's 2026 DR Costs by Category

2026	Program Planning & Design	Administration & Program Delivery	Advertising & Promotion	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Demand Response Program							
Critical Peak Pricing	$ -	$ 379,898	$ 65,000	$ -	$ -	$ 25,000	$ 469,898
Electric Vehicle Critical Peak Pricing	$ -	$ 88,519	$ 5,000	$ -	$ 15,000	$ -	$ 108,519
Peak Day Partners	$ -	$ 57,500	$ 25,000	$ 545,751	$ 15,000	$ -	$ 643,251
Peak Partner Rewards	$ -	$ 414,049	$ 65,000	$ 1,437,237	$ -	$ 25,000	$ 1,941,286
Residential Battery Demand Response	$ -	$ 348,337	$ 10,000	$ -	$ -	$ 20,000	$ 378,337
Residential Demand Response	$ -	$ 7,358,600	$ 823,000	$ 10,033,037	$ -	$ 171,000	$ 18,385,637
Small Commercial Building Controls	$ -	$ 322,203	$ 57,500	$ 136,933	$ -	$ 20,000	$ 536,636
DR Program Total	**$ -**	**$ 8,969,106**	**$ 1,050,500**	**$ 12,152,958**	**$ 30,000**	**$ 261,000**	**$ 22,463,564**
Planning and Research							
DR Planning & Administration	$ -	$ 67,436	$ -	$ -	$ -	$ -	$ 67,436
DR Program Evaluations	$ -	$ 22,869	$ -	$ -	$ -	$ 330,000	$ 352,869
DR Product Development	$ -	$ 1,340,873	$ -	$ -	$ -	$ 200,000	$ 1,540,873
DR Planning and Research Total	**$ -**	**$ 1,431,178**	**$ -**	**$ -**	**$ -**	**$ 530,000**	**$ 1,961,178**
Demand Management Approved in Other Proceedings							
Electric Vehicle Optimization	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Interruptible Service Option Credit	$ -	$ 560,000	$ -	$ -	$ -	$ -	$ 560,000
Demand Management Other Total	**$ -**	**$ 560,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 560,000**
DR PORTFOLIO TOTAL	**$ -**	**$ 10,960,284**	**$ 1,050,500**	**$ 12,152,958**	**$ 30,000**	**$ 791,000**	**$ 24,984,742**

DSM & BE Participation

Decision No. C14-0731 in the 2013 DSM Strategic Issues (Proceeding No. 13A-0686EG) directed the Company to "collect, define, and analyze participant and non-participant rates. In future DSM plan filings, the Company shall explain how these data were collected and used for each program."[20] Furthermore, the Commission clarified in Decision No. C14-0997 that:

> [W]e also require that the Company set forth proposals for tracking participants and non-participants for specific programs and measures and to provide estimates of participant and non-participant counts in its DSM Plans. While we recognize that, for certain programs or measures it may be difficult or prohibitively expensive to collect such data, it is reasonable for the Commission to consider plans for tracking participation and non-participation when programs and measures are proposed in a DSM Plan filing and when we review the cost-effectiveness and ratepayer impacts of those programs and measures.[21]

Tracking Participants / Non-Participants

To most effectively comply with the above-referenced decision, Public Service has determined that participant counts should be collected at the customer level (rather than at the premise level as had been done in the past) and provided by DSM product and by customer class. Because customers may participate in more than one product within a single year, the total number of portfolio participants will not be a direct summation of the individual product participation counts. In order to identify the non-participants, the Company will provide the number and percentage that the portfolio participation count makes up of total Public Service customers (eligible for DSM).[22] Going forward, the Company will begin to identify the number of customers participating in each product in a given year within the Annual DSM & BE Status Report. Additionally, within the Status Report, a portfolio participation and non-participation count will be provided.

The Company believes a thorough analysis of participants and non-participants must go beyond a counting of participation each year. It must also consider the amount of cumulative consumption savings realized by individual customers each year, due to the participation in DSM products over several program years. To this end, the Company will also identify the estimated percentages of business and residential customers by their range of consumption savings attributable to DSM participation since the expansion of the DSM programs in 2009. The extent of individual participation can further be compared to the cumulative rate impacts of DSM programs since 2009. The combination of these factors results in the level and distribution of bill savings among business and residential customers. This additional participation data analysis is included in the Annual DSM/BE Status Reports.

[20] Decision No. C14-0731 at 39, ¶ 115 (mailed July 1, 2014).

[21] Decision No. C14-0997 at 8, ¶ 24 (mailed August 18, 2014).

[22] Public Service gas transport customer classes are not eligible to participate in gas energy efficiency. Gas transport customers who receive retail electric service from Public Service are eligible to participate in beneficial electrification.

Key Assumptions
Participation data is provided with the following key assumptions:

- A participant will be "one individual customer" (based on account number) participating in DSM & BE in a given year.[23] Customers may have multiple premises,[24] multiple projects, and/or participate in multiple DSM & BE products across multiple years. (This represents a shift from historical reporting of "participant" which was based on premises).
- Some participation related data analysis is provided only at the portfolio level, such as non-participant[25] data; this approach ensures that the endeavor is not undertaken in a manner that is costly or extensively laborious.
- Downstream products' participation counts will be actual customer counts based on tracked participation data (means of tracking as identified in Tables 8b and 8c).
- Where mid/upstream products do not track participation at the customer level, counts will be an estimate within both the DSM & BE plans and the Annual DSM/BE Status Reports, unless otherwise noted, given the nature of the approach and difficulty and cost associated with specific customer tracking.

Product-Specific Considerations
Products with unique participant tracking approaches are described below:

Business HVAC+R – Midstream: The participant tracking mechanism for the midstream rebate portion of the product will be determined in conjunction with the selected third-party implementer. The data will either be directly uploaded into Salesforce—the Company's tracking software—or tracked separately and manually added to the Salesforce data for the third-party implemented portion of product participation.

Lighting Efficiency and Small Business Solutions – Midstream Lighting: Product participation for the midstream component of the product is derived through monthly sales reporting from the third-party implementer. This data is manually entered into Salesforce and is also tracked separately.

Energy Efficient Showerhead: Public Service uploads a participation report from the third-party implementer into Salesforce; however, a manual calculation needs to be completed (given current Salesforce configuration) to identify the total number of unique customers that receive a showerhead.

Home Lighting & Recycling: This product is wide-reaching with a significant number of bulbs sold and distributed across mainly the Residential populations. Because the product achieves its participation through IQ and disproportionately impacted ("DI") retail outlets that do not track information on the customers purchasing the bulbs in the product, some estimation of the breadth

[23] Within the Detailed Technical Assumptions table at the end of Appendix H: Technical Reference Manual of this Plan, the Company identifies "units," which differ from "participants." Units are the total number of equipment installed by measure.

[24] A premise is an individual physical location where a customer is served; a customer may have multiple premises associated with their one account, and vice versa a premise could have multiple customer accounts. For tracking participants, individual customer accounts will be tracked as one participant.

[25] A non-participant is a Public Service customer who is eligible to participate in DSM but has not chosen to do so. This type of data point can be tracked based on total Public Service customers and/or Public Service customers by class (business or residential).

of participation—based on average bulbs per customer, total installed bulbs, and the product saturation rate—has been performed.

Multifamily Weatherization and Multi-Family Buildings Efficiency: Participants are both residents living within housing units that receive energy-efficiency measures (regardless of whether they paid for improvements or received them as a direct-install measure), as well as the building and/or equipment owners, who may not represent the metered, bill-payer given the nature of multifamily building units.

School Education Kits: The Company presumes one customer account per kit. However, it is possible that there may be very limited circumstances where a customer could receive two or more kits in one program year and/or multiple kits over the course of several program years (not unlike potential duplicate participation in other DSM & BE products), but these instances cannot be tracked.

Class Participation Calculations

To estimate the count of unique customers participating within each segment (Business or Residential), calculations must be made to estimate the duplication of participation across the individual products. Summing the participation across products and then applying adjustments to account for duplicate participation results in an accurate measure of the breadth of participation within each segment. The methods to estimate duplicate participation across various types of products are described below:

Individually-Tracked Products: To estimate the amount of duplicate participation expected to occur in the 2024-2026 program years, the ratio of the sum of unique participation within each product observed in last full program year (2022) over the unique participation within the Business or Residential segment is calculated. For instance, for the Business class of customers in the 2022 program year, individually-tracked products had a sum of 13,720 unique accounts within products, but these represented only 4,996 unique accounts within the Business class. This results in a factor of 36.4% to account for duplicate participation across the individually tracked products.

Non-Individually-Tracked Products: For the Home Lighting & Recycling product it is not feasible to track the individual participation. Home Lighting & Recycling includes an upstream delivery model that represents very large participation and does not provide an opportunity to identify the individual participants. For 2024-2026, behavioral products for both the Business and Residential classes will be applied to a large fraction of the population, with the individual participants not yet determined. For these products, duplicate participation is estimated by multiplying the fraction of population represented by each product by each other. For instance, if in 2024, the Home Lighting & Recycling product is expected to reach 25% of the Residential class population, and the Residential Behavioral product is expected to reach 40% of the Residential class, the duplicate participation is estimated at 10% (25% * 40%) of the Residential class. The total fraction of the Residential class population participating in either of these products is estimated by summing the total fraction of the two products at 65% (25% + 40%) and then subtracting the duplicate participation fraction (10%) to get a fraction of 55% of the Residential class population participating in at least one of these products.

Participation Tables

The following tables included in this Plan present the Company's best estimates for participation and non-participation in its DSM & BE offerings and products in 2024-2026, based on the methodology for estimating participation described above.

- 8a: 2024-2026 Electric Participant & Non-Participant Estimates, Percentage
- 8b: 2024-2026 Electric Participation Estimates, Average Rebate and Savings by Product
- 8c: 2024-2026 Natural Gas Participation Estimates by Product

Table 8a: 2024-2026 Electric Participant & Non-Participant Estimates, Percentage

	Total Unique DSM Participants		Total PSCo Customers		PSCo Customers Participating in DSM		PSCo Customers Not Participating in DSM	
	Count	%	Count	%	Count	%	Count	%
2024 Total	703,989	100%	1,512,398	100.00%	703,989	46.55%	808,409	53.45%
Business	15,835	2.25%	108,712	7.19%	15,835	14.57%	92,877	85.43%
Residential	688,155	97.75%	1,403,686	92.81%	688,155	49.02%	715,531	50.98%
2025 Total	702,099	100%	1,542,647	100.00%	702,099	45.51%	840,548	54.49%
Business	16,225	2.31%	110,887	7.19%	16,225	14.63%	94,662	85.37%
Residential	685,874	97.69%	1,431,760	92.81%	685,874	47.90%	745,886	52.10%
2026 Total	701,852	100%	1,573,499	100.00%	701,852	44.60%	871,647	55.40%
Business	15,977	2.28%	113,104	7.19%	15,977	14.13%	97,127	85.87%
Residential	685,874	97.72%	1,460,395	92.81%	685,874	46.96%	774,521	53.04%

Table 8b: 2024-2026 Electric Participation Estimates, Average Rebate and Savings by Product

Product	2024 Estimated Participants	Average Rebate Per Customer	Average kWh Savings Per Customer	2025 Estimated Participants	Average Rebate Per Customer	Average kWh Savings Per Customer	2026 Estimated Participants	Average Rebate Per Customer	Average kWh Savings Per Customer
Business Program									
Business Energy Assessments	516	$5,694	58,197	516	$4,765	58,197	516	$4,669	58,197
Business HVAC+R Systems	1,855	$2,420	13,241	3,065	$1,880	10,081	4,098	$1,334	7,606
Compressed Air Efficiency	83	$5,716	56,259	99	$5,716	57,031	110	$5,716	57,325
Custom Efficiency	51	$3,459	39,469	97	$3,833	44,468	163	$1,351	12,349
Data Center Efficiency	9	$100,265	1,119,214	9	$100,265	1,119,214	4	$187,023	2,242,599
Energy Management Systems	847	$351	8,407	883	$397	8,709	919	$424	10,207
LED Street Lighting	4	$0	330,537	4	$0	330,537	4	$0	330,537
Lighting Efficiency	7,668	$1,103	10,565	6,531	$938	10,068	5,925	$721	8,839
New Construction	212	$22,062	299,333	199	$22,062	300,079	185	$22,062	309,576
Self Direct	8	$50,000	556,614	8	$50,000	556,614	8	$50,000	556,614
Small Business Energy Solutions	6,739	$645	3,552	6,832	$581	2,673	4,630	$937	3,818
Strategic Energy Management	388	$14,270	172,833	388	$14,616	180,162	401	$14,665	186,811
Residential Program Total									
Energy Efficient Showerhead	8,753	$2	136	8,753	$2	136	11,073	$2	136
Home Energy Insights	1,865,725	$0	20	2,076,160	$0	19	2,299,765	$0	19
Home Energy Squad	8,000	$128	1,016	16,250	$97	740	11,000	$135	1,142
Home Lighting & Recycling	60,019	$11	97	57,942	$11	99	56,365	$11	101
Insulation & Air Sealing	6,013	$115	172	7,668	$115	180	11,162	$115	183
Multi-Family Buildings Efficiency	1,849	$893	3,522	1,842	$893	3,536	1,836	$893	3,547
Refrigerator & Freezer Recycling	5,350	$50	640	5,905	$50	641	6,460	$50	641
Residential Heating & Cooling	38,877	$71	179	48,479	$86	229	62,644	$99	286
Residential New Home Construction	2,940	$832	1,598	242	$9,145	13,542	551	$6,407	9,217
School Education Kits	56,350	$29	173	56,762	$29	173	57,167	$29	173
Whole Home Efficiency	371	$391	1,906	384	$388	1,854	398	$381	1,802
Income Qualified Program									
All-Electric Affordable New Home Construction	0	$0	0	0	$0	0	25	$15,917	5,044
Energy Savings Kit	27,850	$6	91	27,850	$6	91	27,850	$6	91
Income Qualified Home Energy Squad	0	$0	0	0	$0	0	0	$0	0
Multifamily Weatherization	124	$4,525	17,991	144	$5,430	15,087	185	$6,789	12,365
Non-Profit	220	$1,742	7,456	385	$1,233	4,318	708	$927	2,410
Single-Family Weatherization	2,915	$961	5,224	3,015	$955	5,062	3,121	$946	4,900
Tiered Geographic Prequalification	653	$2,334.43	22,975	754	$2,096.93	19,926	867	$1,881.25	17,349
Indirect Products & Services									
Business Education	21,120	$0	0	21,120	$0	0	21,120	$0	0
Business Energy Analysis	220	$2,313	0	286	$1,807	0	372	$1,406	0
Community Energy Reporting	300	$0	0	325	$0	0	350	$0	0
Consumer Education	120,125	$0	0	120,125	$0	0	120,125	$0	0
Energy Benchmarking	3,766	$42	0	4,519	$42	0	5,422	$43	0
Home Energy Audit	3,600	$50	0	6,450	$27	0	7,763	$22	0
Partners in Energy	N/A			N/A			N/A		
Demand Response									
Critical Peak Pricing	62	$0	25,063	69	$0	25,063	79	$0	25,063
Electric Vehicle Critical Peak Pricing	28	$0	0	38	$0	0	48	$0	0
Electric Vehicle Optimization	3,774	$0	0	8,900	$0	0	10,887	$0	0
Peak Day Partners	8	$51,000	60,750	9	$51,000	60,750	11	$51,000	60,750
Peak Partner Rewards	91	$12,573	7,197	102	$12,573	7,197	114	$12,573	7,197
Residential Battery Demand Response	500	$0	66	500	$0	66	600	$0	66
Residential Demand Response	22,300	$453	8	21,375	$471	8	20,450	$491	9
Small Commercial Building Controls	370	$229	36	1,340	$229	36	599	$229	36

Table 8c: 2024-2026 Natural Gas Participation Estimates by Product

Product	2024 Natural Gas DSM Participation Estimated	2025 Natural Gas DSM Participation Estimated	2026 Natural Gas DSM Participation Estimated
Business Program			
Business Energy Assessments	516	516	516
Business HVAC+R Systems	256	791	1,348
Custom Efficiency	44	95	164
Energy Management Systems	15	16	17
New Construction	55	46	26
Small Business Energy Solutions	249	284	342
Residential Program Total			
Energy Efficient Showerhead	89,694	80,447	90,921
Home Energy Insights	900,000	890,000	1,050,000
Home Energy Squad	8,000	16,250	11,000
Insulation & Air Sealing	3,857	5,263	7,334
Multifamily Buildings	180	214	241
Residential Heating & Cooling	8,071	12,349	19,230
Residential New Home Construction	4,842	226	551
School Education Kits	48,250	48,500	48,740
Whole Home Efficiency	78	91	105
Income Qualified Program			
Energy Savings Kit	10,900	10,900	10,900
Multifamily Weatherization	112	140	189
Non-Profit	212	335	569
Single-Family Weatherization	5,595	5,645	5,010
Tiered Geographic Prequalification	6,348	6,403	5,807
Indirect Products & Services			
Business Education	1,176	1,176	1,176
Business Energy Analysis	220	286	372
Community Energy Reporting	300	325	350
Consumer Education	3,812	3,812	3,812
Energy Benchmarking	4,290	5,148	6,177
Home Energy Audit	4,800	8,600	10,350
Partners in Energy	N/A	N/A	N/A

Business Program

A. Description

The Business Program offers prescriptive and custom DSM/BE products to commercial and industrial customers in the Colorado service territory.[26] The Company has a total of 285,110 gas and electric commercial and industrial customer premises in Colorado.[27] A breakdown of business premises by type is shown in the table below.

Table 9: Business Premise Counts by Type[28]

	Natural Gas Only	Electric Only	Both Gas & Electric	Total
Commercial	35,990	97,820	68,717	202,527
Industrial	731	268	486	1,485
Total	**36,721**	**98,088**	**69,203**	**204,012**

The Company divides business customers into three sub-segments for marketing purposes: (1) large customers and (2) small- and (3) medium-sized customers. Large customers are typically single or aggregated electric customers with demand usage that exceeds 500 kW, natural gas customers with annual loads of 5,000 Dth or more, and/or national customers, such as fast-food chains. The Company assigns an Account Manager to large customers to serve as a liaison on a variety of energy topics. Small- and medium-sized business customers work with the Company's Business Solutions Center ("BSC") to answer any questions they may have on their accounts and to discuss Company resources for potential energy efficiency projects.

Products

An extensive portfolio of products is planned for the Business Program in 2024-2026 including a mix of electric and natural gas products. All natural gas products coincide with their electric counterparts such as Custom Efficiency where electric, natural gas, or electric and natural gas savings can be analyzed. The Business product rankings are shown in Table 10 below.

[26] Most of the Company's high natural gas consumption customers are transportation-only customers that do not purchase gas directly from the Company, and therefore those customers are exempt from the DSMCA and ineligible to participate in the Company's gas efficiency products.

[27] Premise counts as of January 1, 2023.

[28] Natural gas transportation-only customers are excluded.

Table 10: Business Program Product Rankings[29]

2024-26	Rank
Lighting Efficiency	4
New Construction	6
Strategic Energy Management	9
Small Business Solutions	10
Business HVAC+R Systems	12
Business Energy Assessments	13
Data Center Efficiency	17
Compressed Air Efficiency	19
Energy Management Systems	21
Self Direct	23
LED Street Lighting	24
Custom Efficiency	26

B. Forecasts, Participants & Budgets

Forecasts and Participants

The Business Program's forecasts were reviewed by the Company's energy efficiency team for reasonability and appropriateness based on market potential.

The product's energy savings and participation, and corresponding budgets, are shown in Tables 11a, 11b and 11c below.

Table 11a: 2024 Electric Business Program Budgets and Forecasts

2024	Electric Budget	Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Business Program						
Business Energy Assessments	$4,425,009	3,579	30,029,905	50,390	$7,896,230	1.60
Business HVAC+R Systems	$6,290,570	6,394	24,561,824	42,957	$15,893,248	2.10
Compressed Air Efficiency	$767,879	605	4,643,831	8,433	$2,086,985	2.30
Custom Efficiency	$521,768	412	2,012,911	3,555	$1,420,139	1.29
Data Center Efficiency	$1,165,109	1,636	10,072,929	19,380	$5,906,648	2.65
Energy Management Systems	$1,158,986	585	7,121,056	12,887	$731,191	1.21
LED Street Lighting	$0	0	1,322,146	2,853	$309,991	1.99
Lighting Efficiency	$12,284,445	14,768	81,010,367	139,816	$38,857,275	2.22
New Construction	$8,887,323	18,080	63,605,397	118,399	$100,785,221	4.03
Self Direct	$466,372	996	4,452,909	7,769	$1,765,757	1.64
Small Business Energy Solutions	$5,446,401	5,064	23,938,150	36,381	$9,718,599	1.85
Strategic Energy Management	$7,932,517	11,362	67,059,160	104,457	$30,969,911	2.54
General Advertising-Bus	$588,467					
Business Program Total	**$49,934,844**	**63,480**	**319,830,586**	**547,276**	**$215,752,728**	**2.53**

[29]All products in the DSM portfolio were ranked through the same process and the full results can be found in Appendix C of this Plan.

Table 11b: 2024 Natural Gas Business Program Budgets and Forecasts

2024	Gas Budget	Net Annual Dth Savings	Net Targeted Peak Dth/hr Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	mTRC Test Net Benefits (WACC)	Gas mTRC Test Ratio
Business Program								
Business Energy Assessments	$64,750	8,958	4.4	138,355	6,272	34.5	$964,065	7.99
Business HVAC+R Systems	$375,440	24,674	11.1	65,721	28,281	155.4	$3,746,612	4.15
Custom Efficiency	$101,723	5,798	3.8	57,001	5,759	31.6	$706,782	3.05
Energy Management Systems	$85,871	8,131	1.3	94,686	5,137	28.2	$257,623	1.36
New Construction	$853,849	99,748	0.0	116,822	116,546	640.3	$28,632,061	9.06
Small Business Energy Solutions	$63,946	13,953	0.5	218,203	8,433	46.3	$2,738,119	18.81
General Advertising-Bus	$82,093							
Business Program Total	**$1,627,672**	**161,264**	**21.0**	**99,076**	**170,427**	**936.3**	**$36,963,170**	**6.99**

Table 11c: 2025 Electric Business Program Budgets and Forecasts

2025	Electric Budget	Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Business Program						
Business Energy Assessments	$3,948,925	3,579	30,029,905	38,349	$6,809,853	1.54
Business HVAC+R Systems	$7,562,948	8,209	30,897,894	41,350	$20,038,530	2.12
Compressed Air Efficiency	$894,611	734	5,654,420	7,980	$2,454,251	2.30
Custom Efficiency	$636,439	821	4,313,380	5,856	$3,308,344	1.33
Data Center Efficiency	$1,200,072	1,636	10,072,929	15,127	$5,601,021	2.55
Energy Management Systems	$1,293,437	770	7,689,676	10,793	$776,766	1.20
LED Street Lighting	$0	0	1,322,146	2,277	$265,668	1.85
Lighting Efficiency	$9,776,881	12,254	65,754,864	86,002	$30,772,245	2.34
New Construction	$8,215,317	16,909	59,682,599	86,177	$93,028,015	4.00
Self Direct	$468,363	996	4,452,909	5,948	$1,631,016	1.59
Small Business Energy Solutions	$5,051,772	3,935	18,264,621	20,612	$6,311,781	1.64
Strategic Energy Management	$8,028,116	11,652	69,902,960	83,877	$30,423,826	2.47
General Advertising-Bus	$480,381					
Business Program Total	**$47,557,263**	**61,495**	**308,038,303**	**404,348**	**$200,940,935**	**2.46**

Table 11d: 2025 Natural Gas Business Program Budgets and Forecasts

2025	Gas Budget	Net Annual Dth Savings	Net Targeted Peak Dth/hr Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	mTRC Test Net Benefits (WACC)	Gas mTRC Test Ratio
Business Program								
Business Energy Assessments	$67,383	8,958	4.4	132,948	6,272	34.5	$994,151	8.06
Business HVAC+R Systems	$264,727	22,258	9.0	84,081	24,406	134.1	$3,290,628	4.14
Custom Efficiency	$178,849	8,283	5.4	46,314	8,226	45.2	$1,067,413	3.03
Energy Management Systems	$94,378	8,891	1.6	94,210	5,804	31.9	$371,124	1.50
New Construction	$844,738	84,631	0.0	100,186	98,882	543.2	$24,501,696	8.88
Small Business Energy Solutions	$59,916	13,953	0.5	232,879	8,433	46.3	$2,783,084	19.56
General Advertising-Bus	$69,131							
Business Program Total	**$1,579,121**	**146,975**	**20.8**	**93,074**	**152,023**	**835.1**	**$32,938,964**	**6.69**

Table 11e: 2026 Electric Business Program Budgets and Forecasts

2026	Electric Budget	Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Business Program						
Business Energy Assessments	$3,867,578	3,579	30,029,905	27,145	$5,724,451	1.46
Business HVAC+R Systems	$6,658,373	7,706	31,169,469	29,787	$17,615,873	1.97
Compressed Air Efficiency	$989,395	815	6,279,609	6,461	$2,532,461	2.19
Custom Efficiency	$429,622	412	2,012,911	1,960	$1,440,374	1.30
Data Center Efficiency	$1,065,342	1,500	8,970,397	9,980	$5,109,623	2.71
Energy Management Systems	$1,423,386	886	9,380,207	9,343	$497,639	1.11
LED Street Lighting	$0	0	1,322,146	1,727	$220,280	1.70
Lighting Efficiency	$7,768,340	10,290	52,370,951	46,511	$24,034,246	2.54
New Construction	$7,895,190	16,326	57,375,958	60,400	$89,512,790	4.01
Self Direct	$470,414	996	4,452,909	4,255	$1,499,139	1.54
Small Business Energy Solutions	$5,023,429	3,853	17,677,202	13,732	$5,513,903	1.53
Strategic Energy Management	$7,794,671	12,606	74,911,364	63,701	$31,668,986	2.48
General Advertising-Bus	$450,357					
Business Program Total	**$43,836,097**	**58,969**	**295,953,027**	**275,003**	**$184,919,408**	**2.47**

Table 11f: 2026 Natural Gas Business Program Budgets and Forecasts

2026	Gas Budget	Net Annual Dth Savings	Net Targeted Peak Dth/hr Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	mTRC Test Net Benefits (WACC)	Gas mTRC Test Ratio
Business Program								
Business Energy Assessments	$69,954	8,958	4.4	128,061	6,272	34.5	$950,993	7.63
Business HVAC+R Systems	$240,090	20,534	7.3	85,528	22,142	121.6	$2,981,507	4.50
Custom Efficiency	$213,114	10,768	7.0	50,528	10,694	58.8	$1,325,600	3.00
Energy Management Systems	$95,200	9,080	1.6	95,381	5,946	32.7	$343,392	1.45
New Construction	$285,046	50,356	0.0	176,659	58,836	323.2	$14,338,181	10.12
Small Business Energy Solutions	$54,422	13,953	0.5	256,389	8,433	46.3	$2,720,196	19.87
General Advertising-Bus	$69,131							
Business Program Total	**$1,026,957**	**113,650**	**20.8**	**110,667**	**112,323**	**617.1**	**$22,590,738**	**6.38**

Budgets

Achievement forecasts were developed as a result of an organic participation and energy savings estimation process for each product, which was rolled up to the Business Program total. Similarly, budgets for each product were developed based on the anticipated level of achievement and cost of market penetration, including review of historical data for the past several years and experience with similar products in Minnesota.

Rebate budgets were established according to the desired number of product participants and estimated average project size. Next, budget components, such as advertising and promotion, were developed as part of the product planning process. Then, product delivery budgets, including Company labor and external resources, were calculated. The resulting budgets from this planning process are shown in the executive summary section of the Plan.

The Company will continue to closely manage its DSM & BE expenditures due to concerns about reduced cost-effectiveness of its DSM & BE products given fluctuating gas commodity prices, supply chain challenges, lingering effects of the pandemic, increases in renewable energy generation, and the rate impact on non-participating customers.

Additional details are presented in the product descriptions that follow this overview section.

C. Application Process

Application processes vary by product. See individual product summaries following this overview for more information.

D. Market Objectives & Strategies

Market analysis shows that the commercial segment had the highest potential for energy savings within indoor and outdoor lighting, cooling and ventilation, data servers, and refrigeration end-uses. In the industrial market segment, pumps, lighting, compressed air, fans, cooling, and drives show the greatest end-use potential.

Transactional research is also conducted by the Company to identify who is participating in our DSM & BE products. Specific detail from our rebate applications, including customer name, vendor, type of equipment, etc., is collected on each transaction and added to a database. This information is monitored to determine metrics such as participation/non-participation in DSM & BE products, market segments utilized, and equipment types our customers use. By analyzing specific end-use data, the Company can continue to shape the Business Program to further meet the needs of the market.

Trade allies, end-use equipment vendors, energy services companies, and the Company's Account Managers and marketing team work individually and collaboratively to drive participation in the Business Program. While coordination of DSM & BE participation by the largest business customers typically requires regular personal communication and site visits, the Company also utilizes newsletters, customer events, direct mail, email communications, and awareness advertising to reach Business Program customers. A challenge in marketing energy efficiency is that it's not always a topic at the top of customers' minds – they are busy managing the core aspects of their businesses, particularly for those who do not have dedicated onsite energy managers. Customers tend to focus on purchase price (or "first costs") rather than lifetime costs and are often unlikely to replace equipment prior to failure. Customers may also not be aware of energy efficient equipment and process options available to them when the need arises to make purchase decisions. Yet, opportunities are growing in marketing energy efficiency to customers as awareness of conservation, climate change, and the environment increases leading to an affinity for energy-saving actions. To support marketing efforts, the Company employs an integrated approach to marketing communications, where the tactics are designed to work in concert with each other and reinforce key messages over time.

Strategy

The Company follows the "AIDA" (awareness, interest, desire, action) process for encouraging customers to participate in DSM/BE products. The following are the steps in this process:

1. Create awareness of electricity and/or natural gas impacts on bottom-line profits and quantify potential cost savings and available rebates.

2. Promote interest in DSM/BE products by providing more information about the offerings, including payback examples and case studies, through a variety of customer touchpoints.
3. Instill the desire for participation in DSM/BE products by quantifying the impacts of a bundle of potential energy savings technologies and processes, based on specific product and industry information for each targeted market segment.
4. Move the customer toward action by offering a variety of product options with varying degrees of financial commitment and/or long-term customer involvement.

Key Messages and Target Audience

When communicating with customers, the Company uses several overarching key messages including:

- Energy efficiency reduces operating costs and improves the bottom line.
- The Company helps lower energy bills by offering rebates and incentives for installing highly efficient equipment, using energy-saving building designs, and optimizing existing equipment to maximize comfort and energy savings.
- Rebates and incentives shorten payback periods for energy-efficient equipment and systems, providing lasting savings for years to come.
- Energy efficiency helps reduce environmental impacts.

The Company also markets its products differently to the various business sub-populations, depending on the target audience. Each of these target audiences are identified by key shared characteristics before analyzing their motivations. Once motivations are identified, the Company can adjust the above key messages to meet the customers' specific needs.

Small- and Medium-Sized Businesses

Small and medium-sized business customers traditionally own or work in buildings in segments such as offices, retail, healthcare, education, lodging, light manufacturing, and grocery. They are motivated differently than larger businesses and are busy trying to keep their businesses successful and running smoothly which means energy is a low-interest category. Small business owners are motivated by how to save money and make things more convenient. Key messages used to address these needs include:

- Energy savings go right to profits.
- Partnering with the property manager (where applicable) to employ energy savings can lower energy costs, improve ambiance, and increase the owner's property value.

Large Businesses

Large commercial customers traditionally own or work in buildings in segments such as office, retail, education, healthcare, restaurants, auto dealerships, and congregations. These customers recognize the value of environmental responsibility and sustainability efforts; but in doing so want to weave these efforts into their long-term financial strategies. Industrial manufacturing in Colorado is most concentrated in the areas of food and beverage, chemicals, computers and electronics, and machinery. They are highly engaged in getting the most production from every unit of energy, to keep operating costs low and eliminate waste. In all, these customers are the most energy-savvy and are constantly monitoring their equipment and processes. Key messages used to address both these customer groups include:

- Energy is a large part of the operating budget.
- Rebates help reduce up-front costs, shorten payback periods, and provide ongoing savings for years to come.

- Energy savings go right to the bottom line as increased profits.
- Investing in energy savings is a smart decision.
- Energy-efficient equipment and systems help increase reliability while decreasing maintenance costs.
- Saving energy helps reduce environmental impacts and meet sustainability goals.

Marketing Tactics

Marketing tactics center on product-specific promotions, solutions-based marketing, and a variety of communications vehicles.

Product-specific Promotions: Product-specific marketing efforts tie back to the overriding message, which is offering specific examples of concrete ways to do more. These examples show customers and trade partners the direct, personal impacts of their efforts by offering examples of energy savings, paybacks and lifetime savings or personal rewards.

Solutions-based Marketing: These communications focus on product combinations that offer solutions for a specific customer segment (*e.g.*, schools) or solutions that address common customer concerns (*e.g.*, weather, energy costs, environment) rather than marketing a single product.

Communications Vehicles:

- Product collateral, including feature sheets, applications, customer case studies, savings calculators, participating vendor lists and cross-product energy-savings guides.
- Newsletters for specific products or cross promotion, such as the Energy Exchange for trade partners and Energy Solutions for customers.
- Websites.
- Direct mail campaigns for specific product end uses announcing new incentives or for customer education, as well as general direct mail pieces targeted at specific market segments.
- Events, including product and technical training, customer education and customer recognition.
- Speaking opportunities in local industry meetings, business events (*i.e.*, Chambers, National Association of Industrial and Office Properties, and Building Owners and Managers Association) and local conferences.
- Media relations, including free placement in appropriate media, focusing primarily on customer stories and product information and changes.
- Advertising in business magazines, newspapers, the internet, and radio spots.

E. Program-Specific Policies

The Company has adopted several general policies that are followed across products in the Business Program. Individual products may have additional unique policies as noted in each of the product summaries that follow. The general policies provide guidelines; however, they may be altered under specific circumstances and/or for specific periods of time when warranted for promotional events or other purposes.

The Company defines all-electric, electric-only, and gas-only customers as follows:

- All-electric: customers who only receive electric service from the Company and space condition and water heat with electricity;
- Electric-only: customer who receive electric service from the Company and natural gas service from another provider for use in space conditioning and/or water heating; and
- Gas-only: customer who receive natural gas service from the Company and electric service from another provider.

The program-level policies include:

- *Proof of installation:* All products require documentation of installation, such as proof-of-purchase (*e.g.*, invoices) or a site verification.
- *Payback requirements:* The payback policy for custom conservation products:
    a. Rebates may be paid on projects with payback of at least one year.
    b. Project payback must be less than the project lifetime, which varies by product and technology.
- *Studies:* Study funding cannot exceed 75% of the study cost and studies must be completed within three months.
- *Load Shifting:* Load shifting occurs when a measure shifts energy and demand usage to an off-peak period, without necessarily reducing the total load served over a defined time period. Potential load shifting projects need to meet all existing eligibility requirements of the applicable product as well as additional persistence requirements.
- *Study-Driven Savings:* If a customer implements measures identified in a study that are less than a one-year payback, they will not receive a rebate, but the Company will claim the study-driven savings regardless. The Company believes that its financial and technical help in identifying and/or analyzing energy efficiency measures provides sufficient influence on the customer's decision to implement those measures.

F. Stakeholder Involvement

Since 2009, the primary avenue for external party involvement has been the quarterly DSM Roundtable Meetings. The Roundtable Meetings are open to all interested parties who want more information on the Company's DSM products and would like to provide feedback into the design, planning, and implementation of the products. These stakeholder meetings will also be used to discuss BE offerings and solicit feedback on the Company's BE offerings.

Beyond the Roundtable Meetings, each DSM product manager involves applicable trade allies and other stakeholder groups, as needed, in the development of the Company's products. The Company also participates in regional and national efforts to design and develop the best DSM products for business customers. For example, participation in the Consortium for Energy Efficiency's ("CEE") planning and research efforts to promote energy efficiency technologies.

In 2014, the Company launched the *Partners in Energy* product to support communities in developing and implementing comprehensive energy action plans. The Company continues to work with local community partners through this initiative and reaches out to businesses to support them in reducing their energy consumption by participating in the Company's DSM & BE products. This innovative approach gives local businesses greater access to DSM & BE resources through non-traditional channels and leverages joint marketing opportunities and community momentum to drive additional customer participation.

G. Rebates & Incentives

Business rebates are offered for custom and prescriptive products to promote high efficiency technology implementation. Rebates and incentives vary by product and can be offered to customers, vendors, distributors, and manufacturers. The Company may also deem it prudent to offer bonus rebates to customers and/or trade partners to boost participation if implementation lags and budgets allow.

Indirect products, such as Business Energy Analysis and Business Education support participation in business DSM & BE products.

H. Evaluation, Measurement & Verification

The specific product measurement and verification plans are described in the EM&V section of this Plan; and products that will undergo comprehensive evaluations in 2024-2026 are also noted that section.

Business Energy Assessment

A. Description

The Business Energy Assessments product offers study funding and electric and natural gas implementation rebates to commercial and industrial customers who improve their building performance through an energy assessment.

The product's main offerings include the following:

- Subsidized assessment options that identify energy-saving opportunities. Customers pay a portion of the assessment cost based on their size.
- Operationally focused rebates for implementing recommissioning or building system tune up measures identified through a study;
- Prescriptive rebates for the end-uses rebated in the Company's other prescriptive products;
- Custom rebates for any energy-saving opportunities eligible for rebates under the Company's other custom products;
- Free implementation services to help customers implement energy-saving opportunities; and
- Tuition Rebates to off-set the cost of Building Operator Certification training.

Assessments Suite

Customers signing up for an assessment through the Business Energy Assessments product will receive a whole-building energy analysis. This assessment includes a utility bill analysis, a thorough walkthrough of the entire facility and a list of energy-saving strategies with savings estimates, as well as associated cost and rebate values. The assessment options are listed below:

1. *Commercial Streamlined Assessment Implementation* – Advisement support will be provided during and after a Commercial Streamlined Assessment to implement identified system tune-ups and savings opportunities. This option includes agriculture greenhouses without artificial lighting and indoor agriculture greenhouses with artificial lighting.

2. *Building Assessment* – Previously filed as Recommissioning, this assessment focuses on optimizing existing equipment within facilities. Prescriptive and Custom energy-saving opportunity rebates will be identified where applicable.

3. *Targeted Building Assessment* – Additional replacement for the Recommissioning product, this offering encompasses the same components as the Building Assessment but at a greater depth. A detailed, comprehensive assessment that will be tailored to highly engaged customers that have an expectation of building an on-going relationship with their study provider and the Company.

Implementation Services

The product offers a variety of services that customers may choose from depending on their specific needs to help them implement their projects. The intent of adding an implementation consultation is to improve the conversion rate on energy-saving opportunities identified in the assessment offerings. Services include, but are not limited to:

- Attending internal stakeholder customer meetings to obtain approval;
- Assistance with prioritizing projects;
- Financial analysis of implementing measures;
- Bidding process review;
- Coordination of implementation;
- Verification of installation; and
- Paperwork compilation and rebate submission.

Empower Facilities Optional Path

To further broaden participation, a secondary option may be offered to customers who lack the resources to secure project implementation. They may not have available capital for the project, even net of DSM rebates. Additionally, they may not have enough staff to ensure that the equipment is properly installed and maintained. Where applicable the implementer will offer financing and payment options and related project-management services. Customers may use their preferred equipment provider if they have one, or the product will assist them with selecting a qualified trade partner.

Components of the Empower Facilities path include:

- This path will fund the engagement and opportunity identification activities. Activities include initial customer meetings and most of the initial steps described above for traditional BEA projects. Options for implementation services, ongoing maintenance services, and financing will be developed.
- Implementation services, on-going maintenance services, and financing arrangements are each completely optional for the customer. If the customer chooses to proceed with any of the Empower Facilities options:
    - A Company-contracted provider will provide the service.
    - The services will be entirely funded by fees charged to the customer by the implementer. Service commitments and financial arrangements are between the customer and the implementer.
    - Fees collected from the customer may exceed the actual expenses for providing the service. Any such funds remitted to the Company will be credited to DSM accounts as an offset DSM spending. In the longer term and with a high-level of customer adoption, these amounts will help reduce the cost of DSM to all customers.

DSM expenses related to BEA-Empower Facilities, as well as funds remitted back to DSM accounts, will be detailed in the Company's annual DSM/BE Status Report Filings.

B. Targets, Participants & Budgets

Targets and Participants
Energy savings and participation targets were determined by looking at historical performance as well as projects currently in the pipeline.

Budgets
Budgets were developed commensurate with the energy savings targets, based on historical costs. Most of the budget is driven by the number of studies completed and number of customers who implement projects each year.

The main budget drivers include the following:

- *Administration* – This includes historical spending based labor estimates.
- *Third-Party Customer Service*s – This includes scoping and project management services provided directly to the customer.
- *Advertising and Promotion* – This includes outreach tactics to generate awareness of the assessment offerings to encourage participation.
- *Participant Incentives* – This reflects the assumed participation across multiple end-use products based on the average project implementation numbers from the last three years.

C. Application Process

An application process is available to customers and trade partners and is structured to guide participants to the best-fit assessment to serve their needs and operations.

D. Marketing Objectives & Strategies

Customers learn of the product through their Public Service Account Manager, Business Solutions Center representative, direct marketing efforts and via the Business Energy Assessment trade partners.

The marketing strategy is to educate customers and trade partners on the benefits of a Building Energy Assessment. Due to the long sales cycle, it is important to continually build the study pipeline to meet future years' targets. To build the pipeline and to attract customers and trade partners, various marketing tactics such as educational seminars, in person meetings, case studies and the product website are utilized.

E. Product-Specific Policies

Building Energy Assessments has a few policies that are specific to the product which include:

- *Study/analysis driven credit* - If a customer implements measures identified in a study/analysis that are less than a one-year payback or greater than a seven-year payback, they will not receive a rebate, but the Company will claim the study-driven savings

regardless. The Company believes that its financial and technical help in identifying and/or analyzing energy efficiency measures provides sufficient influence on the customer's decision to implement those measures.

- *Maintenance* -The Assessment product may claim energy savings for major maintenance measures identified and implemented through the recommissioning process.
- *Rebate/energy savings validity* -If at least two years have passed since a project was approved, the technical staff re-analyzes it with current rates to determine if the savings/payback has changed. This re-analysis is conducted prior to issuing a rebate.
- *Customer eligibility* -The product is available to retail business customers with both electricity and natural gas service, or electricity only service. Electric customers with transportation natural gas will receive identification of gas energy conservation opportunities. Gas-only service customers are not eligible for this product.

F. Stakeholder Involvement

The Company values feedback from customers and trade partners and tries to gather their input to ensure the product is effective. As ideas are generated from stakeholders, they will be reviewed and implemented, if feasible. The Company will meet with its active trade partners to discuss product specifics and to obtain feedback. Continuous communication with this group through informal conversations and project work provides opportunities to keep this feedback channel open. The Company will work with the different cities implementing building performance ordinances and standards to help customers reach their ordinance or standard compliance.

G. Rebates & Incentives

A range of subsidized assessments will be offered to identify energy-saving opportunities. Customers pay a portion of the assessment cost based on their size. Assessments will identify operational and equipment (capital expense) energy-saving opportunities. Public service will pay for implementing recommissioning or building system tune up measures identified through an assessment, as well as rebates for both prescriptive and custom end-use products. In addition, the Company will pay rebates for peak-coincident kW reductions achieved, kWh saved, and Dth saved for recommissioning measures identified in assessments, up to a maximum of 60% of the measure costs. Finally, Public Service will pay a tuition rebate to off-set the cost of Building Operator Certification training.

Business HVAC+R Systems

A. Description

The Business Heating, Ventilation, Air Conditioning, and Refrigeration ("HVAC+R") Systems product combines Heating Efficiency, Cooling Efficiency, Motors, Drives and Pumps, and C&I Refrigeration measures into an integrated demand-side management product. The product encourages Public Service gas and electric business customers to consider high-efficiency options when choosing to replace existing mechanical systems. The Business HVAC+R Systems product focuses on customer needs to drive deeper penetration of energy efficiency measures and to provide opportunities to integrate demand management and load management strategies.

Residential and Commercial-sized BE measures have been added to the portfolio that mirror the Company's residential portfolio. These measures include ducted and ductless air source heat pumps (including variable refrigerant flow ("VRF") systems), commercial-sized heat pump water heaters and dual-fuel and/or heat pump roof top units ("RTUs"). The Company will continue to actively study additional BE measures that could be added to the portfolio. Where possible, the Company will align rebates, qualification levels, and other technical requirements for heat pump equipment used in both residential and commercial applications.

The HVAC+R Systems product offers a broad range of prescriptive rebates and midstream incentives for high-efficiency equipment options. The product leverages the custom measure to evaluate demand management opportunities. Such projects are evaluated under the Custom Efficiency analysis and must follow the rules of the Custom Efficiency product.

Prescriptive participants receive rebates to help buy down the initial capital cost and shorten the payback period. The new equipment also provides better reliability and lower maintenance costs, as well as lower utility bills via energy savings. The Company will follow the guidelines of the International Energy Conservation Code ("IECC") 2018 for equipment definitions, standard formulas, and minimum recommended efficiencies. These sources, along with Public Service's historical experience, allow the Company to develop influential prescriptive rebates that encourage the most efficient choice of equipment in most equipment categories.

Midstream measures under this product are designed to deliver incentives to qualifying distributors who sell qualifying high-efficiency HVAC equipment by increasing stocking levels and upselling. Incentives are now required to be passed down to customers with a spiff given to the distributors for continuing to participate in the midstream program. The Company will continue working with relevant industry players to enhance the product to include new midstream incentives for equipment that will work well in this model.

B. Forecasts, Participants & Budgets

Forecasts and Participants

Forecasts are based on the achievements of past years, estimates of market penetration, and a review of potential cooling, heating, motors and drives, and refrigeration technology efficiency improvements.

Participation was derived from prior years' (2022 and 2023) performance. Additional factors included feedback from trade partners, product participation trends, and average project size.

Budgets

Historical cost and participation information was analyzed to project expenditures. External resources and discussions with local stakeholders were used to estimate expenditures and market equipment cost. Comparative spending analysis of past-year activity is generally conducted but is not the determining factor, since other external variables like promotions, materials, and staffing influence future costs.

Rebates, incentives, labor, and promotions influence the budget.

- *Rebates* - Developed using the project rebate costs from the detailed technical assumptions, multiplied by anticipated participation levels.
- *Administration* - Determined by estimating the number of full-time employees needed to manage the product, execute the marketing strategy, and process rebates, including Account Management and Business Solutions Center ("BSC") support.
- *Promotions* - The promotional budget anticipates several customer and trade partner communications and events during the year.

For the midstream offering, external resources and discussions with local stakeholders are leveraged to establish the market potential for HVAC equipment. Incentives and third-party implementer costs influence the budget:

- *Incentives* - Midstream incentives to participating distributors influence the sale of high-efficiency products to contractors, thereby increasing the availability of these products for customers in the marketplace.
- *Administration* - A third-party implementer will facilitate recruiting and management of distributors, design and management of the web-based paperless rebate application, and process individual applications. Internal administration and advertising costs are minimal; Account Management and BSC budgets are not required. Rebate Operations costs are minimal.

C. Application Process

Prescriptive Measures:

Online and printable applications for the product are available on the Xcel Energy website.[30] Customers may apply for rebates by completing an application and providing a detailed purchase invoice for the newly installed equipment. The equipment must be new and meet all the qualifications detailed in the application. After the customer has installed the equipment, the application and invoice must be submitted to Public Service within 24 months of the invoice date. Once the application is processed, rebate checks will be mailed to the customer or alternate recipient, as indicated on the application, within six to eight weeks.

[30] https://www.xcelenergy.com/programs_and_rebates/business_programs_and_rebates/equipment_rebates.

Midstream Incentive:
A critical component of the midstream measure is its use of a web-based paperless application for participating distributors. A paperless system is critical for ease of participation and for reducing administrative cost. Distributors will be paid an incentive that has a required pass-through to their contractors, and contractors will be required to pass this incentive down to their customers. For upselling high-efficiency equipment and passing down the customer incentive, they will receive their own incentive.

D. Marketing Objectives & Strategies

The Business HVAC+R Systems product creates a base level of knowledge in the marketplace through newsletters and direct communications to customers and trade allies. These tactics make customers aware of the key benefits of energy efficiency and its applicability to Business HVAC+R Systems and gives the trade allies a platform from which to educate customers on high-efficiency solutions for their applications. The product provides literature and tools for the customers and trade to evaluate rebates and incorporate them into purchase decisions. In addition, customers are served by Public Service's Account Managers and BSC who educate them on energy efficiency, evaluating rebate potential, and the rebate application process. The trade can find similar assistance through the Company's Trade Relations Manager.

Marketing communications will revolve around the benefits of energy efficiency through paybacks, lifecycle costs, and environmental benefits. Newer equipment is typically more efficient, more reliable, and may have more effective controls than an older system providing both energy and non-energy benefits to the end user. Public Service uses generally accepted information from sources such as ENERGY STAR®, the American Society of Heating, Refrigeration and Air-conditioning Engineers ("ASHRAE"), the Federal Energy Management Program ("FEMP"), CEE, and others to educate customers on no- and low-cost ways to save energy, such as performing regularly scheduled maintenance and simple tune-up tips to ensure systems are operating optimally.

E. Product-Specific Policies

The product does not rebate back-up equipment or portable equipment. Qualifying equipment must be new and permanently installed at the end-use customer.

Variable frequency drives ("VFDs") must automatically control the speed of existing or new motors.

Gas Transport Only customers cannot participate in rebates for the heating-only efficiency measures.

Participating customers must be a business retail natural gas, electric, or a combination electric and gas customer of Public Service Company of Colorado.

Qualifying Midstream Distributors - A qualifying distributor is an entity that purchases qualifying equipment directly from the manufacturer and sells such equipment to be installed at a qualifying customer's facility. A vendor who purchases equipment from a distributor does not qualify. Under

certain circumstances, a manufacturer and/or a manufacturer's representative may serve as its own distributor and sell directly to the end-use customer. In this case, the manufacturer/distributor can qualify.

Applications for rebates must be submitted within 24 months of the invoice date.

F. Stakeholder Involvement

Because HVAC+R Systems can be very complex, trade partner relationships are imperative to achieving the product's energy savings and participation forecasts. The Company has engaged trade allies in product design and improvement through focused trainings and outreach events. Members include manufacturer's representatives, and equipment contractors. The Company also works with distributors to promote upselling and stocking of high-efficient equipment to ensure availability to our customers.

G. Rebates & Incentives

Generally, Public Service has set the minimum qualifying efficiency at a point that nominally exceeds the IECC minimum efficiency requirements to encourage customers to purchase more efficient equipment, while ensuring that manufacturers have equipment that meets the criteria of the product.

The proposed rebate level averages approximately 60% of the incremental cost. This level balances the cost-effectiveness of the product with the incentive needed to motivate the customer to purchase efficient equipment, achieving a payback of less than five years in most cases. Rebates are designed to buy down the incremental cost of purchasing efficient equipment, which increases as code requirements become smore strict in the market.

Compressed Air Efficiency

A. Description

The Compressed Air Efficiency product helps customers address inefficiencies in their compressed air systems. The product encourages repair and redesign of existing systems and encourages the purchase of efficient options for new and replacement systems. The product has three components:

1. Prescriptive rebates for the most common high-efficiency options such as no-loss air drains, cycling dryers, purge controls, mist eliminators, and for certain VFD compressors;
2. Rebates for studies that help customers identify efficiency opportunities from fixing leaks as well as from redesign or replacement of system components; and
3. Custom rebates for implementation of unique improvements identified by studies; improvements can include capital purchases such as qualifying compressors, and "process" changes such as piping modifications or horsepower ("hp") reductions.

For the Plan, the Company proposes to add prescriptive rebates for larger variable speed drive compressors. Additionally, we will provide a financial incentive option for customers who choose to fix system leaks without completing an Xcel Energy study.

The Compressed Air product is available to electric business customers. Compressed Air studies require preapproval prior to execution and must be completed by an approved study provider. Custom projects are evaluated under the Custom Efficiency analysis and must follow the rules of the Custom Efficiency product. These processes help to minimize so-called "free ridership" and ensure the technical and financial soundness of projects that are awarded rebates.

System requirements include:

- Electrically driven compressed air systems;
- Minimum 10 hp total installed air compressor capacity (excluding backup equipment); and
- Systems must operate at least 40 hours per week (2,000 hours per year).

Members of the trade are also targeted to increase product education and engagement, including equipment manufacturers and installers, as well as design engineers and electricians.

B. Forecasts, Participants & Budgets

The program's participation, energy savings targets, and budgets were determined by analyzing historical data, reviewing projects in the pipeline, and evaluating the forecasted economic conditions. Other variables such as promotions needed to reach targets, rebate levels, and staffing were also included. Projected customer participation and savings are based on expected average project size and mix of technologies anticipated.

The main budget drivers include the following:

- *Participant Incentives* - This budget represents the rebates we will pay for energy efficient equipment and studies. This is based on historical participation across the offering and includes predicted growth from existing and new products.
- *Utility Administration* - These budgets are based on past program performance with an increase built in for increased participation and technical engineer support.
- *Advertising & Promotion* - This budget will assist in raising awareness of the program and provide training to customers and trade to establish the Company as an expert in the market.

C. Application Process

Customers can learn about the product through various channels, including Account Management, compressed air trade partner, Xcel Energy website literature, or product advertising. Applications must be signed by the customer but can be submitted by customer representatives including building owners, contractors, engineering firms, energy services companies, and equipment vendors. Typically, the customer or a trade partner selling to the customer identifies a project and starts the application process described below.

Compressed Air Prescriptive Measures

For prescriptive measures, the application process is similar to other prescriptive products:

- Customers may apply for rebates by completing and signing the application and providing an itemized invoice for the installed equipment. The equipment must be new and meet all the qualifications detailed on the application. The customers may submit a rebate application within twelve months after the invoice date. Once the paperwork is completed and submitted, rebate checks are mailed to the customer, or alternative rebate recipient, within six weeks, as indicated on the application.

Compressed Air Studies

To begin the study process, the customer will select a participating compressed air trade partner to conduct their study. A list of eligible participating providers and trade partners is available on the website.[31] The customer submits the Compressed Air Efficiency study application to an Account Manager. Maximum study funding is based on system hp, and up to 100% of the study costs when you repair 75% of identified leaks.

To receive the study rebate, the completed study report must show data was collected on the preapproval date or within the allotted preapproval timeframe. The customer must repair at least 75% of the air loss due to leaks as identified by the study and included in the completed report. Once the customer has repaired the leaks, the customer will inform their Account Manager. The customer and Account Manager review the list of identified leaks and note the repair status of each leak. The customer and Account Manager both sign the verification section of the application and submit it to the product manager along with copies of invoices and other required information as stipulated in the preapproval letter.

[31] https://www.xcelenergy.com/staticfiles/xe-responsive/Programs%20and%20Rebates/Business/CO-Compressed-Air-Contractor-List.pdf.

Similarly, demand-side studies will address current conditions and operating parameters, measure flow, pressure, and power, and estimate future process production needs. Scope is not limited to any one factor but can include a variety of factors depending on impacted systems. Some possible considerations for the various systems may be:

- Analyze optimal compressed air/vacuum needs by examining what the uses are, why it's used, when air is used and future use outlook
- Determine what pressure/vacuum is needed on the system and why
- Compressor/vacuum pump selection (size and control type)
- Clean up equipment selection (filters, dryers, and storage)
- Control method
- Multiple-compressor/vacuum pump configuration and control
- Pipe and other system component configuration (reduce pressure drop between equipment room and end-use)
- Waste reduction (high to low pressure conversion, pneumatic to electric conversion, open blowing, etc.)

Custom Compressed Air

If the customer chooses to implement recommended capital improvements to the compressed air system that do not qualify for prescriptive rebates, they may apply for preapproval of their project through the Company's Custom Efficiency product application process. Please see the Custom Efficiency product section of this Plan for a description of the process to be followed. The Compressed Air product offers higher custom rebates for customers who have received a study prior to custom project completion.

Prescriptive	Custom
Variable speed drive compressors	Calibration/tune-up of system set points
No loss air drains	Adjustment of valves and dampers
Cycling refrigerated dryers	Reducing system demand
Dew point demand controls	Air to electric conversions
Mist eliminators	Capital equipment replacements and upgrades
	System redesigns

D. Marketing Objectives & Strategies

Account Managers and compressed air trade partners are the primary marketing conduits for this product and will market the product through their direct relationships with customers. In addition, the following strategies will help meet product forecasts from 2024 to 2026:

Targeting Industrial Customers – Industrial customers make up a sizeable market that has the potential to bring in large, compressed air projects. The Company targets these customers with direct contact (which may include mailings, email blasts, etc.) to create awareness and answer questions about the product.

Leveraging Trade Partners – The trade partners operating in Colorado are a significant factor in the success of this product. Working directly with these trade partners helps to identify

potential participants early in the planning stages of a project. The Company continually strives to demonstrate how incorporating incentives into trade partners' bids can be a benefit to their businesses.

Competition amongst the small group of trade partners is high due to the mid-to-large industrial/manufacturing markets targeted. Therefore, the Company trains each trade partner individually. Throughout 2024 to 2026, training with trade partners will continue. The trainings provide a forum to review the trade partner's work, make recommendations for a better end-product, and solicit feedback on the effectiveness of the Compressed Air product.

Delivering Marketing Collateral – Marketing collateral is an important tool to provide customers with useful, easy to follow guidelines for the product. The Company continuously solicits feedback from customers and trade partners to improve these materials. Collateral is available for customers, trade partners, and others. Customers and trade partners can request hard copies of the material or they can access material on Xcel Energy's website. The collateral includes:

- *Compressed Air Information Sheet* – Helps describe the product to customers and trade partners. Provides examples of projects that may qualify, business reasons to participate, and a summary of the procedures to follow.
- *Compressed Air Application (for qualifying prescriptive measures)* – Lists qualifying prescriptive measures. The customer fills out several sections including technical information related to the proposed and existing equipment.
- *Compressed Air Study Application* – A document that customers fill out to start the process of participation. The customer or trade partner is asked to fill out several sections including information about the location, applicable rates, project description, equipment supplier, technical information about existing and proposed equipment, and project verification.
- *Participating Trade Partners List* – A list of trade partners who have submitted studies in the past or expressed an interest in participating in the product. The list is provided for the convenience of customers who do not have a working relationship with a trade partner. The Company does not endorse any particular trade partner over another and is willing to amend or add partners as the market changes.
- *Compressed Air Study Template* – A detailed example of a study that is comprehensive and provides value to customers' energy saving efforts.

E. Product-Specific Policies

Compressed Air studies require preapproval prior to implementation. Custom projects are evaluated under the Custom Efficiency analysis and must follow the rules of the Custom Efficiency product. These processes help to minimize free ridership and ensure the technical and financial soundness of projects that are awarded rebates. All compressed air equipment projects must have a payback period over one year.

The system requirements include:

- Electrically driven compressed air systems;

- Minimum 10 hp total installed air compressor capacity (excluding backup equipment); and
- Systems must operate at least 40 hours per week (2,000 hours per year).

F. Stakeholder Involvement

The Compressed Air program partners with the U.S. Department of Energy to provide training on the Compressed Air Challenge program and Fan Systems. We have partnered with the Consortium for Energy Efficiency to establish best practices for industrial systems including blower systems and pumping.

G. Rebates & Incentives

The Compressed Air Efficiency program includes compressed air supply-side, demand-side studies, and an efficient fuel switching measure as well as both prescriptive and custom incentives.

Rebates

Measure	Rebate
Supply Side Study	100% Study Cost of current Max structure + Additional $50.00/Leak Fix
Cycling Dryers	$3.00/SCFM
Dryer Purge Demand Controls	$1,500.00 + $1.00/CFM
Mist Eliminators	$2.00/SCFM
No Air Loss Drain	$200.00/Drain
New VFD Compressor	$150.00/HP
Demand Side Study	75% of Study Cost
Flow Controller	$10.00/Operating HP
Storage Tank	$1.00/Gallon
Dryer Purge Demand Controls	$1,500.00 + $4.00/CFM
Leak Only Study	$50.00/Leak Fix
Industrial battery chargers	$250.00/Charger

Quality Assurance

Study providers are vetted and must go through a trial period prior to becoming approved to conduct compressed air studies.

Program Changes

Change	Rationale
Increase in eligible sizes of VSD compressors	This is a project that commonly goes through the Custom Efficiency product and making it prescriptive will improve the experience and turnaround times for participating customers.
Leak fix check	Looking to solely check leaks, which could correspond with a study.
Expand mist eliminator to large size range	Avoids Custom Efficiency path, and already have assumptions built for expanding.
New pressure/flow controllers	Adopting measure to provide opportunity similar to Minnesota offering.
New storage tanks on fixed speed load/unload systems	Adopting measure to provide opportunity similar to Minnesota offering.
New heated desiccant dryers with controls	Common through Custom Efficiency and furthers efficiency beyond current Heatless Desiccant Dryer offering.
New Blower Purge Desiccant Dryers with Controls	Common through Custom Efficiency and furthers efficiency beyond current Heatless Desiccant Dryer offering.

Custom Efficiency

A. Description

The Custom Efficiency product offers rebates to electric and natural gas business customers who implement energy saving projects that do not fit the requirements of prescriptive products. The product is marketed to all business customers regardless of size using direct contact with customers via our sales representatives, the internet, and trade channels.

This product also offers study funding to help customers determine project viability and energy savings potential.

Energy-saving non-prescriptive projects include installing new equipment, replacing existing equipment, retrofitting equipment, or improving processes that lower a customer's electric or natural gas use. The project list includes, but is not limited to, the following:

B. Forecasts, Participants & Budgets

Forecasts and Participants

Equipment	**Application**
Compressed Air	New equipment, reduction in hp of compressors, storage, vacuum pumps, and variable speed drive compressors, reduction of compressor run time
Controls	COB_{2B} based ventilation, compressed air, and refrigeration controls
Cooling	Heat recovery, process cooling, and controls
Lighting	Lumen output changes, exterior lighting, light-emitting diode ("LED") and daylighting, retrofits (not one-to-one)
Miscellaneous	Energy efficient windows (film, argon, Low E), humidification, insulation, printing presses, and welders
Motors & Drives	Motors > 200 hp, Drives > 200 hp, any motor type outside the prescriptive parameters, and Drives for non-fan, non-pump processes
Refrigeration	Ammonia compressors, freezer doors, and evaporative condensers
Process Changes	• New system produces more output than the old system while using the same amount of energy as the old system • New system produces the same output as the old system using less energy • Reconfigure system layout
Load Shifting	Ice Storage and other load shifting technologies
Beneficial Electrification	Implementing electric-fueled technologies in place of natural gas, gasoline, or propane-fueled technologies.

The energy savings and participant forecasts were determined by looking at both historical performance and projects that are currently in the product pipeline, as well as consideration of current economic conditions.

Budgets

Historical cost and participation information is tracked and analyzed to project future expenditures. For the Custom Efficiency product, administration and customer rebates are the primary budget drivers.

- *Administration* - Custom Efficiency is a labor-intensive product due to the pre-approval process and analysis components.
- *Rebates* - The budget for rebates is established based on an estimation of participation levels, multiplied by the rebate per kilowatt ("kW") amount in the technical assumption models.

C. Application Process

The application process for custom projects is more involved than those for prescriptive measures. Each custom project must meet specific eligibility requirements. This process can be broken into distinct steps: Application Submission, Project Analysis, Project Acceptance or Ineligibility, and Project Completion.

Application Submission

Public Service Account Managers and/or a Business Solutions Center representative work with a customer and their vendor to identify a project with energy efficiency opportunities and start the application process. In addition to the application, which must be signed by the customer, an electronic "workbook" is filled out with a detailed description of the project.

Project Analysis

Engineers review the project information and enter pertinent data into a mTRC test model to determine the projected energy savings, benefit/cost ratio and payback. The model calculates energy savings for various end-uses (lighting, motors, cooling, compressed air, etc.) to ensure consistency in analysis from one project to another. All calculations are based on approved ASHRAE methods or other similar industry standards. Based on the modeled results, the project either passes or fails.

Project Acceptance or Ineligibility

Once the engineers have completed the analysis, an approval or not rebate eligible letter is sent to the customer. The letter provides critical information regarding the project, including rebate amount, project description and costs, energy savings, and any conditions that must be met to receive the rebate (*e.g.*, measurement and verification). Should a project be ineligible for a rebate, a letter is sent to the customer with an explanation as to why the project was not approved.

Project Completion

When a project is completed, the customer will inform their Account Manager or BSC representative. The customer will sign the verification section of the application and submit it along with copies of invoices and other required information as stipulated in the approval letter. If the final documentation matches the approved project information, the project the paperwork is submitted to Rebate Operations for issuance of the rebate.

Occasionally, projects must undergo re-analysis because the final project parameters do not match the original project application. This may be due to minor changes in project scope, cost, or technology. In these cases, the actual project information will be given to the technical staff for review and re-analysis. The original analysis will be updated with the new information to determine if the project still meets passing criteria. A passing project will be awarded a rebate based on the calculated savings from the updated analysis. A project that fails on re-analysis will not be issued a rebate.

D. Marketing Objectives & Strategies

Marketing is conducted primarily by Account Managers, leveraging their direct relationships with customers. In addition, the Company will use the following strategies to achieve the product's energy savings forecasts in 2024- 2026:

- *Target Industrial Customers* - Colorado's industrial base is relatively small, but these few customers offer substantial opportunity. Many of the opportunities will come from specialized applications or processes requiring a greater insight into the individual customer's operations. To achieve this, the Company relies heavily on leads from Account Managers and outreach to the vendor community.
- *BSC Representatives* - The BSC provides direct support to non-managed commercial customers.
- *Use of Collateral* - Public Service has developed a broad range of marketing collateral for the product; this information is available in electronic format on Xcel Energy's website[32] and in hard copy format for customers, trade allies, and internal Public Service staff as needed. This material is continually reviewed and revised based on feedback from participants and as changes are made to the product. The key collateral includes:
    - Custom Efficiency Brochure – This is the primary tool for Account Managers that helps describe the product to customers and trade allies. It provides examples of projects that may qualify; business reasons to participate; and a summary of the procedures to follow.
    - List of Potential Projects – Project types that have fared well in Colorado and Minnesota serve as the basis for this list. The list includes both electric and natural gas conservation measures.
    - Trade Partner Website[33] – This resource was designed specifically for the Company's trade allies. It includes all the materials indicated above and other helpful information.
    - Energy Exchange – A quarterly email newsletter that goes out to all trade allies who have registered to be part of the trade ally network.
    - Custom Specific Workshops – Workshops will be conducted for vendors and/or customers to communicate project opportunities specific to custom end-use situations.

[32] https://www.xcelenergy.com/programs_and_rebates/business_programs_and_rebates/equipment_rebates/custom_efficiency.
[33] https://www.xcelenergy.com/working_with_us/trade_partners.

E. Product-Specific Policies

Custom projects that do not include beneficial electrification must have an mTRC ratio of equal to or greater than 1.0. Projects will be screened fora simple payback of over one year and less than the estimated life of the product. Rebates are capped at 60% of the incremental project cost.

Custom beneficial electrification projects are not required to pass the mTRC cost test, but must reduce natural gas, propane, or gasoline usage by implementing electric-fueled technologies.

F. Stakeholder Involvement

Customers, trade allies, and other stakeholders are engaged at the project level to gather input regarding best practices, methods, and support for evaluating new technologies.

G. Rebates & Incentives

Rebates apply to new and leased equipment. Used or portable equipment is not eligible. To determine eligibility for a rebate, all projects are analyzed as described in the application process. Rebates are calculated based on the demand reduction (kW) yielded by the project. Additional details are identified in the Electric and Natural Gas Forecast Technical Assumptions within Appendix H: Technical Reference Manual. For 2024-2026, Public Service will offer an incentive level of $500.00 per peak coincident kW and $100.00 per off-peak kW for electric energy savings projects and $4 per Dth for natural gas savings project. For electrification projects, Public Service will offer an incentive level of $10.00 per Dth electrified minus $0.02 per kWh added.

Data Center Efficiency

A. Description

The Data Center Efficiency product helps customers address energy conservation opportunities in both new and existing data centers, as well as other computing spaces. This specialized product was designed in response to the significant energy savings potential of these customers and the projected growth in energy use in data centers and computing spaces.

There are numerous ways data centers can become more energy efficient, including:

- High efficiency servers;
- Airflow improvements;
- Electrical equipment;
- High-efficiency cooling;
- Humidification;
- Power systems;
- High-efficiency lighting;
- Plate and frame heat exchangers; and,
- Virtual Desktop Infrastructures ("VDI").

Any size data center or computing space may participate. The product encourages a holistic approach to energy efficiency within the data center, data closet, or computing space.

For existing facilities, the product provides funding towards an on-site evaluation and analysis and rebates based on the energy savings resulting from implementation. Such projects are evaluated under the Custom Efficiency analysis and must follow the rules of the Custom Efficiency product. However, prescriptive rebates for high-efficiency computer room air conditioner ("CRAC") units, plate and frame heat exchangers, direct-evaporative pre-cooling for air-cooled condensers ("DEPACC"), servers and VDI equipment are available. Data center customers can also apply for prescriptive equipment rebates from other products offered in the Company's DSM portfolio. Data Center prescriptive equipment rebates will also be available to non-data center customers.

For new facilities, the product delivers expert knowledge and resources to help data center owners optimize the efficiency of their facilities during the design, early construction and operation stages of the new data center. Aligned closely with the design of the Energy Design Assistance ("EDA") offering within New Construction (for commercial new construction projects), this Data Center offering will provide free consulting during the design phases of new data center construction projects and provide financial incentives to offset the increased costs of more advanced energy systems. The product commences with the customer's first discussions with the Company

regarding siting of a new data center and ends after construction and occupancy of the last in-scope portion of the data center.

Public Service maintains a list of approved study providers to perform data center studies and analysis. Study paths leverage the study providers, who have been provided training on Company tools, to conduct the analysis.

Fifteen-minute interval data could show an operator if cooling is adjusting properly to match changes in IT load. It could also be used as a basic indication if fan speeds, compressors or free cooling are adjusting as IT load or outside air changes.

B. Forecasts, Participants & Budgets

Forecasts and Participants

Electric energy savings and participation forecasts were determined by looking at historic participation and identified projects from the last several years in addition to leads and discussions regarding possible future projects.

Budgets

Budgets were developed commensurate with the electric energy savings forecast, based on historical cost of achievements. The largest cost in the budget is for energy efficiency project implementation and study rebates.

C. Application Process

Customers learn about the product through a variety of channels, including: the product website, Account Managers and trade partners or study providers. In addition, the Company will identify data center experts to help with the education of the product to customers. Product applications are available through all these channels. Customers may apply through their Account Manager or trade partner or send it via mail or email to Public Service. A digital application is available for the prescriptive equipment rebates.

Customers building a new data center need to submit their application in the early phases of design to ensure recommended strategies are included in final design plans. The data center design study is similar to the New Construction product's Energy Design Assistance guidance for facilities.

Pre-approval is required to receive rebates for studies. Prescriptive measures do not require pre-approval and will be rebated for implemented projects. Custom rebates are available for energy saving measures that are not included under the prescriptive rebate category. Such projects are evaluated under the Custom Efficiency analysis and must follow the rules of the Custom Efficiency product.

D. Marketing Objectives & Strategies

The marketing strategy for Data Center Efficiency leverages a variety of channels including Account Managers, trade relations managers, professional organizations and direct customer communications. The goal of the Data Center Efficiency product is to build and/or retrofit data centers and computing spaces, with their copious electronic equipment, to be as efficient as possible. Because the market for this product is so specific, Public Service will have Account Management focus on recruiting data center customers to participate. Account Management and a product engineer will work together to maintain contact with data center customers from identification of potential energy saving measures through implementation of the recommended measures. Face-to-face contact with our customer base is necessary to engage them in the product.

The Company will also conduct meetings with study providers and design firms to provide rebate information and other support for customer engagement. The Company will use these meetings to discuss new potential energy saving measures and best practices to encourage energy efficiency in a data center. Additional study providers will be sought after to help data center customers identify potential energy saving strategies at their location.

Soliciting Data Center Efficiency participation has typically required significant marketing effort to influence customers; many are reluctant to make changes to their mission-critical operations and upgrades require agreement across many function areas.

Public Service will offer on-site walkthrough audits of a customer's data center by a product engineer to help identify energy efficiency opportunities. Once the walkthrough audit is complete, the customer will receive a report that describes the identified opportunities and the possible paths for earning a rebate. This offer is intended to generate awareness of the product to data centers that have not previously participated in the product.

As part of our strategy to increase participation in demand response products, this product will provide opportunities for customers to participate in Critical Peak Pricing ("CPP"), Peak Partner Rewards ("PPR"), and Interruptible Service Option Credit ("ISOC"). Further details are provided in the technical assumptions.

E. Product-Specific Policies

Existing Facilities

Customers may perform a study by selecting a pre-qualified study provider.[34] If they select a provider who is not on the Company's list, the new provider will be required to submit qualifications prior to receiving study funding approval.

The Company typically evaluates measures identified within a study as one project, based on the customer's indication to implement all measures included in the project. Pre-approved projects must be cost-effective. If at least two years has passed since a project was approved, the technical

[34] http://www.xcelenergy.com/staticfiles/xe/PDF/Marketing/CO-BUS-Data-Center-Efficiency-Provider-List.pdf.

staff will re-analyze it to determine if the savings/payback has changed. This re-analysis is conducted prior to issuing a rebate check.

Studies, once pre-approved, need to be submitted to Public Service within three months of issuance of the pre-approval letter.

New Facilities

To participate in this measure, customers will work directly with contracted agents of the Company who will facilitate the integrated design and modeling components of the measure. The choice of contracted providers is influenced primarily by the fact that the new Data Center market is highly dynamic and complex. To manage the risk introduced by this complexity, the Company chose to move forward with a limited provider delivery model. As the market evolves, the Company will evaluate the potential to open the consulting services of this measure up to other providers in a manner similar to the existing Data Center Efficiency studies and EDA offerings.

Computing Spaces

For prescriptive VDI measures and prescriptive high efficiency servers, all equipment rebated through the measure must be new and meet all measure rules and requirements. A minimum of 10 units must be purchased in order to qualify for the rebate. The application must be submitted within twelve months of the invoice date.

F. Stakeholder Involvement

The Company continues to develop collateral and educational materials to support the product. As participant feedback is received, suggestions will be evaluated for feasibility of incorporating changes.

The Company has been an active participant in the CEE Data Centers and Servers Initiative.[35] The initiative focuses on collaboration among utilities striving for energy efficiency standards for data center equipment, including knowledge sharing of data center efficiency product development.

Xcel Energy is also a member of the Association for Computer Operations Management ("AFCOM"), [36] the leading association of data center and facilities management providers, and 7x24 Exchange,[37] a not-for-profit organization for the mission critical industry.

[35] http://www.cee1.org/content/committee-work.
[36] http://www.afcom.com.
[37] http://www.7x24exchange.org.

G. Rebates & Incentives

Study Rebate
Data Center Efficiency studies for existing facilities will be rebated up to 75% of the data center study cost, not to exceed $25,000. This cap will be re-evaluated if a very large data center is being reviewed.

Custom Rebate
Rebates are calculated based on the demand reduction (kW) yielded by the custom project. For 2024-2026, Public Service will offer an incentive of $500 per peak coincident kW and $100 per off-peak kW.

Prescriptive Rebate
Rebates are available for High Efficiency CRAC units, Plate and Frame Heat Exchangers, VDI, direct-evaporative pre-cooling for air-cooled condensers ("DEPACC"), and High Efficiency Servers. Prescriptive rebate levels are shown on the rebate application and on the Company's website.

Data Center New Construction Rebate
The product will provide rebates on the actual savings of a project based on the times of day the project saves energy compared to the modeled baseline.

Energy Management Systems[38]

A. Description

The Energy Management Systems ("EMS") product offers customers rebates for installing systems that control and reduce a building's on- and off-peak energy usage and demand. Electric and natural gas customers are eligible for participation.

An EMS is a computer system designed specifically for the automated, centralized control of electromechanical functions within a customer's facility. Typically, the EMS controls a building's heating, cooling, ventilation, or lighting. The system may be referred to as a building automation system or the more general term of direct digital controls ("DDC"). EMS and DDC may sometimes refer to systems that control the customers' process-related equipment for the purpose of energy reduction or demand management.

The product's scope includes only existing buildings or process equipment. For such buildings or equipment, the product incentivizes a new EMS and the replacement of a non-functional or obsolete EMS. Adding functionality or control points for demand management to an existing system and software or programming will also yield incentives. The product is focused on reducing a building's on- and off-peak energy usage through sensors and controls that are centrally operated and optimized to save energy without compromising occupant comfort through custom and prescriptive measures. Through automation, the systems may control heating, cooling, demand or ventilation functions. The product includes lighting controls only when they are integrated with the control system.

There are now three prescriptive rebate measures added to the EMS product: Guest Room Energy Management ("GREM") thermostats; Rooftop demand-controlled ventilation ("DCV"); and pneumatic to wireless DDC thermostats.

Examples of measures encouraged by the product are shown in the following table:

EMS Control Strategies

DEMAND CONTROL AND LOAD SHEDDING	MISCELLANEOUS	SCHEDULING
• Demand limiting or load shedding • Sequential startup of equipment • Duty cycling • Pre-Cooling • Occupied Setpoint Setups	• Upgrade from pneumatic to DDC • Reduce simultaneous heating& cooling • Zone-based HVAC control • Variable speed drive control • Replacing old sensors	• Holiday scheduling • Zonal scheduling • Override control and tenant billing • Night setup & setback • Optimum start and stop • Morning warm-up & cool-down

[38] Changes to product write-up introduced via the 60-day notice filed June 30th, 2023. https://www.xcelenergy.com/company/rates_and_regulations/filings/colorado_demand-side_management.

ENERGY MONITORING	RESETS	VENTILATION CONTROL
• Whole building or end-use • KWh or demand	• Supply air & discharge air temperature • Condenser water temperature • Chilled water supply temperature • Variable air volume fan duct pressure and flow • Static pressure • Hot water supply temperature	• Carbon dioxide • Occupancy sensors • Supply air volume/Outside air damper compensation routines • Exhaust fans • Air-side equipment

Future opportunities in EMS exist due to building occupancy patterns becoming more variable and less predictable. A properly running control system is now more important in managing energy. In addition, when buildings have reduced capacity, demand control ventilation can manage lower and varying occupancy rates, thus helping buildings that remain unoccupied.

Bundled with EMS will be our Empower Intelligence offering at Xcel Energy. Empower Intelligence was not part of Xcel Energy's previous 2021-2022 DSM Plan for 2021-2022 nor the 2023 DSM & BE Plan. The Company proposes to add Empower Intelligence to our Business Segment in the 2024-2026 DSM & BE Plan under the EMS program. Empower Intelligence is a paid subscription service that gives customers access to energy use information and insights.

The Empower Intelligence program offers business customers a data-driven software solution that delivers energy usage insights through a user-friendly intuitive web-based portal. Customers can subscribe to monthly, daily, or real-time levels of electric energy usage granularity subject to the capability of the customer's meter. Water and natural gas usage tracking may also be available from the vendor for an additional fee with a real-time subscription.

In addition, the Company will provide a virtual commissioning component identifying low, no-cost measures to customers for implementation. If other opportunities are identified, the customer will have the opportunity to participant in one of our many Businesses Segment programs. Empower Intelligence provides more granular information than the free Energy Benchmarking service, along with offering insights and suggestions through a Virtual Commissioning component. The product is primarily marketed through our Account Managers and Energy Efficiency Specialists.

Program Changes
Empower Intelligence is a new program within EMS and the Business Segment.

B. Forecasts, Participants & Budgets

Forecasts and Participants
EMS savings and participation forecasts were established considering recent product trends, average project size, typical project costs, and the product's historical performance. The resulting forecasted participation has decreased significantly in the past three years due to the following:

- Trade partners have shifted their focus from system implementation to ongoing performance contracting;
- The COVID-19 pandemic has presented lingering challenges including low building occupancy, tighter budgets, reduced efficiency investments, and supply chain constraints; The complexity of controls has increased the incremental costs of projects and these costs have been difficult to separate in the cost-analysis.

The target for EMS' marketing activities includes the owners or managers of existing commercial or manufacturing business that:

- Have not installed or upgraded controls systems for at least seven years;
- Have one entity that incurs the energy costs (without individually metered tenants);
- Are of sufficient size to likely have acceptable energy savings compared to costs, which tend to be buildings of at least 150,000 ft^2; and,
- Has load shifting opportunities to decrease energy usage during peak coincident hours.

The Company will implement only those adjustments that are designed to be cost-effective and meet established engineering standards.

For Empower Intelligence all business customers are eligible to subscribe to Empower Intelligence. Depending on the level of service chosen additional metering may need to be installed at the customer's expense. Customers pay a monthly subscription fee to access the portal to view usage for the premises they have enrolled. Customers utilize the portal to view utility usage, identify anomalies, compare usage patterns over time, set usage and peak demand alerts, and more.

Budgets

Anticipated participation levels guided budget development. Historical costs were also considered, and promotional costs were minimized. The product's budget is driven by two costs:

- Rebates – The budget for rebates is estimated using historical data and analyzing anticipated payouts per kWh, PCkW, and Dth; and,
- Internal labor – EMS is a labor-intensive product due to the analysis components of the product. As the product includes demand control measures more analysis may be necessary to validate savings, thus requiring measurement and verification. Prescriptive measures have been added to provide efficient processes for customers.

Empower Intelligence participation, targets, and budgets were determined by analyzing existing, known costs of the Empower Intelligence product, and forecasted growth of the product. Costs of the Virtual Commissioning feature were also taken into consideration.

The main budget drivers include the following:

- Utility Administration: These costs are driven by marketing, sales, and internal labor resources to support the program.
- Subscriptions: Subscription costs vary by tier with the lowest, monthly tier priced at $75 per month per meter. Daily and real-time subscriptions cost $150 per month per meter. The customer pays the Company for the utility data and analytics services, and a credit will appear in the program budget. The Company pays the vendor for the data and analytics services.

- Customer Service: The Company utilizes a third-party vendor to provide the customer portal and Virtual Commissioning ("VCx") services.

C. Application Process

The application process for the EMS product is the same as the Custom Efficiency product plus there is now a separate EMS application for the new prescriptive measures.

The Empower Intelligence offering is for all business customers who are eligible to subscribe to Empower Intelligence. First, they meet with their Account Manager/BSC representative to start conversations with our vendor. Second, once they have decided on the level of service they want to participate in, they begin the contract building process. Third, the contract lays out the premise, account, meters, and level of service along with one-time and reoccurring payments. The customer and our vendor work through our Consent to Disclose Utility Customer Data form since we are not regulated in Colorado.

Depending on the level of service chosen additional metering may need to be installed at the customer's expense. Customers pay a monthly subscription fee to access the portal to view usage for the premises they have enrolled. Customers utilize the portal to view utility usage, identify anomalies, compare usage patterns over time, set usage and peak demand alerts, and more.

Quality Assurance
Empower Intelligence subscribers receive VCx services via a third-party partner.

Through the Virtual Commissioning offering:

- Opportunities identified are typically low-cost and yield simple paybacks of less than a year;
- The customer only pays for their subscription to Empower Intelligence and any implementation costs of identified operational improvements they choose to pursue;
- There are no in-person meetings or rebates;
- The vendor utilizes regression models on an hourly or daily basis to measure savings looking at a variety of metrics to verify customer savings. The vendor routinely runs M&V modeling and monitors savings to ensure accurate savings are captured and anomalies can be identified.

D. Marketing Objectives & Strategies

EMS and Empower Intelligence marketing is primarily conducted by Account Managers, leveraging their direct relationships with customers. In addition, the following strategies will help meet energy savings forecasts:

EMS: Trade Partner Communications – EMS is substantially marketed to and through trade partners, which primarily consists of equipment manufacturers and distributors; electrical contractors; and mechanical contractors. The Company provides training sessions for these trade partners. The Company has hired Trade Channel Managers who work closely with Trade Partners to inform them on products. The "Energy Exchange", a quarterly email newsletter

also goes out to all trade partners who have registered to be part of the Company's trade ally network.

Empower Intelligence: Stake Holders – Account management teams are the primary way we sell and get customers involved in the program. We rely on their relationships with the business customers and their knowledge of their customer support.

1. Collateral – Customers and trade partners can access material electronically on Xcel Energy's website.[39] Marketing materials include:
   - *Product Information Sheet* – The primary tool for sales staff that helps describe the product to customers and vendors. It provides examples of qualifying projects, business reasons to participate, improvements made to the product, new prescriptive measures, and a summary of procedures.
   - *Case studies* - Outlining specific savings and benefits achieved through EMS and Empower Intelligence.
   - *Product Application and Worksheet* – The document used for customers to start the process is the Custom application and workbook. Here all the necessary information about the project and the building are entered by the trade partner or customer.

2. Target Market – All commercial and industrial facilities within the Company's service area are eligible to participate. The bulk of energy management systems and Empower Intelligence are installed in commercial facilities (office buildings, schools, etc.). The products focus on managed accounts and large unmanaged accounts. Approximately 80% of these customers are concentrated within the Denver metro area, thus marketing campaigns are focused in this area. For EMS systems, new buildings are eligible only to the extent that they have extensive control strategies that exceed all codes and standards. For Empower Intelligence, we need a running electric, water, or natural gas meter to sell our service.

   The primary targets for marketing activities for EMS are the owners or managers of existing commercial buildings that:
   - Have not installed or upgraded controls systems for at least seven years;
   - Have one entity incurring the energy costs (no individually metered tenants); and
   - Are of sufficient size to likely have acceptable energy savings compared to costs, which tend to be buildings of at least 100,000 ft^2.
   - Buildings or industries that have low load factors during the peak coincident time period.

The primary targets for marketing activities for Empower Intelligence are as follows:
- Owners or managers of existing commercial buildings
- Energy efficiency facility managers or facility managers
- Customers who have high energy bills
- Have reporting needs for electric, water or natural gas
- Annual energy expenditure of $50,000- $500,000
- Considering an EMIS

[39] https://co.my.xcelenergy.com/s/business/lighting-equipment-rebates/energy-management-systems.

E. Product-Specific Policies

- Information pertaining to minimum requirements for custom EMS measures is included on the application, just as with the Custom Efficiency product, project pre-approvals follow the rules of the Custom Efficiency product. A cost-effective metric ratio equal to or greater than one; and
- A payback between one and fifteen years based on the analysis.

As part of our strategy to increase participation in demand response products, this product will work directly with the Demand Response products to offer an incentive for demand response controls and collaborate more closely with the Peak Partner Rewards, Critical Peak Pricing, or other Demand Response products. Rebate amounts are based on the project performance and cost-effectiveness. Further details are provided in the technical assumptions.

Empower Intelligence:

Empower Intelligence is a direct savings program. Savings are identified through VCx which is provided by a third-party vendor. Business customers that have subscribed to Empower Intelligence will automatically receive the VCx services as part of their subscription. The vendor's VCx analysis is ongoing if the customer has an active subscription, and we estimate that around 10% of customers will have opportunities identified. If the customer chooses to proceed with the identified improvements, there is a measurement & verification period that follows the implemented changes. Opportunities that are undertaken will be communicated back to The Company for tracking.

F. Stakeholder Involvement

Customers, trade partners, and other stakeholders are currently engaged at the project level, and a product development team has been formed to improve the product. The Company continuously works with stakeholders to identify product trends that may require changes to product design. The Company will also discuss potential changes with trade partners or third-party implementers.

Empower Intelligence stakeholder involvement is also a major part of the program offering. Business customers have played a major role in the ongoing dynamics of this product. Additionally, key internal stakeholders such as the Account Management team will provide consistent feedback on product performance and customer satisfaction that continuously influences product design and operations. The Company continues to meet frequently and interact with these business customers and internal stakeholders to encourage their input.

G. Rebates & Incentives

EMS offers rebates of up to $700 per peak coincident kW saved, plus up to $0.035 per annual kWh saved. EMS also offers Public Service natural gas customers up to $4 per Dth saved. To attract

greater participation, the Company will reduce incremental project costs submitted in applications by 50% to exclude potential non-energy incremental costs associated with projects.

Empower Intelligence Rebates:
Not applicable

Empower Intelligence Trade Partner Incentives:
Not applicable

LED Street Lighting

A. Description

The Company's LED Street Lights product captures energy savings for local municipalities on the Street Lighting Service ("SL") Rate by replacing legacy Company-owned streetlights with LED fixtures.

The Company owns approximately 95,000 cobrahead-style streetlights across its service territory with nearly three-fourths of those lights being concentrated within a small number of larger municipalities. Replacement of the current bulbs (70-Watt, 100-Watt, 150-Watt, 250-Watt, and 400-Watt fixtures) with more efficient LED fixtures will result in significant energy savings. Cobrahead replacements offered through this voluntary product will be provided to customers who opt-in to the new SL Rate to transition to LED technology, for both retrofits and new installations. The Company intends to replace 100% of cobrahead fixtures within 10 years of the new rate offering.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The Company is forecasting replacement of 4,000 Company-owned cobrahead street light fixtures—through retrofits and new installations—annually for 2024-2026. The replacement schedule is tied to an energy savings target of approximately 1.8 GWh which represents the annual savings estimates.

Budgets

Equipment and labor costs for LED installation are not being recovered through the DSMCA and therefore are not included in the DSM & BE Plan budget for this product.

C. Application Process

Customers are required to submit their preference for the Option A or Option B rate.

D. Marketing Objectives & Strategies

The product will have a marketing budget to develop customer communications, case studies, and allow for customers who many have opted out to now participate.

E. Product-Specific Policies

Voluntary product participation is available for only Public Service customers on the SL Rate. The upgraded street lighting infrastructure will remain under Public Service ownership.

Note: The Company offers separate rebates for customer-owned street lighting within the Lighting Efficiency product.

F. Stakeholder Involvement

Local municipalities on the Company's SL Rate are the primary product stakeholders. The Company consulted with local municipalities regarding this product through several outreach meetings starting fall of 2014 through 2020. Collaboration will continue as implementation continues.

G. Rebates & Incentives

No rebates are offered for this product because the Company is the equipment-owner. SL ratepayers will benefit from the ability to transition to the new technology under the new, lower rate enabled by the lower energy consumption and competitive cost of the LEDs.

Lighting Efficiency

A. Description

The Lighting Efficiency product offers prescriptive and custom rebates to Xcel Energy electric business customers who install qualifying energy-efficient lighting equipment in existing buildings. Rebates are offered to encourage customers to purchase energy-efficient lighting by lowering the upfront costs associated with this equipment.

The product's main offerings include the following:

- Prescriptive rebates for qualifying lighting measures and projects[40] that save energy such as:
    - LED fixtures that replace inefficient systems, including incandescent, HID and fluorescent. LED measures include both interior and exterior fixtures, retrofit kits, and lamps for retrofit applications;
- Custom rebates for energy-saving lighting projects that do not fall within the requirements of the prescriptive rebate;
- Midstream LED lamp rebates called Business LED Instant Rebate;
- Networked Lighting Control Rebates for qualifying systems controlling LED technology, including systems that also control HVAC equipment and have demand response capabilities; and
- Rebates for indoor LED horticultural lighting projects.

Prescriptive Lighting Rebates

The product offers rebates for qualifying lighting equipment that is more efficient than existing equipment in retrofit situations. Lighting measures applicable to a prescriptive rebate format are ones that are commonly installed in the marketplace and have an easily identifiable means to determine energy savings.

Custom Lighting Rebates

The product pays custom rebates for qualifying energy saving measures that are not included under the prescriptive rebate category. Such projects are evaluated under the Custom Efficiency analysis and must follow the rules of the Custom Efficiency product. Requirements include that the customer obtains and provides all information needed to analyze the energy savings potential of the project. In addition, for advanced lighting controls projects all equipment must be new and the control retrofit must be for an existing building.

Additionally, as the importance of managing peak demand continues to grow, the Company will explore ways to incentivize and incorporate load management technologies and strategies. Interval data from advanced meters will help the Company better identify strategies to shift energy use from peak to off-peak periods.

[40] http://www.xcelenergy.com/Save_Money_&_Energy/Rebates/Lighting_Efficiency_-_CO.

Business LED Instant Rebates
The product offers upfront rebates to customers on qualifying LED screw-in or pin-based lamps and downlight retrofit kits and fixtures that are purchased from distributors participating in the LED Instant rebate product.

B. Forecasts, Participants & Budgets

Forecasts and Participants
The product's participation and energy savings forecasts were determined by looking at historical participation levels, as well as the large number of LED products that are expected to be commercially available during the time period of this Plan. Previous project characteristics, including equipment type/mix, were also used to develop projected average cents-per-kWh rebate for each measure.

Budgets
Historical expenditures were analyzed to project the budget. The main budget drivers include:

- *Participant Incentives* – The vast majority of the budget is allocated for rebates. This budget reflects the new rebate levels and projected customer participation in each measure, which was based on 2019 and some of 2020 participation across the offerings.
- *Administration* – These budgets are based on past product performance with a slight increase built in for expanded product offerings, engineering, and account management involvement. The budget also includes third-party implementer costs for the implementation of Business LED Instant Rebate efforts, technical assistance with complex lighting projects, and preparing rebate paperwork
- *Advertising and Promotion* – A promotional budget was developed based on historical expenditures on marketing activities. Promotions and paid advertising are targeted to customers and trade partners and typically focus around activities such as new or revised product offerings, case studies featuring successful projects, educational opportunities such as events, and bonus rebates.

C. Application Process

The Company promotes the Lighting Efficiency product through several channels, including the Company's website, advertising, direct mail, email promotions or through the lighting trade. Account Managers work directly with the Company's largest customers to help them identify energy saving opportunities in lighting and BSC representatives are available for all business customers, particularly small- and mid-sized business customers, who need information on lighting rebate products.

Lighting Efficiency Retrofit Application
The application process for the prescriptive retrofit product is similar to other prescriptive products. Customers may apply for rebates by completing the application and providing a detailed invoice for the newly installed equipment. The customers may submit a rebate application after the equipment has been purchased and installed. The replacement of fixtures must provide equivalent lighting levels between the baseline and proposed scenarios and result in energy savings.

The equipment must be new and meet all the qualifications detailed on the application form. After the customer has installed the equipment, the application and invoice must be submitted to the Company within 24 months of the invoice date for retrofit projects. Once the paperwork is completed and submitted, rebate checks will be mailed to the customer as indicated on the application within six to eight weeks.

Business LED Instant Rebates

At the point of sale, participating distributors validate that the end-use customer is an active customer within Xcel Energy electric service territory. Participating distributors will apply an incentive to the retail price to decrease the qualified product cost. Customers will not be required to submit a rebate application as the participating distributor will provide the sales data to the utility.

Custom Efficiency Lighting

Applications for energy saving lighting projects that do not fit into the prescriptive paths may be reviewed using the Custom Efficiency or Advanced Lighting Control product application and the accompanying Lighting Evaluation Worksheet.

D. Marketing Objectives & Strategies

The key marketing objective is to raise awareness, interest and participation in the Lighting Efficiency product, contributing to goals for energy savings and demand reduction.

Marketing Strategy

Lighting Efficiency is primarily promoted through Company Account Managers, BSC representatives via inbound and outbound telemarketing, through Colorado's lighting and electrical trade via the Company's Channel Managers, and by traditional marketing vehicles such as advertising, mailings, Web content and tools, email, and other sales promotions.

Significant market segments for potential Lighting Efficiency savings include office buildings, manufacturing sites, retail establishments, schools, and 24-hour facilities. Marketing campaigns targeted to those customer segments are executed during one-on-one Account Manager meetings, BSC scripted calls, and/or customer direct marketing that drive inquiries to the Company's inbound phone center.

Marketing to Trade Partners

The Company's outreach and relationship building with lighting and electrical trade, professional engineers, architects, and lighting designers is another key strategy to reach important business segments and indirectly influence the purchase and installation of energy-efficient lighting systems. The Company establishes and maintains contact with this audience by:

- In-person training and presentations by the Channel Managers at industry events and trade shows, such as the Energy Efficiency Expo, for both customers and trade allies;
- The Lighting Advisory Board, described in section *F. Stakeholder Involvement* below;
- *Energy Exchange*, an email that is sent to the trade discussing energy efficiency lighting applications, case studies, product changes, and other pertinent topics; and

- Trade website,[41] including specific brochures and informational pieces directed toward the trade, and updates on product offerings.

Marketing to Small Business Customers

The Company accesses this harder-to-reach market primarily through direct mail, email, and the BSC, as well as via outreach conducted by the Company's Small Business Solutions third-party implementer.

In addition, several marketing pieces are available on the Company's website[42] or viewing or download. These pieces are targeted to large-, medium- and small-sized business customers, as well as trade partners. The website offers information on lighting technologies, case studies of successful lighting upgrades, and external sources highlighting reasons to pursue lighting upgrades or implement efficient lighting sources.

- *Prescriptive Rebate Applications* – Applications detail product requirements, rebate levels and additional information to help customers complete the form and submit it for rebate with accompanying invoices and equipment specifications.
- *Resource Documents* – The Lighting Efficiency webpage links to several documents on energy efficient lighting technologies, written by outside organizations such as the DOE, that further identify lighting efficiency sources and opportunities.

E. Product-Specific Policies

Lighting Efficiency has several product-specific policies:

- All rebated equipment must be new, meet all product rules and requirements, and the application must be submitted within 24 months of the invoice date for retrofit projects.
- Non-DLC and non-ENERGY STAR® products must meet the DLC or ENERGY STAR® product eligibility category definitions.
- Customers who purchase lights in bulk can earn rebates on select LED lamps for stocking purposes. Lamps in storage must remain on the premises.
- In cases where the customer is unable to obtain an equipment invoice, the Company will send an Account Manager to complete an onsite field verification to confirm that equipment was installed as stated on the application.

F. Stakeholder Involvement

Stakeholder involvement in the Lighting Efficiency product comes through a Lighting Advisory Board and the quarterly DSM Roundtable Meetings. The Lighting Advisory Board was formed as a collaborative effort between several key lighting professionals and the Company's management team. The objectives of the board are to identify gaps in the Company's product offerings, suggest areas of improvement, and to offer a forum for open discussion of lighting topics. Several recommendations from the board have been addressed through the Company's product development process and incorporated into the product. The Board will continue to meet on a regular basis, or as long as needed.

[41] https://co.my.xcelenergy.com/s/partner-resources.

[42] http://www.xcelenergy.com/Save_Money_&_Energy/Rebates/Lighting_Efficiency_-_CO.

G. Rebates & Incentives

The Lighting Efficiency product offers rebates through the retrofit prescriptive component, and/or Custom Efficiency and Advanced Lighting Controls, and/or the Business LED Instant Rebate component.

The Company will use the most appropriate rebate channel to implement rebates.

Program Changes

The Lighting Efficiency program strives to make it easier for customers to participate in the program by moving rebates from custom to prescriptive as well as adding new products and services and removing barriers. Many, of the program changes come directly from the industry trade partners that support and participate in the program. The details of the new measures and program changes are listed in the chart below.

Change	Rationale
Fluorescent phase out	The program will begin phasing out of midstream LED tubes with a fluorescent baseline in accordance with the State of Colorado's mandates for the manufacturing and selling of this type of equipment. S
LED to LED	The efficiency of LEDs that were installed more than 10 years ago are diminishing. To ensure customers are installing energy efficient equivalent equipment when the existing equipment deteriorates at the end of its lifetime, the program is moving the LED-to-LED rebate from custom to prescriptive for both interior and exterior applications.
Increased rebate value per watt for standalone lighting controls	Recently the Design Lights Consortium (DLC) made it harder for customers to get the needed information to validate if specific lighting equipment was DLC rated or not. The program is eliminating this criterion for the program. This policy change will increase participation in the program.
Increased rebate value per watt for network lighting controls ("NLC")	Rebates are increasing to $0.50 per watt from $0.40 per watt.
Adjust baseline for general service lamps, screw-in lamps.	The baseline for general service lamps and screw-in lamps will change to 45 lumens per watt to align with Federal EISA Backstop legislation.

Increase the wattage ranges for area lights, high bays and parking garages measures.	The equipment has become energy efficient and the lumens per watts have increased. By increasing the lower wattage threshold, the Company can account for more efficient fixtures
Add new measures for Prescriptive Retrofit: exterior mogul base lamps, exterior downlights, exterior daylighting controls, expanded LED Street Lighting, interior track lighting.	Offering prescriptive options reduces customer adoption barriers.

New Construction

A. Description

The New Construction product influences building owners, architects, and engineers to include energy efficient systems and equipment in their design for new construction and/or major renovation projects. With regards to the New Construction product offering, new construction is defined as a new building, addition to an existing building, or renovation/redesign. Since the Company services building owners of different areas and size, the whole-building New Construction product offers four core components:

1. EDA
2. Energy Efficient Buildings ("EEB")
3. New Construction Lighting
4. Codes and Standards Compliance
5. All-Electric Multifamily Affordable Housing Pilot

All components are available to non-residential customers in Public Service's electric and natural gas service territory.

EDA

The EDA offering provides a source of energy expertise to encourage energy efficient building design and construction practices. EDA offers design assistance in support of integrated design process by providing comprehensive computer modeling of the planned design, funding to offset the cost of design time associated with the increased energy analysis, financial incentives to improve the cost-effectiveness of a package of energy-efficient measures, and field verification to ensure that the strategies are installed per the design intent. Public Service covers the average energy modeling cost of an EDA project for customers.

According to *Best Practices Benchmarking for Energy Efficiency Programs*,[43] it is crucial for new construction DSM products to engage early in the design process and utilize integrated design modeling. The report states that, "Integrated design adds value because cost-effective energy savings opportunities decline as the project progresses through the various design stages." EDA uses computer energy models and a well-established, collaborative method for exchanging information with design professionals, contractors, developers, and building owners throughout the integrated design process. Important information is provided at critical points in the design process about the value and application of strategies for reducing peak demand and energy use. By analyzing integrated systems in the beginning of the design process, customers can make a building significantly more efficient, more comfortable for the occupants, and less costly to operate in the future.

In addition to technical assistance, Public Service provides financial incentives to building owners to improve the cost-effectiveness of energy efficient materials and equipment. Incentives are paid only after a verification process is completed, which typically occurs within three

[43]National Energy Efficiency Program Best Practices Study, Quantum Consulting Inc., Dec. 2004, pg. NR8-2. Available: http://aceee.org/files/proceedings/2004/data/papers/SS04_Panel5_Paper21.pdf.

months of building occupancy. Verification ensures that the measures were installed as proposed and provides an added degree of confidence in the project's calculated energy savings.

EDA will increase its focus on technologies and strategies that mitigate peak loads and reduce revenue requirements on the system. As technologies such as electricity storage become more economically viable for developers, EDA will encourage customers to incorporate them into building designs, as they can be used to support load shifting improvements. By increasing focus on system peak reductions, the product aims to identify and incentivize strategies that will maximize economic and environmental benefits for participants.

EDA offers three tracks for customer involvement:

Basic Track
The Basic Track is for Public Service customers interested in the opportunity to participate in a collaborative design process and identify energy savings opportunities using new technologies and energy methodology. The following requirements apply to the Basic Track: Energy Savings

- Square footage: Greater than 50,000 square feet (new construction, major renovation, or addition)
- Design phase: Schematic design or early design development
- Energy Savings: minimum of 15% peak coincident demand savings and 10% natural gas savings for combo projects and minimum of 15% peak coincident demand savings for all-electric projects achieved in the FEA Stage, compared to a code-compliant design; and
- For major building renovations, building must include significant renovations to at least two of the following three systems: building envelope, lighting/electrical, or mechanical systems.

Enhanced Track
The Enhanced Track is for Public Service customers interested in obtaining sustainable building certifications, such as the U.S. Green Building Council's Leadership in Energy and Environmental Design ("LEED®")[44]. The Enhanced track allows for further analysis in daylighting, lighting, and mechanical system comparison and building orientation. The following requirements apply to the Enhanced track:

- Square footage: Greater than 50,000 square feet (new construction, major renovation, or addition)
- Design phase: Pre-design or early schematic design
- Energy Savings: minimum of 30% peak coincident demand savings and 15% natural gas savings for combo projects and minimum of 30% peak coincident demand savings for all-electric projects achieved in the FEA Stage, compared to a code-compliant design; and

For major building renovations, building must include significant renovations to at least two of the following three systems: building envelope, lighting/electrical, or mechanical systems.

<u>Express Track</u>
The Express Track is for Public Service customers whose projects are of a common type (such as multifamily, office, school, etc.) and draws on results from previous modeling experience of similar building types and systems to calculate hourly building simulations of the actual project. The following requirements apply to the Express track:

[44]USGBC, LEED, http://www.usgbc.org/leed.

- Square footage: Greater than 50,000 square feet (new construction, major renovation, or addition);
- Design phase: Schematic design or early design development (same as basic track);
- Energy Savings: minimum of 15% peak coincident demand savings and 10% natural gas savings for combo projects and minimum of 15% peak coincident demand savings for all-electric projects achieved in the FEA Stage, compared to a code-compliant design; and
- For major building renovations, building must include significant renovations to at least two of the following three systems: building envelope, lighting/electrical, or mechanical systems.

Public Service administers EDA using third-party implementers to help identify project candidates, facilitate meetings with the design teams (including the building owner), and complete energy modeling activities. Energy modelers are chosen based on a set of qualification criteria to become a third-party implementer of EDA services. The EDA offering will open a qualification pathway for energy modelers to apply to become an approved Xcel Energy EDA third-party implementer in accordance with the Settlement Agreement in Proceeding No. 22A-0315EG. Qualification opportunities will be opened periodically as Public Service deems appropriate for successful delivery of the EDA offering. Third-party implementers are paid on a pay-for-performance basis.

EEB

The EEB offering is intended to provide a simplified approach to optimizing energy efficiency options in new construction or major renovations. This component addresses the portion of the new construction market not suited for the full-scale energy modeling offered through EDA. Projects must be a minimum of 10,000 square feet. Projects are also generally less than 70,000 square feet and have passed the schematic design stage of new construction. However, any size project above 10,000 square feet may qualify provided the project has not awarded bids for equipment.

Focusing on the needs of small building owners, the EEB offering provides a comprehensive list of typical energy efficiency measures that can be incorporated into the new/major renovation building design, as well as the rebate amount available for each measure. Incentives are provided for heating and cooling, lighting, building envelope, electric motors, refrigeration, and custom opportunities. Customers will receive a rebate tailored to their building after the project has been constructed and onsite verification completed.

Public Service administers EEB using both internal and external resources to review the calculations and rebates and verify installation. The EEB offering is managed by a third-party implementer to assist customers with the EEB process.

New Construction Lighting

The New Construction Lighting offering replaced the prescriptive measure offered under the Lighting Efficiency product and is intended for customers that either do not meet the size and timing requirements of the EDA of EEB offerings, or for customers whose scope only includes lighting systems in their new buildings, additions, and major renovations.

Like the EEB offering, New Construction Lighting will focus on energy saved over the IECC code-compliant baseline, using lighting ComCheck documents to identify allowed wattage versus proposed wattage based on Lighting Power Density.

Codes and Standards

The Company will proactively encourage and support jurisdictions to adopt the latest building codes within the residential and commercial new construction segments. In addition, it will give those communities tools to improve compliance with the new codes and ultimately help them reach their energy performance and economic development goals. This support will be designed to meet each jurisdiction where it is in the code adoption cycle and address current gaps in new code adoption across the state including lack of resources, lack of knowledge, and internal and external opposition to increasing code standards. Specific strategies include one-on-one support for local officials, marketing materials available through various channels, and trainings designed to support awareness and implementation.

All-Electric Multifamily Affordable Housing Pilot

The Company will develop a pilot program to incentivize high-efficiency electrification in new construction of multifamily affordable housing buildings. The Company will take stakeholder suggestions for the pilot, which will be run by a third-party implementer that is specialized in applicable energy and jurisdiction codes. Pilot participants are anticipated to go through EDA to leverage that product's energy modeling services to design highly efficient all-electric multifamily buildings.

The pilot is intended to determine proper rebate levels to help offset the additional costs associated with the high-efficiency all-electric equipment. Additionally, it will help determine the path forward with equipment selections and the proper structure for this pilot, if successful, to become a filed product.

B. Forecasts, Participants & Budget

Forecasts and Participants

Participation is estimated using actual historical product data. All non-residential customer segment types are eligible to participate in EDA; however, typical projects fall in the sectors of office, schools, retail, multifamily, and healthcare. The EDA energy savings forecasts were estimated based on the average energy savings of participating buildings when compared to the usage of a baseline building. The baseline building is defined as a building compliant with the ASHRAE 90.1 standards, or the local jurisdiction's code, whichever is more stringent.

Budgets

Once forecasts were established, the budget was developed based on historical cost and participation information. The following are the specific budget drivers:

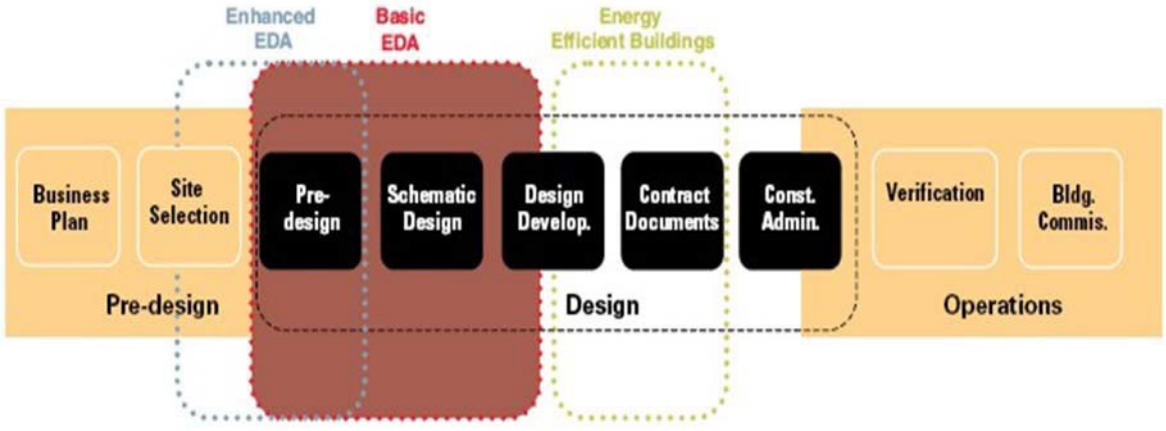
- *Consulting Payments* - Much of the product delivery budget is associated with the cost of modeling for customer projects. Modeling costs are estimated to be approximately $100 per kilowatt ("kW") saved for all three tracks. Modeling costs are then split between the year modeling begins and the year in which the project will be completed due to final as- built modeling being used in rebate calculations. There are also minimal dollars allocated for EEB for a third-party implementer. New Construction Lighting will not incur modeling or consulting costs.
- *Incentives*- Incentives are calculated based on the energy saved by the as-modeled and as-verified building compared to a code-compliant design
- *M&V*- Completed in two steps for the offering and described in the M&V section of this Plan. Cost estimates are based on construction documentation and site review and are analyzed on a per-project basis. Projects in the New Construction Lighting measure will have M&V activities performed on a sample of completed projects.
- *Promotions, Advertising and Customer Education* - Promoting the product through specific advertising campaigns, trade alliances, trade shows, and training opportunities is an important part of New Construction and aids in shifting the market towards higher efficiency. As such, historical data was used to determine the appropriate level of expenditure on product marketing.

C. Application Process

Energy Design Assistance

The application process for EDA is more involved than for prescriptive products and follows the design schedule of a new construction project as outlined in the diagram below.

Building Design Process



The average timeframe for project completion can range from two to five years depending on project schedules. For example, projects beginning modeling in 2024 will likely be completed in 2026 or beyond.

The application steps for the product include:

1. *Application Submittal*- Each project is evaluated by Public Service and the third-party implementers to ensure the project meets eligibility requirements. Customers who are interested in participating in the product must meet the design schedule requirements. Once approved to participate in the EDA offering, the customer receives an email approving the project and explaining next steps.

2. *Introductory Meeting*- An introductory meeting with the customer, design team, the third-party implementer, the Public Service Account Manager, and other key parties, takes place within two weeks of approval, depending on the design schedule. This meeting sets the tone for the collaborative approach, by explaining how the process works, who is involved, and what results should be expected. Initial project details, such as baseline systems, are collected during this meeting.

3. *Preliminary Analysis*- Using project details and costs from the design team, the third-party implementer begins the modeling process. Analysis is completed using a whole-building energy simulation computer program. Modeling software and protocols are established by Public Service, with reference to ASHRAE 90-1 standards or the local jurisdiction's code, whichever is more stringent. Further analysis under the Enhanced track, if applicable, is also completed using the relevant modeling program and code base.

   Within this analysis, different energy efficiency opportunities are explored that fit into the project criteria (*e.g.*, payback analysis, energy expectations, and original design strategy). A meeting is then held to review these strategies to find the ones that meet the original project criteria and which ones should be considered moving forward.

4. *Final Energy/Strategy Analysis*- Energy efficiency opportunities are then packaged together in design alternatives to show expected building energy savings, paybacks, and incentives. A whole building approach is used to identify the net effect of multiple strategies on a project. This approach provides opportunity for more energy savings impact, by trading less-effective ideas that may be in the budget for more effective, new concepts. The packaging of design alternatives also provides protection against pitfalls in the value-engineering phase of the design/construction process, which typically cuts individual elements of projects based on their first cost and impact on the tangible elements of the building, with little regard for ongoing energy use. These energy alternatives are then presented to the design team and the customer to choose the best approach for their project.

5. *Construction Document Review*- Once the design team completes construction documents ("CDs"), a third-party implementer reviews the CDs and adjusts the energy model as needed. This energy model is used to determine the expected incentives from

Public Service and to verify compliance with the energy savings intent of the customer. A review of the CDs energy analysis is completed before construction.

6. *Verification*- The final step in the EDA offering occurs when Public Service completes an onsite verification of the energy alternative addressed within the energy model. Equipment and systems are logged to evaluate performance variables as appropriate to verify consistency with modeling assumptions. The actual results are compared to the estimated savings to determine the final customer rebate.

EEB

The application process is similar to other Public Service prescriptive products; however, preapproval is required to allow for calculations of energy-efficient measures, review of construction documents for verification of project design, and final verification of actual installation.

The first step in the process is for the customer to submit a preapproval application and agreement to Public Service. Once received, Public Service will review the project to confirm the project timeline, building square footage, and customer interest in energy efficiency options. Once the application is preapproved, the customer will receive an email from Public Service's consultant explaining the terms of the EEB offering and processes. An introduction meeting invitation will be extended to the customer to provide energy efficiency advice. The building owner will then submit the project data throughout the construction of the project, and upon completion, for review by Public Service. The customer will receive the final construction rebate once the project and onsite verification have been completed.

New Construction Lighting

The application is similar to other Public Service prescriptive products. Customers may apply for rebates by completing the application and providing a lighting ComCheck and detailed invoice for the newly installed equipment. The customers may submit a rebate application after the equipment has been purchased and installed. The equipment must be new and meet all the qualifications detailed on the application form. After the customer has installed the equipment, the application and invoice must be submitted to the Company within 24 months of the invoice date.

The first step in the process will be for the customer to submit a completed preapproval application, lighting ComCheck, and equipment invoice to Public Service. Once the paperwork is completed and submitted, rebate checks will be mailed to the customer as indicated on the application within six to eight weeks.

D. Marketing Objectives & Strategies

The New Construction product is primarily marketed through the Company's sales team and external third-party implementers to reach architects, engineers, general contractors, and Public Service customers, as detailed below. The Company fosters a collaborative approach, meeting with design teams to show how the product works and how it is beneficial to customers. Marketing strategies used within the product scope include trade shows, electronic newsletters, face-to-face meetings, advertising, and participation with various trade organizations including American Institute of Architects, Association of General Contractors, U.S. Green Building

Council, and ASHRAE. A secondary market is building owners and developers. The EEB offering, on the other hand, is primarily marketed to developers and customers.

Primary Market – General Contractors, Architects, Mechanical and Electrical Engineers

- Implement energy efficiency strategies
- Influence customer/developer decisions
- Trusted by owner
- Often suggest New Construction product to owners and developers
- Key to actual inclusion of strategies and cooperation

Secondary Market – Owners and Developers

- Make initial decision on budget
- Hire and contract with an architect, engineers, and general contractor(s)
- Initiate conversations on energy efficiency
- Make final decision on equipment choices
- Key to moving general contractors to energy efficiency strategies within a limited budget

Public Service continually works to improve and update the information available to customers on the website and/or for events. There are several pieces of collateral used for the New Construction product.

- *Product Feature Sheet*- Explains the features and the benefits of the product;
- *Case Studies*- provides Examples of how various customers have benefited from participating in the product;
- *Process Flow Chart*- Detailed information on the product processes; and
- *White Papers*- Explains different options for energy efficiency in lighting, heating, cooling, envelope, and other measures.

The EEB offering provides Public Service with the opportunity to conduct a larger marketing effort for New Construction. Customers may hear of the EEB offering through several channels, including Account Managers, the Business Solutions Center, architects and engineers, general contractors, or equipment trade partners. Several strategies are used, such as:

- *Product Feature Sheet*- Explains the features and the benefits of the product;
- *Trade and Customer Seminars*- In-person opportunities to educate customers and trade partners on the benefits of new construction; an important part of the marketing strategy;
- *Conferences and Exhibits* -In-person expertise to help customers determine what product best fits their needs, as well as guidance on the EEB and EDA processes; and
- *E-newsletters*: Another avenue to educate the market on the product and benefits of reviewing new construction projects for energy efficiency opportunities.

The New Construction Lighting offering provides Public Service with the opportunity to conduct a larger marketing effort for customers whose needs were previously met by the prescriptive new construction measure under the Lighting Efficiency product.

E. Product-Specific Policies

New code adoption only impacts new EDA project starts. Since the sales cycle for EDA is typically two to five years—from project initiation and design to the completion and occupancy of a physical building—many of the projects expected to finish in 2024 have already been identified by the Company and third-party implementers. The following policies are in place for the New Construction product:

- *Natural Gas Impacts* -In taking the whole-building approach, there are times when an efficiency measure may cause a decrease in one fuel consumption, but an increase in consumption of another fuel. In these situations, Public Service will account for both the decreases (energy savings) and increases in fuel consumption and will issue the rebate accordingly.
- *Completion of several opportunities*- The EEB offering will require installation of new equipment in both the electrical and mechanical sections of the building. Buildings that only require adjustments to one "section" will be referred to the Company's other prescriptive products.
- *Ineligibility for additional products*- The New Construction product is a holistic approach to whole-building energy efficiency. For this reason, customer participation in whole-building New Construction offerings (EDA or EEB) will preclude customer's participation in Xcel Energy's prescriptive and custom (component) rebate products.
- *Design Team Incentive deadlines*- Design Teams in the EDA offering may submit design team incentive request applications as late as two years after the project has finished (Construction completed and M&V performed).
- *Technological eligibility*- Technologies such as fluorescent lighting and metal-halide lighting will not be eligible for rebates in the New Construction product.

F. Stakeholder Involvement

Customers, trade allies, and other stakeholders are engaged at the project level. Feedback is garnered individually from participants and when feedback trends are identified, Public Service will develop recommended changes for consideration in product design. Public Service will also discuss potential changes with trade partners or third-party implementers.

The Company continues to coordinate with other utilities and organizations to improve and effectively deliver the New Construction offerings. In addition, surveys are used to gather feedback from participants to continually improve the product.

G. Rebates & Incentives

EDA provides rebates to customers based on the times of day the above-code measures included in the project are saving energy compared to the modeled baseline. Public Service also reimburses design team members to offset the incremental cost of their participation from $8,000 to $12,000 per project, depending on the square footage of the building. Design Teams can claim these incentives as late as two years after project completion. The EEB offering covers analysis of

measure opportunities and provides both prescriptive and custom rebates for measures above code. The New Construction Lighting offering provides rebates for lighting designs that perform above code.

Self Direct

A. Description

The Self Direct product will provide large commercial and industrial customers with a holistic approach that enables qualifying them to control all stages of their project's process. The qualified, participating customers will identify, engineer, implement, and commission energy efficiency projects and receive rebates whose dollar value are calculated and based on the incremental energy savings achieved.

The fundamental and differentiating characteristics of Self Direct is that customers perform all the costs and work (*e.g.*, study and scope of work identification, design, engineering, M&V, and reporting associated with their projects) in exchange for the opportunity to receive a higher rebate over Public Service's other DSM products.

Participation is as follows:

1. Public Service pre-qualifies customers for participation.
2. Qualified customers identify the energy savings opportunities of their mixed technologies, and submit their project proposal.
3. Public Service reviews and confirms application receipt, and requests additional information as warranted.
4. Public Service apprises the customer of pre-approval (or denial) of the application. The response identifies an estimated rebate based on projected energy savings and an applicable M&V plan.

Customers who proceed will follow the requirements detailed in the M&V plan and pre-installation monitoring data requirements. Thereafter, the customer proceeds and performs work and follow-up monitoring as described in their M&V plan.

Upon completion - operational and M&V monitoring - the customer submits their report; whereupon Public Service reviews and requests any additional data and validates the final rebate.

B. Forecasts, Participants & Budgets

Forecasts and Participants

Energy savings and participation forecasts were estimated based on projects currently in the pipeline, as well as analysis of historical performance.

Budgets

The product budget was estimated based on the project pipeline and historical participation. No M&V costs are budgeted because customers incur these costs. Budget dollars are focused on

customer rebates since customers are responsible for administrative and project management oversite.

C. Application Process

The Company promotes the Self Direct product through Account Managers and trade partners. Customers are pre-qualified and project scope justification is attained. The justification includes, but is not limited to, a list of the customer's aggregated account, locations, and meter numbers (to meet the minimum aggregated peak load requirement – see Section E below).

These pre-qualified customers submit a scope of efforts containing a combination of multiple mixed technology measures at a single, or their multiple sites. These sites must receive electric service from the Company. Sole common/conventional technology, whether prescriptive or custom, will be applicably redirected.

Project Application

The project application must include the following components:

- Description of the customer, including electric and gas rate classifications, business activities at involved sites, names and roles of personnel involved in the project, and those personnel's history of and expertise with energy efficiency projects.
- Description of the proposed project(s) including technology, locations, implementation schedule, expected measure life, how the project fits into the customer's operations, and a description of previous implementations of similar technology or projects. The project description should include product specification sheets, white papers, quotes from vendors to validate cost estimates, and other supporting documentation.
- For new buildings, the application must contain computer energy modeling specific to the planned building to forecast the base case and efficient energy use. Computer modeling should be in accordance with the protocol specified within the Energy Design Assistance approach of the New Construction product.
- Engineering calculations to forecast energy and demand savings, participant O&M benefits and costs, and the estimated rebate.
- Benefit-cost calculations to determine the MTRC test ratio, including a discussion of the sensitivity of the MTRC and payback to various inputs, and the perceived accuracy of the inputs.
- Description of the controls the customer will use to reduce the likelihood of project cost and schedule overruns.
- Description of the proposed monitoring activities that will be used to track and document energy and demand savings. Pre- and post-installation metering and verification will be required for all projects with predicted energy savings greater than 0.25 GWh, unless the

Company and customer agree upon another methodology. The Company reserves the right to require data measurement and verification for projects of any size.
- Any information reasonably requested by the Company to document and support the application.

Project Completion Report

The format of the project completion report must include the following components:
- Description of all deviations from the application package including equipment substitution, cost adjustments, operating procedures, etc.;
- Documentation of all actual costs incurred including invoices, internal labor, incremental operation and maintenance costs, etc.;
- Raw monitoring results and engineering calculations to demonstrate actual energy and demand savings based on monitoring results;
- Requested rebate amount; and
- Any information reasonably requested by the Company to document and support the project completion report.

D. Marketing Objectives & Strategies

The Self Direct product is marketed to large customers who have expressed an interest in overseeing their own energy efficiency improvement projects and typically have their own in-house engineering capabilities. The product will continue to be marketed to engineering and design companies. Other marketing efforts will focus on potential participants based on customer energy use, conservation potential, and in-house experience and expertise with energy efficiency improvement projects.

E. Product-Specific Policies

The Self Direct product is open to Public Service commercial and industrial electric customers who have an aggregated peak load of at least 2 MW in any single month and/or an aggregated annual energy consumption of at least 10 GWh. The customer of record must be the same for all aggregated meters to qualify for this product. New customers, or existing customers with new facilities, that demonstrate predicted demand and usage above the minimum requirements, may participate in the Self Direct product.

The mTRC test ratio for each application will be calculated based on the combination of all measures proposed in the application. The Company will provide an mTRC calculator to facilitate the calculation. The customer will again use the mTRC calculator to calculate the final project mTRC value and include this in the project completion report using the actual implementation costs, energy conservation data, non-energy costs and/or benefits and the calculation methodology provided by the Company. The Company will verify the MTRC for the completed project upon review of the project completion report.

Participants in the Self Direct product will be allowed to participate in other DSM products offered by the Company but will not receive a rebate for the same energy efficiency measure through two different DSM products. No funding will be paid by Public Service for the identification (study)

of projects that receive a rebate through the Self Direct product. Customers may enroll their new facilities in either the Self Direct product or the New Construction product. If the customer chooses to participate in the Self Direct product for a new building project, the design work and energy modeling shall follow the protocol established in the New Construction product; however, the customer will be required to pay for all energy modeling costs.

F. Stakeholder Involvement

Customers, trade allies, and other stakeholders are currently engaged at the project level. Feedback is garnered individually from participants. The Company will evaluate trends for product improvement and, after discussion with key stakeholders and/or third-party consultants, will implement potential changes (*via* 60-Day Notice, as needed).

G. Rebates & Incentives

Self Direct provides rebates on the actual savings of a project compared to the baseline, will be paid and limited to 50% of the incremental costs of the project, and will apply to new and long-term leased equipment, but not to used equipment. The maximum lifetime and payback for a measure is limited to the lease duration. All measures submitted in a Self Direct project application will be combined for calculation of financial tests and rebate levels. Rebates will not be given for applications with expected paybacks of less than one year. For electrification projects, Public Service will offer an incentive level of $10.00 per Dth electrified minus $0.02 per kWh added.

Small Business Energy Solutions

A. Description

The Small Business Energy Solutions product is designed to engage small business customers in deploying DSM measures that will lower their energy consumption and demand. This product offers rebates and support for energy efficient upgrades to Public Service's small- and mid-sized business customers with annual peak demand of up to 400 kW.

This product aims to overcome specific barriers that often prevent small businesses from investing in energy efficiency and demand management measures, including:

- Lack of knowledge of energy and bill savings potential in system upgrades;
- Lack of time to complete all the necessary steps to upgrade systems;
- Lack of capital to make improvements;
- Uncertainty of value when facility is not owner-occupied; and
- Limited access to qualified contractors due to small margins on some projects.

To address these issues, the product offers the following components:

1. *Outreach* - Intensive outreach to bring resources to the customer, rather than relying on the customer to seek them out.

2. *Onsite Audit* – Each customer will be offered a facility walk-through audit. The audit is designed to be a simple, one-stop service that keeps customer time requirements to a minimum. The customer will receive a report that outlines the recommended efficiency upgrades with associated rebates, energy savings, and demand reduction.

   Substantial rebates are offered to offset the cost of installing qualifying energy efficient equipment, as follows:

   Direct Install for Immediate Savings – Customers with an annual peak demand of less than 100 kW will qualify for participation in the direct install ("DI") component of the product. During the walk-through audit, the third-party implementer will perform free installation of the following energy savings measures, where applicable.

a. Select screw-in LED lamps;
b. Aerators in restrooms and kitchen sinks;
c. Select ENERGY STAR® certified smart thermostats;
d. LED exit signs or retrofit kits;
e. Strip curtains for freezers;
f. Auto-close doors for coolers and freezers;
g. Pipe Insulation;
h. Water conservation showerheads;
i. Water conservation kitchen spray valves;
j. Select LED tubes; and
k. Other cost-effective measures to be identified.

Customers with an annual peak demand greater than 100 kW can also receive a direct installation of select ENERGY STAR® smart thermostats; however, additional costs to the customer may apply.

Prescriptive Rebates – See savings calculations and rebates available from the Company's prescriptive products deemed technical assumptions.

Custom Rebates – See savings calculations and rebates available from the Company's Custom Efficiency model.

3. *Connect with a contractor* – This product will connect the customer to participating contractors and provide intensive outreach and training for contractors so that they can accurately and effectively market to customers.

4. *Install energy efficient upgrades* – The third-party implementer serves as a liaison between the customer and the contractor, maintaining engagement with the customer to ensure recommended measures get implemented.

5. *Processing Application* – The third-party implementer will assist the customer in reviewing and submitting their rebate applications(s).

With the transition to smart meters and Time of Use ("TOU") rates, this product will also provide support to customers by providing education on how energy is used in their facilities. Further education on TOU and coordinated marketing strategies will help these customers make informed decisions on how they can change energy usage and save money with the rates available.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The forecasts for this product were derived from historical data, market data, and equipment deemed savings values in Colorado.

Budget
The forecasted expenditures for this product are based on projected participation levels, promotion, and administrative expenses. Most of the product costs are customer rebates, third-party implementation costs and promotional expenses.

C. Application Process

The third-party implementer offers and conducts a free walk-through audit at the customer's facility and provides a written report of the energy saving findings. At the time of the audit, customers with an annual demand of 100 kW or less may qualify for direct installation of specific measures (as outlined above). Throughout the process, the third-party implementer will assist customers in applying for rebates for qualifying equipment, reviewing completed applications, and ensuring that there is a detailed invoice for the newly installed equipment.

The third-party implementer will also assist customers in applying for a Custom Efficiency rebate for projects that do not fit into the prescriptive rebate offerings. Such projects are evaluated under the Custom Efficiency analysis and must follow the rules of the Custom Efficiency product.

After the customer has installed the equipment, the rebate application and invoice must be submitted to the Company within 12 months of the invoice date. Once the paperwork is completed and submitted, rebate checks will be mailed to the customer as indicated on the rebate application.

D. Marketing Objectives & Strategies

The key marketing objective is to raise awareness, interest, and participation in the product, which contributes towards the Company's energy savings and demand reduction goals. The product is marketed primarily through the third-party implementer. The third-party implementer is contracted to meet the implementation targets and deliver the marketing strategies. Secondary outreach is likely to occur through the Company's BSC, contracted trade allies, and/or other marketing efforts such as mailings, newsletters, and the Company website.

E. Product-Specific Policies

Small Business Energy Solutions has several product-specific policies:

- The product is for customers with peak electricity demand of 400kW or less; customers with an annual demand of 100 kW or below may qualify for free direct installation of specific measures.
- Rebated equipment must meet all product rules and requirements, and the application must be submitted within 24 months of the invoice date.
- Once completed paperwork is submitted, rebate payments are usually issued in six to eight weeks.
- The product pays custom rebates for qualifying energy saving measures that are not included under the prescriptive rebate category. Such projects are evaluated under the Custom Efficiency analysis and must follow the rules of the Custom Efficiency product.

The customer has up to 24 months after the preapproval date to implement the project. Custom projects that exceed that timeframe, or have significant equipment deviations from the original plan, require reanalysis and approval.

F. Stakeholder Involvement

The third-party implementer has considerable influence on the success of the product, as they will be the face of the Company to potential participants. The Company expects that the third-party implementer will engage stakeholders in the implementation of this product.

Trade partners are an important stakeholder as they will perform the retrofits and upgrades, and promote the product to customers. The Company expects the third-party implementer to maintain and grow the trade partner list of qualified contractors. Trade partners on this list will have a vested interest in the product's success, as they will benefit from the work generated by the audits.

G. Rebates & Incentives

The product provides eligible direct-install measures for qualifying participants and direct rebates for eligible projects based on savings calculations from the Company's prescriptive products deemed technical assumptions and Custom Efficiency model.

As part of our strategy to increase participation in demand management, this product will provide opportunities for customers to participate in the Small Commercial Building Controls Demand Response product.

Strategic Energy Management

A. Description

Strategic Energy Management ("SEM") is a holistic approach to managing energy for persistent savings and continuous improvement. In addition to capital equipment improvements for energy efficiency, the product also stresses system-level operational change as well as cultural change from customers' senior management, mid-management, and other personnel.

The product provides customers with a Strategic Energy Management Consultant ("SEMC"). The SEMC will typically be sourced by the Company's third-party contractors.

Due to the magnitude and complexity of this holistic approach:

- SEMC costs vary greatly from customer to customer. Costs are often not determinable until later phases of the customer's activity.
- Significant internal Company resources are required for completing project analyses and verifying adherence to all M&V requirements.
- Where feasible, additional providers who are experts in the field of strategic energy management, or who are experts in the operation of the customer's processes, may augment the SEMC's activities.
- Lastly, the Company provides support, in partnership with trade allies, to customize the offering to match customer needs.

SEM engagements guide customers through a series of steps designed to improve energy performance. Where possible, each step adheres to the "SEM Minimum Elements" established by the Consortium for Energy Efficiency. [45] The steps fall into three broad categories:

1. Gaining customer commitment
2. Demonstrating how to plan, prioritize, socialize, and implement improvements
3. Ensuring regular measurement, analysis, and reporting of energy performance

Initially, the SEMC guides the customer through creating an "Energy Team" with defined roles including that of "Energy Champion". The SEMC also conducts an Energy Management Assessment ("EMA") to understand the organization's communication and decision-making processes. The EMA:

- Typically reviews management practices, including project budgeting and capital allocation, polices and communications related to energy use
- Measures past progress in energy management and, where possible, benchmarks that progress against firms in similar industries
- Analyzes interval data, conducts personnel interviews, and provides an operational overview
- Establishes energy performance objectives and develops Energy Performance Indicators
- Develops a map of major energy end uses and costs

[45] https://cee1.org/content/cee-program-resources.

The SEMC conducts a facility-wide Energy Scan for efficiency opportunities, and for most engagements, a detailed study of one or more major processes or systems. Depending on customer-specific needs, the initial focus may be on capital improvements or may be on systemic operational improvements. A report of findings includes estimates of project costs and rebates to support the projects. The report also incorporates data visualization techniques designed to improve the understanding of how decisions affect energy performance.

After initial steps, the SEMC works with energy team on several iterative activities to drive customer implementation. The activities are performed on a regular, repeated basis to instill best practices within the customer's decision-making processes. The activities include:

- Produce, maintain, revise, and prioritize an energy plan, including a register of opportunities; facilitate conversations and actions related to implementation barriers; and justify projects by modeling expected outcomes,
- Engage and influence the operators of major systems and help educate non-operators. Interactions with employees encourage their ideas and input about continuous improvement,
- Support project implementation with analysis, estimation of incentives, and prompting the team's interactions with Trade Partners,
- Document new measures as they are discovered and implemented,
- Support supplemental sub-metering and data-logging as necessary to confirm assumptions of the energy analysis,
- Periodically reassess performance, priorities, goals, and plans,
- Ensure the existence of a system for measuring and reporting, including:
    - A repository for data, and
    - The measurement, analysis, and dissemination of results at consistent and frequent intervals.
- Help the customer interpret usage patterns, identify opportunities for savings, and ultimately verify energy savings.

Annually, the team will compile an analysis delineating savings achievement from each measure category. Subject to cost-benefit criteria, incentives will be awarded to offset costs incurred for the implementation, measurement, or verification of measures. The SEMC then reprioritizes the project register and implementation plan, and gains customer alignment for continued improvement.

Depending on customer need, additional optional consulting helps customers automate part or all their performance measurement systems. Sometimes described as "Energy Management Information Systems ("EMIS"), or Energy Analytical Systems, they collect data and accurately depict the energy performance of the customer's processes. The SEMC assists the customer in defining an EMIS implementation scope, including:

- End-use targets, metering points, and depth of metering
- Preferences about EMIS characteristics
- Communication needs
- Existing sources of data
- Assistance in designing the EMIS solution

For the EMIS, the customer can choose from a wide range of suppliers. The Company has determined minimum EMIS requirements to ensure that the M&V protocol for savings will be

consistent from customer to customer. The Company has pre-qualified a growing number of EMIS tools that meet those requirements. For an EMIS of qualifying scope and the Company will pay an installation incentive to help defray the upfront cost of the system.

Measure Categories

To ensure persistence of savings, the Company will follow appropriate monitoring guidelines and participants will be held to those requirements in return for eligibility toward incentives related to energy-efficiency activities pursued. The table in the EM&V section of this Plan describes the protocols for verifying savings from each of the measure categories.

The product may encourage, measure, and validate four categories of measures:

- Capital equipment or process automation measures include purchases of new equipment that is more efficient than baseline conditions. Savings relating to new system purchases will be analyzed and incentivized using the traditional "bottom-up" analysis methods through the Company's prescriptive and custom products. Equipment rebates for this product include both prescriptive and custom measures, adhering to applicable policies and rebate levels for those project types.

- Recommissioning-type measures consist of low- and no-cost Recommissioning opportunities addressing failure or underperformance of installed systems and equipment that can be fixed by making small adjustments, typically not requiring new equipment.

- Systemic Operational and Maintenance ("Systemic O&M") measures process automation measures that consist of equipment and processes where automation capabilities don't currently exist or are underutilized. Systemic O&M measures are typically more robust and reliable than behavioral measures, and may include:
    - Automated operation – the installation, programming, or reprogramming of automated functions for improved energy efficiency.
    - Standardized procedures – significant changes to documented standard operating procedures, with formalized management directive and assigned accountabilities, for the purpose of more efficient process operation.

  Examples of Systemic O&M measures are programming reduced system pressure or lower condensing pressure, scheduled precooling, optimizing pump variable frequency drive controls, or tying variable air volume operation to occupancy sensors.

- Behavioral measures require manual intervention with repeated decision-making to achieve energy savings that may not be feasible through system automation. Behavioral measures rely on the choice of individuals to change the way they use equipment. Behavioral savings is the reduction in energy use by customer personnel that is statistically attributable to behavioral measures conducted as part of the product. Examples of behavioral measures include workshops and targeted training sessions, gamification, competitions, dash-boarding, and the placement of informational kiosks.

Empower Facilities Optional Path

To further broaden participation, a secondary option may be offered to customers who lack the resources to secure project implementation. They may not have available capital for the project, even net of DSM rebates. Additionally, they may not have enough staff to ensure that the

equipment is properly installed and maintained. Where applicable the implementor will offer financing and payment options and related project-management services. Customers may use their preferred equipment provider if they have one, or the product will assist them with selecting a qualified trade partner.

Components of the Empower Facilities path include:

- This path will fund the engagement and opportunity identification activities. Activities include initial customer meetings and most of the initial steps described above for traditional SEM projects. An Energy Scan will be performed, if needed, resulting in prioritized efficiency recommendations. Additionally, options for implementation services, ongoing maintenance services, and financing will be developed.
- Implementation services, on-going maintenance services, and financing arrangements are each completely optional for the customer. If the customer chooses to proceed with any of the Empower Facilities options:
    - A Company-contracted provider will provide the service.
    - The services will be entirely funded by fees charged to the customer by the implementer. Service commitments and financial arrangements are between the customer and the implementer.
    - Fees collected from the customer may exceed the actual expenses for providing the service. Any such funds remitted to the Company will be credited to DSM accounts as an offset DSM spending. . In the longer term and with a high-level of customer adoption, these amounts will help reduce the cost of DSM to all customers.

DSM expenses related to SEM-Empower Facilities, as well as funds remitted back to DSM accounts, will be detailed in the Company's annual DSM/BE Status Report Filings.

B. Forecasts, Participants & Budgets

The participation forecast is based on an increase in new enrollments as well as a best-in-industry rate of projects per enrollee.

The budget was developed by applying historical implementer and incentive costs per enrollee and per project. The budget's administrative costs were based on that of the prior years, with minimal additions for planned staffing and for additional, identified marketing strategies.

C. Application Process

Application for enrollment in the product consists of customer interviews, bill analysis, interval usage analysis where available, and an in-person "expectations" meeting. If both parties agree, the meetings culminate in the signing of a Memorandum of Understanding ("MOU") between the Company and the customer. The MOU defines each phase of the path and is customized to reflect the customer's specific need. By signing the MOU, the customer formally acknowledges influence of, and participation in the product. Once the SEMC begins onsite meetings and the MOU is signed, conditional preapproval is established for measures the customer subsequently pursues.

D. Marketing Objectives & Strategies

The product is resource-intensive, and its potential depends on the customer's level of engagement. Therefore, the Company's Account Management and Product Management teams will market the product, with the assistance of the Company's third-party implementers.

SEM engagements have proven to be effective for large industrial customers as well as large "institutional" customers, such as hospitals and schools. For prospective enrollees annually consuming between one GWh and six GWh, and for whom the technical opportunity and/or management interest is unknown, the Company may offer a "SEM Qualification Assessment". The Qualification Assessment involves a streamlined version of an EMA, an Energy Scan, and a report. The report lists any efficiency opportunities found and recommends whether a full SEM engagement is a good fit for the prospect. The product will record the savings from implemented projects that were influenced by the assessment and its report.

The Company primarily delivers SEM via engagements with individual customers. If applicatory, the Company may enroll groups of similar customers in a SEM Cohort. SEM Cohort is a group of enrolled customers, who are guided through the SEM steps as a collaborative group. A Cohort may be offered where its delivery cost per unit of potential achievement is lower than that of individual SEM engagements. The Company may also leverage existing industry or trade organizations to not only recruit enrollments, but to also drive SEM concepts and activities.

Participants often have interest in projects or technologies that fall outside of DSM's traditional scope. "Non-Traditional" project examples include on-site storage, EV charging, and beneficial electrification. Customers seldom distinguish between traditional energy efficiency and other energy-related projects. To provide comprehensive services, and to encourage the continual integration of energy efficiency into business practices, SEM engagement may help customers investigate these "non-traditional" projects. The SEM engagement will support the discussion, assessment, and coordination of non-traditional projects. Project implementation costs will continue to be borne by the customer.

E. Product-Specific Policies

Quantifying Energy Savings

Quantifying energy savings from Systemic O&M measures, Behavioral measures, and certain other measures that did not qualify for rebates, will involve calculations using a "top-down" method of statistical modeling of the individual customer's actual data. To avoid double-counting, the Company will reduce the savings implied by the regression model by the amount of the achievements associated with any rebated Capital Equipment and rebated Recommissioning measures, where applicable.

Top-down modeling may include a variety of techniques, including multi-variable regression analysis. The modeling will meet or exceed the validity requirements like those within the "BPA MT&R Reference Guide". [46]

[46] https://www.bpa.gov/EE/Policy/IManual/Documents/MTR-Reference-Guide-Rev6.pdf.

A “bundle”, or combination of measures, can be evaluated and qualified for a rebate. For example, this allows a measure with a short payback to be leveraged with longer payback projects, as to influence the implementation of an entire bundle.

The product uses extensive resources to identify and scope ways to drive energy efficiency into how a customer does business. Additionally, savings relating to new system purchases will be analyzed using the traditional “bottom-up” analysis methods through the Company’s prescriptive and custom products.

Eligibility
Eligible customers for SEM must have an annual consumption of more than one GWh within a location or contiguous premises. The Company will screen candidates’ usage, demand, energy intensity if available, history of implementation, and management receptiveness to energy efficiency goals. Because the product is resource intensive, not all large customers will qualify.

As part of our strategy to increase participation in demand response products, this product will be offering customers the opportunity to participate in Peak Partner Rewards, Critical Peak Pricing, or other demand management measures. Further details are provided in the technical assumptions.

F. Stakeholder Involvement

Although trade partners cannot enroll customers, the customer may use any trade partner to install measures or provide customer-contracted services. Primary stakeholders include the customers, third-party subcontractors, and Company representatives. The Company works with these stakeholders to identify product trends and potential changes to product design.

G. Rebates & Incentives

For implemented Capital equipment measures, the Company will award rebates equivalent to the prescriptive or custom rebates the customer would have received had the customer not enrolled in the SEM product.

For packages of opportunities that are both highly beneficial and unlikely to otherwise be implemented, the product may incorporate additional rebate bonuses for implementation of the entire package.

Annualized adjusted Systemic O&M and Behavioral measures may qualify for incentives, which will be paid to the customer as a rebate. The incentives are intended to motivate the customer to collect and share data such as production, occupancy, or shift scheduling information.

For optional EMIS installations, the Company offers an incentive of up to 30% of the EMIS in-scope installation costs. Qualifying scopes must be jointly developed by the Company, the SEMC,

and the enrolled customer; exclude 3rd-party system consulting charges; and exclude systems implemented before product enrollment.

To influence customer commitment, participation expense may include a small proportion of customer contribution, up to $7,500.

Residential Program

A. Description

Public Service will continue to offer a wide range of product offerings to serve residential customers in 2024-2026. Public Service has a total of 1,784,208 gas and electric residential customer premises in Colorado.[47] A breakdown of residential premises by type is shown in the table below.

Table 12: Residential Premise Counts by Type[48]

	Natural Gas Only	Electric Only	Both Gas & Electric	Total
Premise Count	382,552	347,081	1,001,234	1,730,867

The DSM& BE products that make up the Residential Program will be available to all residential customers based on the services they receive from the Company. These customers traditionally reside in single-family homes, multi-family homes, and apartments/condominiums. To address this varied set of customers, the Company will offer a unique set of products targeted to reach the vast majority of the residential market and provide customers with multiple opportunities to participate.

While the Business Program focuses on customers with large energy savings projects, the Residential Program is truly a mass-market program that will touch tens of thousands of customers annually. The products are implemented in a manner that enables large numbers of customers to participate and benefit from the products.

The residential DSM & BE products focus on educating customers on energy efficiency and giving them simple ways to participate, encouraging long-term commitment to reduce energy use. The Company offers a comprehensive set of products including prescriptive rebates for heating and cooling equipment, home lighting, whole house solutions for new or existing homes, lessons on energy efficiency to school-aged children, energy savings through behavior change, and refrigerator recycling.

Products

A thorough portfolio of residential products is planned for 2024-2026 including 12 electric and eight natural gas products. Like the Business Program, all the natural gas products coincide with their electric counterparts. The Residential product rankings are shown in Table 12 below.

[47]Premise count as of January 1, 2023.

[48]Natural gas transportation-only customers are excluded.

Table 13: Residential Program Product Rankings[49]

2024-26	Rank
Home Energy Insights	1
School Education Kits	2
Energy Efficient Showerhead	3
Residential Heating & Cooling	5
Residential New Home Construction	11
Home Energy Squad	15
Home Lighting & Recycling	16
Multi-Family Buildings Efficiency	18
Insulation & Air Sealing	20
Refrigerator & Freezer Recycling	22
Whole Home Efficiency	27

In developing and refining the portfolio of products, Public Service worked closely with external consultants familiar with residential and IQ products nationally. This included assessing possible new products, developing technical assumptions for new energy efficiency measures, evaluating the Colorado climate and energy code impacts, and performing an initial cost-effectiveness analysis. The Company researched other utility offerings to learn about new products, understand their challenges, and discover how the existing products could be improved. The Company worked with industry consultants and vendors such as E-Source, ACEEE, and CEE to learn about energy efficiency activities across the nation. In addition, Public Service spoke with local energy industry members to shape and refine products and discuss partnership opportunities.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The Company's residential DSM & BE products have a large reach to customers and provide a wide portfolio of offerings that will allow all customers to participate.

[49]All products in the DSM portfolio were ranked through the same process and the full results can be found in Appendix C of this Plan.

Table 14a: 2024 Electric Residential Program Budgets and Forecasts

2024	Electric Budget	Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Residential Program						
Energy Efficient Showerhead	$152,187	96	1,189,102	1,804	$1,004,618	6.85
Home Energy Insights	$4,094,789	12,581	37,059,860	49,544	$11,052,236	3.70
Home Energy Squad	$4,800,374	1,285	8,131,378	14,030	$406,572	1.07
Home Lighting & Recycling	$1,591,110	391	5,807,282	10,178	$1,139,264	1.49
Insulation & Air Sealing	$734,626	832	1,033,459	1,997	-$509,310	0.86
Multi-Family Buildings Efficiency	$2,193,071	1,066	6,961,395	13,119	$2,381,808	1.50
Refrigerator & Freezer Recycling	$1,339,989	269	3,425,446	5,414	$280,820	1.21
Residential Heating & Cooling	$3,779,222	7,332	6,970,206	11,226	$8,791,814	1.53
Residential New Home Construction	$2,976,988	2,060	4,698,153	9,606	$5,277,265	1.72
School Education Kits	$2,753,654	1,301	9,751,384	17,897	$4,809,920	2.09
Whole Home Efficiency	$227,430	67	707,234	1,355	-$165,908	0.78
General Advertising-Res	$880,267					
Residential Program Total	**$25,523,707**	**27,281**	**85,734,899**	**136,169**	**$33,588,833**	**1.65**

Table 14b: 2024 Natural Gas Residential Program Budgets and Forecasts

2024	Gas Budget	Net Annual Dth Savings	Net Targeted Peak Dth/hr Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	mTRC Test Net Benefits (WACC)	Gas mTRC Test Ratio
Residential Program								
Energy Efficient Showerhead	$563,106	49,571	0.1	88,032	28,959	159.1	$11,041,281	15.50
Home Energy Insights	$799,744	144,054	0.0	180,125	25,247	138.7	$3,685,790	5.61
Home Energy Squad	$3,182,756	24,047	3.0	7,555	14,267	78.4	-$284,071	0.92
Insulation & Air Sealing	$1,181,835	60,586	32.9	51,264	54,708	300.5	$3,937,531	1.64
Multi-Family Buildings Efficiency	$722,987	15,996	2.0	22,125	10,436	57.3	$2,384,027	3.10
Residential Heating & Cooling	$1,167,242	80,028	33.5	68,562	76,963	422.8	$8,193,074	2.52
Residential New Home Construction	$1,899,992	89,856	0.0	47,293	157,481	865.1	$17,078,473	2.89
School Education Kits	$741,537	69,916	0.1	94,285	40,845	224.4	$14,067,998	15.75
Whole Home Efficiency	$27,113	426	0.2	15,697	388	2.1	$16,885	1.32
General Advertising-Res	$202,524							
Residential Program Total	**$10,488,837**	**534,480**	**71.8**	**50,957**	**409,294**	**2,248.5**	**$59,918,465**	**3.14**

Table 14c: 2025 Electric Residential Program Budgets and Forecasts

2025	Electric Budget	Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Residential Program						
Energy Efficient Showerhead	$152,390	96	1,189,102	1,343	$959,401	6.58
Home Energy Insights	$4,167,511	12,895	38,707,204	48,776	$11,743,519	3.82
Home Energy Squad	$6,068,661	2,025	12,019,363	16,264	$1,506,936	1.20
Home Lighting & Recycling	$1,563,906	390	5,728,204	7,730	$951,393	1.42
Insulation & Air Sealing	$925,730	1,054	1,379,390	2,098	-$637,309	0.86
Multi-Family Buildings Efficiency	$2,190,170	1,066	6,961,395	10,217	$2,194,839	1.46
Refrigerator & Freezer Recycling	$1,401,253	297	3,782,848	4,450	$241,582	1.17
Residential Heating & Cooling	$4,964,684	9,541	11,108,046	15,507	$3,125,603	1.10
Residential New Home Construction	$2,723,862	1,681	3,277,173	4,929	$5,209,328	2.06
School Education Kits	$2,816,930	1,310	9,815,806	13,941	$4,499,634	2.00
Whole Home Efficiency	$232,077	72	711,913	1,070	-$190,839	0.76
General Advertising-Res	$630,337					
Residential Program Total	**$27,837,510**	**30,427**	**94,680,444**	**126,324**	**$28,973,750**	**1.43**

Table 14d: 2025 Natural Gas Residential Program Budgets and Forecasts

2025	Gas Budget	Net Annual Dth Savings	Net Targeted Peak Dth/hr Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	mTRC Test Net Benefits (WACC)	Gas mTRC Test Ratio
Residential Program								
Energy Efficient Showerhead	$542,050	43,821	0.1	80,844	25,601	140.6	$9,839,959	14.70
Home Energy Insights	$1,270,660	219,535	0.0	172,772	38,476	211.4	$5,843,387	5.60
Home Energy Squad	$3,450,493	40,550	5.3	11,752	23,890	131.2	$1,151,238	1.28
Insulation & Air Sealing	$1,601,881	80,400	43.7	50,191	72,568	398.7	$5,357,994	1.64
Multi-Family Buildings Efficiency	$737,891	20,999	2.8	28,458	13,821	75.9	$3,398,503	3.75
Residential Heating & Cooling	$959,584	77,829	33.5	81,107	74,496	409.2	$8,612,139	2.75
Residential New Home Construction	$202,507	27,473	0.0	135,666	48,150	264.5	$7,602,018	38.54
School Education Kits	$761,283	69,974	0.1	91,916	40,879	224.6	$14,251,862	15.64
Whole Home Efficiency	$27,818	426	0.2	15,299	388	2.1	$18,039	1.34
General Advertising-Res	$153,705							
Residential Program Total	**$9,707,872**	**581,007**	**85.6**	**59,849**	**338,268**	**1,858.3**	**$55,921,433**	**3.55**

Table 14e: 2026 Electric Residential Program Budgets and Forecasts

2026	Electric Budget	Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Residential Program						
Energy Efficient Showerhead	$157,631	122	1,504,213	1,153	$1,185,639	7.50
Home Energy Insights	$4,477,603	13,702	43,099,020	27,796	$10,626,135	3.37
Home Energy Squad	$5,030,029	2,066	12,561,090	12,260	$2,337,931	1.36
Home Lighting & Recycling	$1,557,455	390	5,678,832	5,477	$749,248	1.33
Insulation & Air Sealing	$1,327,624	1,528	2,041,038	2,291	-$952,468	0.86
Multi-Family Buildings Efficiency	$2,188,615	1,066	6,961,395	7,475	$2,004,114	1.42
Refrigerator & Freezer Recycling	$1,468,930	325	4,140,251	3,307	$160,395	1.11
Residential Heating & Cooling	$6,871,966	12,391	17,943,359	19,465	-$3,572,258	0.93
Residential New Home Construction	$3,738,880	2,075	5,078,774	5,843	$6,187,444	1.79
School Education Kits	$2,860,869	1,319	9,879,796	10,143	$4,187,547	1.92
Whole Home Efficiency	$223,491	77	717,165	791	-$205,122	0.74
General Advertising-Res	$361,120					
Residential Program Total	**$30,264,213**	**35,061**	**109,604,932**	**96,000**	**$22,347,485**	**1.25**

Table 14f: 2026 Natural Gas Residential Program Budgets and Forecasts

2026	Gas Budget	Net Annual Dth Savings	Net Targeted Peak Dth/hr Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	mTRC Test Net Benefits (WACC)	Gas mTRC Test Ratio
Residential Program								
Energy Efficient Showerhead	$563,257	48,819	0.1	86,672	28,520	156.7	$10,828,728	15.27
Home Energy Insights	$1,361,179	244,641	0.0	179,727	42,876	235.5	$2,256,242	2.66
Home Energy Squad	$3,119,592	37,748	4.8	12,100	22,204	122.0	$1,043,882	1.29
Insulation & Air Sealing	$2,220,203	116,153	61.4	52,316	105,442	579.3	$7,964,622	1.68
Multi-Family Buildings Efficiency	$749,120	26,054	3.8	34,780	17,366	95.4	$4,322,175	4.28
Residential Heating & Cooling	$892,054	77,829	33.5	87,247	74,496	409.2	$8,525,889	2.76
Residential New Home Construction	$223,693	29,227	0.0	130,657	51,223	281.4	$8,114,495	37.28
School Education Kits	$776,773	70,030	0.1	90,155	40,911	224.7	$13,990,827	15.15
Whole Home Efficiency	$28,042	426	0.2	15,176	388	2.1	$16,831	1.31
General Advertising-Res	$135,700							
Residential Program Total	**$10,069,612**	**650,926**	**103.9**	**64,643**	**383,428**	**2,106.4**	**$56,927,991**	**3.28**

Budgets

Achievement forecasts were developed as a result of a participation and energy savings estimation process for each product, which was rolled up to the Residential Program total. Similarly, budgets for each product were developed based on the anticipated level of achievement and cost of market penetration, including review of historical data for the past three and half years, and experience with similar products in Minnesota.

Market Analysis

The Company's Residential Program reflects the primary market opportunities for residential energy savings in four areas: whole home and building envelope, HVAC, education and behavior change, and common measures.

1. *Whole Home and Building Envelope:* With increased awareness of energy costs, interest in conservation, and varied energy performance of existing homes, there continues to be good energy efficiency opportunities for residential customers in new or existing homes.
   Products: Residential New Home Construction, All-Electric New Home Construction, Whole Home Efficiency, Insulation & Air Sealing

2. *HVAC:* Public Service believes evaporative cooling is an excellent low-cost source for cooling in the Colorado climate. The Company also realizes that customers are looking for additional cooling and heating options. To address this demand, the Company offers products focused on quality installation of new units and replacement of inefficient, existing systems. Additionally, to promote beneficial electrification, the Company offers dual fuel heat pumps and heat pump water heaters.
   Products: Residential Heating & Cooling

3. *Education and Behavior Change:* The Company funds initiatives to educate customers, enhance participation in direct impact products, and influence market transformation.
   Products: Home Energy Insights and School Education Kits

4. *Common Measures:* The Company supports rebates and incentives for prescriptive, energy-saving measures focused on the most common household equipment.
   Products: Home Energy Squad, Home Lighting & Recycling, Refrigerator & Freezer Recycling, Energy Efficiency Showerhead, and Residential Heating & Cooling.

C. Application Process

Application processes vary by product. See individual product summaries following this overview for more information.

D. Marketing Objectives & Strategies

Trade allies, end-use equipment vendors, energy services companies, Public Service's call center representatives and marketing team are the primary drivers for realization of the planned achievements in the Residential Program. The Company utilizes newsletters, customer events, direct mail, telemarketing, email communications, and awareness advertising to reach customers. A challenge in marketing energy efficiency is that it's not a topic on the top of customers' minds. Customers tend to focus on purchase price (or "first costs") rather than lifetime costs and are unlikely to replace equipment prior to failure. Customers may also not be aware of energy efficient equipment options available to them when the need arises to make purchase decisions. Yet, opportunities are growing in marketing energy efficiency to customers because energy costs and climate change have led to increased awareness and affinity for energy-saving and carbon reduction actions. To support marketing efforts, Public Service employs an integrated approach to marketing communications, where the tactics are designed to work in concert with each other and reinforce key messages over time.

Furthermore, residential DSM product managers and product developers periodically meet with the Company's residential Customer Care Centers and energy efficiency specialists to determine how the energy efficiency products and services are being received in the marketplace and solicit ideas for existing product improvement or new product introduction.

<u>Strategy</u>
Public Service follows the "AIDA" (awareness, interest, desire, action) process for encouraging customers to participate in DSM & BE products. The following are the steps in this process:

1. Create awareness of electric and/or gas prices and potential savings from energy efficiency offerings.
2. Promote interest in DSM/BE products by providing information about the offerings across a variety of customer touch-points.
3. Instill the desire for participation in DSM/BE products by showing how customers can reduce their "first costs" via rebates in the near-term and reduce their monthly energy bills in the long-term with energy-efficient appliances and equipment.
4. Move the customer toward action by providing a wide range of product offerings to address one or more of their needs.

Key Messages and Target Audience

When communicating with customers, Public Service uses several overarching key messages including:

- Energy efficiency reduces monthly energy bills due to lower operating costs.
- Public Service helps lower energy bills by offering rebates and incentives for installing highly efficient equipment.
- Energy efficiency helps reduce environmental impacts.

E. Program-Specific Policies

There are several general policies that apply to Public Service's Residential Program. Individual products may have additional, unique policies as noted in each of the product summaries that follow.

The Company defined all-electric, electric-only, and gas-only customers as follows:

- All-electric: customers who only receive electric service from the Company and space condition and water heat with electricity;
- Electric-only: customer who receive electric service from the Company and natural gas service from another provider for use in space conditioning and/or water heating; and
- Gas-only: customer who receive natural gas service from the Company and electric service from another provider.

Residential Program policies include:

- *Proof of installation:* Nearly all residential DSM & BE products in the Company's portfolio require documentation of installation through either proof of purchase (*i.e.*, detailed invoices) or by measurement and verification.
- *Installation date:* Determines rebate eligibility and amount. Other products may have more specific requirements to qualify for a rebate.
- *Load Shifting:* Load shifting occurs when a measure shifts electrical energy and demand usage to an off-peak period, without necessarily reducing the total load served over a defined time period. Potential load shifting projects need to meet all existing eligibility requirements of the applicable product as well as additional persistence requirements.

F. Stakeholder Involvement

Throughout the product development process, Public Service has discussions with key external parties. The discussions are often initiated via work groups, public forums like the quarterly DSM Roundtable Meetings, one-on-one meetings, phone calls, and/or brainstorming sessions. In developing this Plan, the Company had discussions with local stakeholders, including City/County of Boulder, City of Denver, Colorado Energy Office, Energy Outreach Colorado, Colorado Department of Public Health and Environment, EEBC and Denver Water.

In addition to discussion with Colorado area contacts, Xcel Energy had also worked with national organizations in the past when developing many of its DSM & BE products, including: ACEEE, CEE, DOE, U.S. Environmental Protection Agency ("EPA"), E Source, Western Resource Advocates, and the Southwest Energy Efficiency Project ("SWEEP").

These organizations continue to provide feedback on the Company's DSM & BE products to suggest areas for future improvement.

Additionally, as the Company explores new ways to reach the residential market, we continue to work with local communities as key partners. In 2014, the Company launched the *Partners in Energy* product to support communities in developing and implementing comprehensive energy action plans. Local energy plans are a platform to drive participation in the Company's DSM & BE products. In our 2024-2026 DSM & BE Plan, the Company will continue to support and grow community partnerships through *Partners in Energy*, by configuring our DSM & BE products and resources to support the unique energy goals and markets of individual communities.

G. Rebates & Incentives

Residential rebates are prescriptive and vary by product.

Indirect Products such as Consumer Education and Home Energy Audits support customer learning, and influence participation in residential prescriptive products.

H. Evaluation, Measurement, & Verification

The specific product measurement and verification plans are described in the EM&V section of this Plan; and products that will undergo comprehensive evaluations in 2024-2026 are also noted that section.

Energy Efficient Showerhead

A. Description

The Energy Efficient Showerhead product is designed to offer year-round natural gas and electric savings to Public Service customers. Residential natural gas and combination gas and electric customers are eligible to receive free (or discounted) energy-efficient showerheads and faucet aerator kits to help reduce their energy and water use.

Eligible customers are contacted and offered multiple kit options based on their past participation in the Energy Efficient Showerhead product. Kit combinations may include one or more of the following units from the showerhead program:

- 1.5GPM showerhead
- 1.5GPM handheld showerhead
- 1.5GPM inline shower flow restrictor
- 1.0GPM bathroom faucet aerator
- 1.5GPM kitchen faucet aerator
- Shower timer
- Teflon Tape
- Instructions
- Other energy and water saving devices.

The free or discounted kit is mailed to customers who make the decision to request the energy efficiency measures within the promotional period. Participants receive one kit per household.

Customers may also purchase showerheads and aerators individually through the Xcel Energy Store, which are mailed to the customer. Rebates are available for eligible customers and are applied at the point of purchase. In many cases, these rebates cover the full cost of the equipment. Limits on the number of showerheads and aerators per customer are the same as if the customer had ordered a kit.

The Company contracts with third-party implementers to manage customer requests and distribute the kits and individual equipment. Customer participation is tracked and provided to the Company following the distribution of the kits or individual equipment.

Showers heads target year-round energy savings during time of use peaks use allowing customers to reduce hot water usage during high usage winter morning hours towards reducing gas consumption and evening peak hours for electricity. Customers can be encouraged to utilize pre-heating to take advantage of off-peak rates if their equipment allows.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The Company set the product forecasts for participation and energy savings based on past performance of the product. Actual savings will be driven by the customer's water heater energy source and service type (electric and/or natural gas) and customer installation rates.

Budgets

The product budget was developed based upon the cost of reaching the proposed energy savings forecasts – using previous year's product performance as a guide for the cost of the showerheads/aerators, fulfillment charges, postage, and all necessary marketing efforts.

C. Application Process

Customers are notified of this product through direct to customer, social media, Xcel Store promotions, and other media channels. Customers have a limited amount of time (approximately 45 to 60 days for direct mail and one to two weeks for email) to respond to the third-party implementer only to encourage action. Once the customer responds to the offer, one free or discounted energy-savings kit is shipped to the customer within six weeks. If a customer orders their products from the Xcel Energy store, the products are shipped within two-six business days. Shipping costs may be applied depending on customer qualifications and store promotions.

In addition to marketing campaigns, the Company will continue to seek out or consider proposed partnerships with other organizations or cities to distribute energy efficient showerheads and/or aerators.

D. Marketing Objectives & Strategies

The Company has developed a marketing plan utilizing multiple channels to engage customers and reach the participant goal. The marketing collateral requests the customer to indicate whether their water heater runs on gas or electricity.

E. Product-Specific Policies

Natural gas and combination gas and electric customers who have not previously participated in the past ten years are eligible for the offer. Additionally, past participants may be offered additional or replacement units through follow-up marketing offers based on when they last participated. If an eligible customer who did not receive the offer becomes aware of the product and would like a free kit, they will receive one if budget allows.

F. Stakeholder Involvement

In past program years, the Company has partnered with local cities, counties, and organizations on their water efficiency initiatives. The Company plans to continue its support of these types of products.

G. Rebates & Incentives

The product generally provides free energy efficient equipment rather than a rebate to the customer—the price for that equipment is classified as a rebate in the product budget. While most participants choose this option, the product also offers more expensive showerheads with additional features (handheld showerheads, for instance) at a discounted price. In these cases, the rebate covers only a portion of the cost of the equipment and is subtracted directly from the cost at the point of purchase.

Home Energy Insights

A. Description

The Home Energy Insights ("HEI") product offers a variety of behavioral programs offered at no cost to residential customers. The behavioral programs are developed to educate and influence the actions of customers to engage in behaviors that help them save energy, money, and raise awareness of their energy expenses.

The programs administered by HEI include:

- Home Energy Reports ("HER")
- Online Portal
- High Bill Alerts ("HBA")
- Gas Hight Bill Alert
- Budget Alerts
- My Energy Connection ("MEC")
- Behavioral Demand Response
- Conservation Messaging

HER

The program engages customers through a report that compares a customer's energy consumption to similar nearby households for benchmarking an individual household's performance. The reports provide energy savings tips and information to demonstrate how much customers can save by changing their behavior. Participants receive free monthly emails or quarterly printed reports.

Reports provide:

- Customer's energy use compared to other nearby houses with similar home characteristics (square footage, home type, energy use characteristics etc.).
- Targeted efficiency recommendations based on home profile data available; and
- Other information such as consumption graphs or year-to-year bill comparisons.
- Low cost/No cost tips for saving energy.

Recipients are selected from the Company's residential customers and may "opt out" of the product at any time upon request. Through the duration of this Plan, the Company may add additional customers to the treatment group as needed to maintain participation levels due to attrition and achieve energy saving targets.

To administer the HER product, Xcel Energy works with a third-party company that helps utilities meet their efficiency goals through effective customer engagement. The report's goal is to improve the quality of the energy efficiency behavioral recommendations and the customer experience towards increased energy savings. Generally, realized energy savings increase gradually over time as behavior is impacted by treatment, then begin a long slow decline as the control group efficiency

catches up. Product savings are measured and reported to the Company each month by the third-party implementer.

HER energy savings are derived by comparing a control group's energy usage to communication recipients (treatment) group. The treatment group receives reports with tips and suggestions to speed up the adoption of energy saving opportunities. The control groups improve energy consumption more organically based on both The Company and other external influences. Compared with equipment upgrades, behavioral savings require consistent support to the customer through reminders to act on energy savings tips. Savings will be reported under the combined HEI program.

Online Portal

This feature is available to all the Company's residential customers when historical information is available. It provides the same information as energy usage reports on demand, energy saving recommendations and more, all with greater timeliness. When going to the web portal, customers can utilize the following actions:

- HER Participants can view their similar home comparison on their last report PDF.
- See graphs showing energy consumption by fuel type by bill period or day (for electric advanced meter customers);
- Earn rewards redeemable for gift cards for energy savings activities.
- Complete a Home Energy Assessment which guides insights into how energy is used in the home as well as more accurate and actionable energy saving recommendations.
- Receive tips and recommendations for a wide array of energy savings measures, from low- and no-cost improvements to major upgrades of building envelope and mechanical systems; and
- See electric disaggregated energy usage by technology and end use. This will be initially based on general information, and as advanced meters and data become more widespread and as customers complete Home Energy Assessments, the accuracy of this disaggregation will improve.

Customers are encouraged to visit My Energy through their email and paper mailed reports the use of emails, targeted messaging, and social channels. Customers who engage in the online portal are compared to similar customers who have not accessed the portal, to determine energy savings resulting from customers' use of the tools. Savings from customers who are part of the HER Treatment Group who also use online tools will have all savings measured as part of their HER savings calculation. Only savings from customers who are not part of the HER Treatment Groups will be counted as attributable to online savings. Savings will be reported under the combined HEI program.

HBA

The HBA product notifies customers during their billing cycle if their projected bill is more than 30% higher than the same billing period the previous year. The system does bill comparison checks on the sixth and sixteenth day of each billing period. Enrolled customers will receive an email alert around mid-billing cycle if their projected bill is over 30% higher than the same billing period last year. Eligible customers will be automatically enrolled to the 30% Alert and can opt-out via the My Energy portal.

Currently HBA is only available to electric customers, however, the Company may develop a gas version of the alert.

Eligibility requirements

- HBA is currently available to electric customers.
- Customers must have MyAccount so they can access product preferences *via* MyEnergy portal.
- Customers with Average Monthly Payments are not able to participate.
- To participate in high bill alerts, a customer must have 12 months of bill history for bill comparison.
- To perform projection calculations, a customer needs to have a smart meter.
- Customers must be on one of the following rates:
    - Residential General, Residential Demand, Residential Demand-Time Differentiated Rates, Residential Energy Time-of-Use

Gas High Bill Alert

The Gas High Bill Alert is in development and is intended to be a general alert for customers of the potential for increased costs for natural gas on their bill. The main drivers of the program are the cost of natural gas and weather trends which traditionally lead to an increase in gas consumption and higher bills. The intent of the program is to give customer the opportunity to reduce consumption or prepare for an increase in their gas bill.

Alerts will be sent via email and other digital communications channels.

Eligibility is open to all natural gas residential customers with digital contact information on file.

Budget Alerts

Budget Alerts is an opt-in product available to all residential electric smart meter customers. This product allows customers to set a dollar threshold to be notified if their current electric bill will exceed that amount. The system does daily checks on the customer's bill from the fifth to the twenty-eighth day of the billing cycle. If the customer's bill exceeds their threshold during that timeframe, they will receive an email alert. Customers can enroll and un-enroll for Budget Alerts.

MEC

The Company is currently deploying advanced meters that includes the Home Area Network ("HAN") and Distributed Intelligence ("DI") capabilities. The DI enabled HAN capability allows customers to connect devices directly to the meter accessing real-time usage and cost data. With advanced meter capabilities the Company can estimate the energy usage by appliance with a higher accuracy than the current Home Energy Reports which relies on customer provided home characteristics.

In late 2023, the Company will be releasing a mobile application called MEC that provides customers with detailed information on their energy usage. The first release of this mobile application uses the DI enabled HAN which provides users with real-time meter data, energy usage, and cost information starting with the ability to access this information from home. These capabilities will empower users to shift energy consumption behaviors and increase engagement across existing DSM products and services.

Key features included in the MEC Release 1 include:

- *Real-time in-home energy usage presentment* - A speedometer and running graph view of a customer's usage in the home that changes in real-time. Includes a reading of the current demand (Watt) and rate as well.
- *Away from home 15-minute data* - Energy and rate information updated every 15-minutes while outside of the home.
- *Running total energy and cost usage for current day* - From midnight to when the customer opens the app, how much energy they've used and how much that usage costs. Total energy usage can be compared to yesterday's usage at that same time.
- *Historical usage and cost graphs* - A line graph showing the current and historical usage and cost with daily, weekly, and monthly views. Ability to compare yesterday, last week, and last month.
- *Actionable savings tips* - Whole home energy savings tips.
- *Educational energy items in-app* - Pop-out info icons within the application explaining what certain data points mean along with a glossary for energy terminology used in the app and beyond.

MEC's second release will focus on providing customers with appliance-specific usage and cost breakdowns, also known as disaggregation insights. Customers will be able to access this information through the same mobile application as Release 1 as well as a customer facing website. The release date for MEC version 2 is dependent on the vendor selected and time needed to develop the application. The second release is tentatively estimated for late 2024 or early 2025.

Having detailed usage and cost by appliance will allow customers to understand where and when they are using the most energy and will provide focus for their energy savings goals. It will also allow the Company to recommend DSM programs based on the end uses detected in the home. Access to disaggregated versus whole home insights has also been shown to increase the impact of behavioral DSM programs.

MEC Release 2 will be available on a mobile application and the web and is anticipated to include:

- *Energy usage by appliance* - Displays energy consumption and cost refreshed daily for home's appliances and devices.
- *Anomaly alerts* - Displays an alert and sends a push notification when an appliance's consumption is unusually high compared to previous values.
- *Program Recommendations* - Analyzes disaggregation data and provides recommendations to customers on programs from which they may benefit.

For measurement and verification, we will use a third party(s) to develop a M&V Plan and implement that plan. During our verification, we will use best practice research methods to measure impacts. The research design is to be determined by the third party conducting the plan.

Behavioral Demand Response

The Company proposes adding a Behavioral Demand Response measure to the Home Energy Insights program starting in 2024. This new measure would send messages to all electric Xcel Energy customers who have opted into communications from the Company and encourage them to reduce energy consumption during peak events called "Energy Action Days". A gas version of Energy Action Days may become available and is under evaluation. Should a customer wish to leave the program an opt out option will be provided.

Energy Action Days will be triggered by projected energy use and environmental conditions in the area. The company monitors conditions and will be the triggering organization. Communications will be sent through a third-party vendor.

Energy Action Days will be communicated to the customer the day of, or the day prior to an action day. Communications may be via email, automated phone call, social media, or other communication channels.

The Company has contracted with a third-party vendor to administer the program. The Company's forecasted savings for 2024 is roughly 0.02 kW per customer contact and is based on savings from the Energy Action Days program in MN. The Company will use measured values from the program to claim actual savings. Savings will be reported under the combined HEI program. Energy Action Days Events are called based on projected energy use and grid capacity. The goal is to call five or less events per year.

<u>Conservation Messaging</u>

Conservation Messaging is being developed as a program to provide messaging about reducing natural gas use during peak natural gas use events. Customers will be notified of an upcoming event via email and other communication channels and asked to reduce gas use during a specific period. The goal of the program is to reduce gas demand during those times when it is most likely to be more costly dues to supply and weather-related issues.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The Company has developed specific energy savings and participation forecasts for each product component:

- *Home Energy Report* - Participants in the 2023 product will carry over and remain in the print and email groups for 2024 through 2026.
- *Online Portal* - All residential customers have access to the online portal; however, customers must sign up for My Account to access it.
    - The online portal follows an opt-in model where customers will receive targeted marketing messages encouraging them to access it and actively participate. This differs from the HERs, where customers are randomly selected to receive reports unless they opt out. Some participants may be single-fuel service customers while others may receive both natural gas and electric service from The Company. Therefore, each fuel service counts as a "participant," meaning a dual-fuel customer will count as a gas participant and as an electric participant.

- Behavioral Demand Response: all electric Xcel Energy customers who have opted into communications from the Company.
- MEC is available to residential electric customers with smart meter technology.
- HBA is available to all electric customers, Gas customers will become eligible with the addition of the gas alerts.
- Budget Alerts are available to all residential customers.

Customers will be able to enroll in each measure within the HEI program concurrently. A multi-channel approach allows the Company to engage customers using their preferred method of communication whether that is through a paper or printable report, insights via a mobile application, or simply an email notification when their bill is trending high.

Budgets

The majority of the product's budget is allocated to third-party implementation services, which includes preparing and sending the customer communications, data analytics, marketing and conducting an ongoing regression analysis of Treatment and Control Group participants to determine the electric and natural gas savings. Administrative costs for customer data extraction and product administration to be completed by the Company are based on costs derived from previous product years.

C. Application Process

There is no customer application for this product.

D. Marketing Objectives & Strategies

The product is a behavior change effort focusing on energy and demand conservation to lower customer bills. The primary objective is to educate customers on their energy use and encourage change that results in savings behaviors. A secondary benefit of the product is that customers who participate in programs may choose to participate in other DSM & BE products, and this becomes more likely when a specific DSM & BE product is cross promoted within the programs. The Company plans to continue to utilize this effective marketing channel for targeted promotion of other energy-saving DSM & BE products and services.

E. Product-Specific Policies

Customer confidentiality and data privacy practices will be stringently applied in accordance with the Company's Privacy Policy, available on the Company's website.[50] Customer assistance will be provided to participants and non-participants in the same manner.

F. Stakeholder Involvement

The Company is coordinating efforts with stakeholders for the adoption of multiple language, especially Spanish, capabilities within residential products. The Company will continue to evaluate how language preferences can be incorporated further into the product as a part of the overall language strategy.

G. Rebates & Incentives

Rebates are not offered as part of the product.

[50] Xcel Energy Privacy Notice.

Home Energy Squad®

A. Description

The Home Energy Squad® product offers delivery and direct installation services of energy conservation measures to customers who seek to improve their home's energy efficiency, increase their comfort, and lower their utility bills. The Company pays for the cost of the measures and installation, while customers pay a fixed trip charge. Customers may also purchase additional measures that are priced individually.

The Home Energy Squad® team will install several moderate-impact, low-cost measures for customers. The product seeks to enhance customer knowledge and assist customers in overcoming barriers related to making energy improvements, including customer confusion about product choices, varying costs, and locating qualified installers.

The main Home Energy Squad® product offering includes:

- LED bulbs of various types and wattages
- Installation of a new smart thermostat with enrollment in the Company's AC Rewards program
- Advanced power strips
- High efficiency showerheads
- Low flow faucet aerators for the kitchen and bathroom
- Installation of a new smart thermostat with enrollment in the Company's AC Rewards program Weather-stripping of one exterior door
- Weather-stripping of one attic hatch
- Temperature assessment and setback of the water heater
- Direct install measures available for customer purchase
- Weather-stripping of additional doors
- Installation of additional or premium smart thermostats

The product also offers the Plus visit and the Virtual visits to facilitate participation.

Plus Visit

- The Plus visit includes all direct install conservation measures of the Squad visit
- The Plus visit adds an audit for diagnostic testing which may include a blower door test and infrared camera test when applicable

Virtual Visit

- Virtual visits are conducted via a videoconferencing tool provided by the third-party implementer, with a Home Energy Squad® technician remotely accompanying a customer on a walkthrough of their home.
- Virtual visits are intended to lead to follow-on interactions, such as an in-home installation visit from the Home Energy Squad®, a Home Energy Audit, or participation in other Company products.

- If such follow-on services have an associated customer co-pay or fee, the customer will pay them in accordance with the guidelines of the follow-on services.

The product will be another tool to help customers identify behavioral changes that may impact their energy rates. The product technicians will help customers identify smart meters, answer questions regarding time-of-use rates, and access online and phone resources provided by the Company.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The product participation and savings forecasts were developed based on Colorado residential market size, historical participation, and experience with similar products in the Company's other jurisdictions. The product has been identified for growth based on ease of participation as a low-cost solution for customers to identify additional energy-efficient opportunities in their homes.

Budgets

Budgets were determined by evaluating vendor cost estimates and potential participation levels in Colorado. A marketing budget is included for advertising, promotion, and outreach to generate awareness and drive participation in targeted areas. Primary budget drivers are:

- *Administration* – administration costs for the third-party implementer; internal labor and administrative costs; and the installation costs associated with energy efficient measures installed in customer homes.
- *Customer Incentives* – materials costs associated with the energy efficient measures installed in customer homes.
- *Advertising and Promotion* – print, radio, broadcast, direct mail, interactive media, and event promotion.

C. Application Process

Customers sign up for a visit online or by phone. During an in-home visit, the Home Energy Squad® technician will work directly with the customer to determine which energy-saving measures will make their home more energy efficient. The installation labor and materials costs are paid to the third-party implementer by the Company. The third-party implementer reports the installation of energy-saving measures to the Company; therefore, the customer does not need to submit a post-project rebate application.

D. Marketing Objectives & Strategies

Marketing objectives will focus on building awareness and product interest, in addition to driving customer participation. The Company intends to utilize an array of marketing channels for this product, including bill onserts, email, newsletters/blogs, radio, social media, the Company website, door hangers, sweepstakes, and/or promotional incentives. Targeted direct mail and digital marketing tactics may also be used. Call Center agents will direct any customers inquiring about this product to contact the third-party implementer using their toll-free number or website.

Local outreach products, such as Partners in Energy, are an important channel for building awareness and driving participation. Participating trade partners from other products are another important channel.

Cross-marketing opportunities exist with other products such as Whole Home Efficiency, Refrigerator Recycling, Home Energy Insights and School Education Kits. Concurrent appointments with a Home Energy Audit product technician are another opportunity for cross-promoting multiple products to increase awareness and drive stronger customer participation.

This product continues to explore Spanish-language marketing collateral and channels to reach a significant portion of the Company's customers who might not otherwise be aware of the product.

E. Product-Specific Policies

The Company will connect customers with the third-party implementer to begin the product engagement.

The technical assumptions will largely reflect those of other residential products such as Home Lighting & Recycling, Energy Efficient Showerheads, and Residential HVAC to consistently report measure costs and energy savings. Where technical assumptions from other residential products do not apply in direct install situations, direct installation-based technical assumptions will be utilized.

F. Stakeholder Involvement

The Company partners with its existing array of customer and trade stakeholders regarding product design and implementation, awareness building and ongoing product feedback. This may include partnering with other utilities where the Company is the electric-only or gas-only provider, and customers are receiving gas or electric service from that other utility provider.

G. Rebates & Incentives

A customer co-pay may be required to receive direct-installed energy-saving items such as LEDs, high efficiency showerheads, etc. The customer co-pay covers the technician trip charge. This process differs from most prescriptive rebate products where the customer submits a rebate application after equipment is installed and operational. The third-party implementer will report the installed measures to the Company, and the Company pays the implementer directly for the equipment and installation costs. Therefore, the customer does not need to submit a post-project rebate application.

Home Lighting & Recycling

A. Description

The Home Lighting & Recycling product provides resources for customers to purchase energy-efficient light bulbs and to dispose fluorescents in an environmentally friendly manner. Using energy-efficient bulbs is an easy and inexpensive way for customers to save electricity. The Company provides an avenue for customers to purchase discounted energy-efficient bulbs and associated lighting measures through local small retailers in IQ or DI communities. Customers can also purchase discounted products via the Company's online marketplace. We also offer compact-fluorescent lights ("CFLs") recycling free of charge.

Discounts

The Company motivates customers to purchase LEDs and associated lighting measures by offering in-store retail discounts through an upstream incentive model or through our online marketplace. An instant rebate is provided through Company collaboration with bulb manufacturers and retailers, enabling customers to purchase a variety of energy-efficient bulb models and associated lighting measures at a discounted price. Customers receive the discounted price at the register or at checkout; there is no mail-in rebate form.

CFL Recycling

The CFL recycling component of the product provides an environmentally friendly method for customers to dispose of CFLs. Customers can bring spent CFLs to participating Ace Hardware, Batteries Plus and independent hardware stores and recycle them free of charge. The retailer then stores the bulbs in a covered bin until it is full. Then they ship the bulbs to the recycler in the postage paid bin. The Company covers the cost to ship and recycle the bulbs that are submitted for recycling at participating retailers within the Company's service territory.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The energy savings forecast for the product was derived by analyzing the market potential and historical sales data in the IQ/DI communities, while considering new technologies, available retail channels and participating customer segments. All Company electric customers are eligible to participate in the Home Lighting & Recycling product.

Budgets

The main budget drivers include the following:

- Rebates – includes the discounts offered at retail stores as well as free measures (*i.e.*, LED bulbs) distributed at community events.
- Promotion and Advertising – includes costs for any home lighting specific advertising campaign as well as in-store signage displays and fees for participating in community events.
- Consulting – includes product administration labor to manage the product.

C. Application Process

Customers do not need to apply to participate in the Home Lighting & Recycling product. The Company works with retailers and manufacturers to provide a discounted price on products through upstream incentives. The incentive varies depending on the type of bulb/product and the manufacturer/retailer partner. The customer receives the discounted price at the cash register or at checkout. Incentives are paid upstream, and the discounts are passed on to the customer.

D. Marketing Objectives & Strategies

The objective of the Home Lighting & Recycling product is to motivate customers to purchase energy-efficient bulbs or associated products and encourage them to recycle CFLs when they burn out. The Company will focus marketing dollars on building awareness and sales of LED bulbs, in addition to helping educate customers about the product benefits. The Company will use various media channels to reach customers which may include television, radio, in-store signage, publications, bill onserts, social media, internet, and sponsorship of local community events. The peak sales period for energy efficient bulbs is in the fall and winter, as such, promotions are focused during these buying time periods.

The Company uses an RFP process to select participating retailers and endeavors to enable partnership with retailers to ensure optimal pricing and to help reduce free ridership.

CFL Recycling is marketed locally through the local retail partners, Ace Hardware, Batteries Plus and independent hardware stores. The Company also markets recycling through the Company's website.

E. Product-Specific Policies

The Company selects retailers within its electric service territory in IQ or DI communities per the Settlement Agreement (Proceeding No. 22A 0315EG) and assumes that the customers purchasing the discounted products live within the given area. If a store is within one mile inside of our territory boundary, the Company only claims 75% of the savings for sales at those stores.

The third-party implementer will be responsible for delivering the calculated savings, actual high efficiency product sales details, including the location, types and quantities of products sold each year to be used in the Company's annual DSM & BE status report.

The Company uses a third-party implementer for CFL recycling. The selected implementer separates the CFL components by hand to ensure that hazardous materials do not end up in the ground soil or water. The third-party implementer also provides bins made of recycled material and recycles the bins that the bulbs are shipped in. In addition, they provide certificates of proper recycling.

F. Stakeholder Involvement

The Company collaborates with several organizations to monitor and incorporate best practices into lighting product design. These activities include member of the Consortium for Energy Efficiency, attending the national ENERGY STAR® Product Partners meeting, and monitoring information published by lighting manufacturers, E-Source, the ACEEE, the EPA, and the DOE.

G. Rebates & Incentives

The upstream markdown incentives typically account for up to 75% of the incremental cost, depending on the product. The cost savings are passed on to the customer as an instant rebate.

Insulation & Air Sealing

A. Description

The Insulation and Air Sealing Rebate product offers rebates for installing qualifying insulation and air sealing measures in existing single-family homes or properties with four or fewer units. Eligible customers must either have a combination of residential electric and natural gas service, gas-only service, or an electric-only service residence that is heated with electricity and cooled with central air-conditioning.

The Insulation and Air Sealing Rebate product also offers rebates for installing qualifying cellular shade measures in existing single-family homes. Eligible customers must be those with either a combination of residential electric and natural gas service with central air conditioning, or electric-only heating or central air conditioning.

In addition to the rebate support for weatherization, the Company has added a proposed measure to document savings from a new investment in training and research resources to support the adoption of ENERGY STAR® as the standard for windows, doors, and skylights in Colorado. Public Service will rebate the following qualifying measures:

- Air sealing with a 20% reduction in air leakage based on blower door results;
- Attic insulation to a minimum R-value of 60 (where pre-improvement insulation is R-24 or less);
- Wall insulation to a minimum R-value of 13 (pre-improvement existing exterior wall cavities must be empty); and
- Cellular shades that are listed with the Attachments Energy Rating Council and certified with a Warm Climate rating of at least 35 and a Cool Climate rating of at least 5.

B. Forecasts, Participants & Budgets

Forecasts and Participants

Participation forecasts and rebate amounts are aligned with marketing and trade partner education plans to encourage participation from customers who will benefit from the product.

Budgets

Budgets for the insulation and air sealing measures are based on 2021 and 2022 product performance. The air sealing incremental costs include the costs to the customer for bypass attic air sealing, weatherization and envelope air leakage reduction, and additional costs of blower door testing. M&V costs are based on a percentage of the installations to ensure they meet quality installation standards and achieve the expected energy savings.

Budgets for the cellular shade measure are based on internal analysis and input from industry; rebates are the single largest expense component.

Typically, this product is promoted through the Company's website, communications to local area insulation and air sealing contractors, interior design contractors, community events and by the

Company's Consumer Education team. The product requires a minimal budget for promotion and marketing purposes. The Company has allocated some budget for contractor trainings and educational opportunities for the trade community.

C. Application Process

The Company must receive a completed rebate form and a copy of a dated invoice detailing the work performed. Applications will be reviewed and processed according to company policy and rebates are generally issued within eight weeks. The Company will issue the rebate directly to the customer, or an alternate rebate recipient if appropriately designated on the rebate application form.

For Insulation measures, participating trade partner companies must have a technician on staff that is currently certified in one of the following: BPI – Building Analyst, Envelope Professional, Residential Whole House Air Leakage Control Installer, Air Leakage Control Installer, Quality Control Inspector, Crew Leader, or Energy Auditor certification. The Company reserves the right to expand the list of certifications accepted for contractor participation.

A technician's certification may not be used by another trade partner company to meet the product requirements. All contractor companies must register to participate in the product, which includes terms of the Company's trade partner agreement and meeting BPI requirements.

D. Marketing Objectives & Strategies

The Company will market the Insulation and Air Sealing product through a variety of channels such as the Home Energy Audit product, the Company's website, communication with participating contractors, and events. The Company may support the overall marketing strategy with email efforts, advertising, and social media. Historically, this strategy has been implemented during the key heating months of December, January, and February, and during the summer months.

Additionally, the Company will incorporate communication activities to participating contractors to facilitate proper education of customers on the features and benefits of the product.

Finally, the Company may initiate cross-marketing efforts with our other natural gas rebate products. Other strategies may also be incorporated such as weatherization measure benefits combined with heat pump installation to promote beneficial electrification.

The Company is looking into ways to provide a more comprehensive experience for our residential customers that simplifies the process of installing capital intensive energy efficient equipment. This may include an end-to-end solution where the customer chooses from any, or all, of the following as applicable:

- Advice and analysis of the available equipment options
- Financing
- Assistance with choosing qualified contractors

E. Product-Specific Policies

For insulation measures, the customer must use a registered contractor. These contractors have agreed to the terms of the Company's trade partner agreement and met the requirements of the product. The cellular shades measure does not require customers to use a registered contractor.

Air sealing Natural Air Changes per Hour ("NACH") airflow reductions of at least 20% are required for each install, unless the home has a pre-improvement rating of 0.50 NACH or lower, based on the Company's calculation formula found on the rebate form. Pre and post blower door tests are required for these homes.

For homes that do not meet the .50 NACH but need less than a 20% reduction to achieve .50 NACH; participation in the insulation measure will be allowed and pre and post improvement blower door tests are required. These customers are not eligible for air sealing rebates.

For homes that achieve a pre-improvement rating of less than .50 NACH; participation in the insulation measure will be allowed, and the NACH reduction requirement and the post improvement blower door test will be waived. These customers are not eligible for air sealing rebates.

Combustion Appliance Zone ("CAZ") testing is required for all insulation measures.

Customer, or Do-It-Yourself installations, as well as installations done by non-registered contractors do not qualify for rebates.

This product excludes new residential construction, new residential additions, insulation of doors, garages, sheds, workshops, below-grade walls, mobile homes, projects with pre-improvement R-values that exceed product minimums, and residential properties with more than four units. To qualify for a rebate, all insulation must be installed to the manufacturer's specifications and meet all state and local codes and federal regulations. All measures must follow industry-accepted practices. For areas being treated, where there is a risk of asbestos or other hazardous materials becoming airborne, blower door diagnostic tests may not be performed. In these situations, the contractor is required to safely complete air sealing measures to the best of their abilities and note the invoice that the presence of a hazardous material prevented a blower door test from being completed. These customers will not be eligible for an air-sealing rebate.

The Company reserves the right to inspect installations before or after issuing a rebate. Rebates will not be issued if the same improvement has already been rebated through other Public Service rebate products. Customers are eligible for one rebate per calendar year.

F. Stakeholder Involvement

The quarterly DSM & BE Roundtable Meetings will provide a forum for stakeholder involvement and feedback regarding this product. The Company continues to conduct meetings with interested trade partners and stakeholders to improve and implement this product. The Company will continue to engage stakeholders for product feedback.

G. Rebates & Incentives

All insulation measures are rebated at 30% of project costs, up to the measure cap. Prescriptive rebates on cellular shades are 71% of incremental costs.

Additionally, the Company will offer a bonus rebate of $600 for customers who install insulation and air sealing first and then install a Residential Heating and Cooling program rebate qualifying heat pump within two years of installation of the insulation. The insulation must qualify for the requirements of the Company's Insulation and Air Sealing program. Providing this bonus and requiring the completion of the measures in this order promotes best practices for minimizing the heating load of the home, which minimizes upfront costs and bill impacts for the customer, as well as saving energy and peak demand for the utility. The two-year period is intended to allow for time for customers and contractors to address challenges such as availability of funds, equipment, and labor.

Multi-Family Buildings Efficiency

A. Description

The Multi-Family Buildings Efficiency product is designed to engage multi-family building owners and property managers in deploying DSM measures that will lower energy consumption. The product encourages DSM participation in this market segment by helping to identify and support implementation of energy efficiency improvement opportunities, both in-unit and in common areas. This product offering has a three-stage approach.

Stage 1: Energy Assessment

The first step is to complete a virtual or on-site energy assessment. Virtual assessments have been added as an option to reach customers in outlying areas of the Company's service territory where participation has been historically low due to added travel time and expense. The assessment will identify opportunities for improving building energy efficiency via a specific set of direct-install measures (eligible measures are listed below under Stage 2). The assessment will include an inspection of a unit samples within each building, typically one of each unit type (*e.g.*, 1 studio, 1 one-bedroom, 1 two-bedroom), as well as larger, capital-intensive projects for the whole building (Stage 3). The assessment is offered at no cost to the customer.

Stage 2: Direct-Install

The second stage of participation is direct installation of energy savings measures identified in the energy assessment. These measures address savings opportunities both in the common spaces as well as in-unit. Installation is completed by the Company's third-party implementer. There are six eligible measures for Stage 2 that will be installed for no cost to customers:

- LED lamps
- Low-flow showerheads
- Kitchen and bathroom sink faucet aerators
- LED exit signs
- Eligible smart thermostats[51]
- Other cost-effective measures as identified

Participants will work with the third-party implementer to schedule installation.

Stage 3: Prescriptive or Custom Energy Efficiency Improvements

The third stage for participants involves the completion of prescriptive or custom energy-efficiency improvement projects such as HVAC upgrades, common-area lighting upgrades, or other projects currently eligible for rebates through the Company's prescriptive offerings or Custom Efficiency product. Recommendations for implementation will include opportunities for beneficial electrification.

Implementation of Stage 3 projects may be challenging for several reasons: lack of ownership willingness, long sales cycle, capital constraints, market economics, etc. To overcome these barriers the third-party implementer will provide participants with advice on selecting a contractor

[51]Eligible smart thermostats will be installed at no additional cost if the equipment is enrolled in the Company's Demand Management product upon completion of installation.

and reviewing bids as well as periodically provide follow up consultations. Access to advanced meter interval data is a resource for the third-party implementer during these consultations, allowing them toto show customers how their energy usage may affect their energy costs and what the savings might look like after energy efficiency upgrades.

The third-party implementer is crucial to the product's success. They serve as a consistent point of contact for participants. The third-party implementer will be responsible for advertising and recruiting participants, delivering the Stage 1 on-site energy assessment and Stage 2 measure installations, and working to successfully convert participants into Stage 3 projects in conjunction with the Company's Product Managers or BSC representatives.

With the installation of smart meters and the transition to the TOU rate in Colorado, the Company will work with the third-party implementer on bilingual educational efforts regarding the smart meter, new rate, and how customers may save money by shifting electricity use to off-peak hours when rates are the lowest.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The participation forecasts for energy assessments, direct installs, and larger energy efficiency projects for 2024-2026 are based on forecasts provided by the third-party implementer along with historical participation within the product.

Budgets

The bulk of the product expenditures is product administration and customer incentives (*e.g.*, energy assessments and direct-installation of energy-efficient equipment). The budget also includes costs for prescriptive and custom rebates from Stage 3 projects including technologies related to beneficial electrification.

Direct-install costs were developed based on the actual costs contracted between the Company and the third-party implementer and the forecasted participation. Rebates for Stage 3 are estimated by the third-party implementer based on deemed values from the anticipated mix of prescriptive and custom DSM measures.

C. Application Process

The product is available to multi-family buildings that are Public Service electric and/or natural gas customers. To participate, customers must apply through the third-party implementer, who will review applications and approve participants. Applications will be reviewed on a first-come, first-served basis. Upon meeting the qualifications for participation, customers will work with the implementer to schedule a virtual or on-site assessment (Stage 1).

D. Marketing Objectives & Strategies

The third-party implementer will recruit customers by leveraging their existing customer relationships and market expertise. Additional options for direct promotion by the Company may include the following:

- Marketing materials and brochures;
- A webpage to educate interested customers, explaining how to participate and the benefits of participating;
- Attending multi-family events in the Company's service territory; and/or
- Co-hosting educational events with the third-party implementer.

E. Product-Specific Policies

All eligible multi-family buildings must be Public Service electric and/or natural gas customers with five or more units per building. This primarily includes market-rate qualified buildings.[52] If a property has multiple buildings and at least 80% of the buildings qualify, the entire property may participate in the product.

F. Stakeholder Involvement

Initially, the Company worked closely with several external stakeholders to design this product. Today, the product has ongoing relationships with:

- Platte River Power Authority
- Energy Efficiency Business Coalition
- Ft. Collins Utility
- Southwest Energy Efficiency Project
- Colorado Energy Office
- City and County of Denver
- City of Boulder
- Boulder County
- ACEEE
- Colorado PUC Staff

The Company has also been active with national multi-family working group efforts to research successful utility multi-family programs and network with those program managers and staff. Primarily, the Company has participated in ACEEE's Utility Multi-Family Working Group and E Source's Multi-Family Leaders Group.

The Company has also worked with third-party implementers and other vendors to understand the tools and services available to this customer segment.

[52]Low income qualified buildings should participate in the Low-Income Multi-Family Weatherization product. If for some reason a building doesn't qualify for low income, the property can qualify for the market rate program.

G. Rebates & Incentives

The product provides a virtual or on-site energy assessment (Stage 1) and eligible direct-install measures (Stage 2) to participants at no additional cost. The product will provide direct rebates for eligible projects completed in Stage 3 based on savings calculations from the Company's Custom Efficiency model and/or prescriptive products deemed technical assumptions.

Refrigerator & Freezer Recycling

A. Description

The Refrigerator & Freezer Recycling product strives to decrease the number of inefficient refrigerators, freezers, and room air conditioners in use, and by doing so, deliver electric energy savings and peak demand reduction. The product is designed to encourage customers to upgrade to a more-efficient unit, and/or choose to decommission their operable, inefficient unit by providing a convenient way to dispose of their units in an environmentally safe and compliant manner. Eligible customers include electric customers in the Company's service territory. Residential and business customers with qualifying units will receive an incentive for their participation and will not be directly responsible for any costs associated with pick-up, transportation, disposal, and proper recycling of their unit. The Company will use the services of a qualified third-party implementer to perform the following:

- Refrigerator/Freezer/Room air conditioner collection, transportation and storage;
- Verification of eligibility of the appliance at time of scheduled pick-up;
- Appliance processing and materials recycling;
- Issuing the customer incentive payment;
- All customer service aspects related to above activities;
- Product tracking and reporting; and
- Supporting M&V requirements.

The third-party implementer will be required to comply with all local, state, and federal requirements. This includes maintaining all permits and licenses required for any facilities, equipment and personnel used for this product. Adherence to this process will ensure that recycled units will not re-enter the secondary or primary market and be placed back on the Company's grid.

B. Forecasts, Participants & Budgets

Forecasts and Participants

Participation and energy savings levels for this product were developed based on historical product performance.

Budgets

The 2024-2026 budget is based on forecasted participation and recycling costs. Recycling-related expenditures account for approximately 65% of the overall budget. The projected rebates account for 23 percent of the budget. Marketing, M&V, and administrative expenses make up the remaining budget.

C. Application Process

Customers will either call-in to the third-party implementer's toll-free service number or schedule this service online.[53] The third-party implementer will qualify the customer and schedule an

[53] http://www.xcelenergy.com/fridge.

appointment to pick up the unit. Customers will be contacted one to two days prior to their scheduled pick-up date to confirm their appointment and remind them to turn on their unit and ensure it is empty. Customers will receive their incentive check within six to eight weeks after their unit has been picked up by the implementer.

D. Marketing Objectives & Strategies

The target market consists of customers who are disposing of their primary (usually located in the main kitchen) or secondary refrigerator (usually located in a garage or basement area), or freezer units (usually located in a garage or basement). Generally, these customers have single-family homes with two or more individuals in the household. Customer interest in this type of product is seasonal, usually occurring in the spring, summer, and early fall seasons (prior to the Thanksgiving holiday). Product demand often peaks in the summer months, which is associated with customer home improvement periods. Deployment of promotional tactics will coincide with these seasonal time periods.

The Company will utilize several marketing channels for this product, including bill onserts, newsletters/blogs, social media, email, and the Company's website. Additional tactics may include direct mail, telemarketing, sweepstakes, or promotional incentives. Cross-marketing opportunities exist with other products such as Home Energy Squad, Home Energy Insights, Saver's Switch, School Education Kits and other products and services the Company offers. Call Center agents will direct any customers inquiring about this product to contact the third-party implementer using their toll-free number or website.

This product will also explore Spanish-language marketing collateral and channels to reach a significant portion of the Company's customers who might not otherwise be aware of the product.

E. Product-Specific Policies

All refrigerator, freezer, and room air conditioner units must meet the following requirements to qualify for this product:

- Must be operational. "Operational" is defined as in working order. Refrigerators must be capable of cooling water; freezers must be capable of freezing.
- Appliances will be categorized as follows for reporting purposes:
    - *Secondary:* Used as a secondary unit for at least two months prior to pick up
    - *Primary:* Used as the primary unit in the home at the present time
    - *Freezer:* Used separately from the primary refrigerator and is a standalone unit.
- Refrigerator/Freezer must be plugged in the night before the pick-up date (customer will receive a reminder from the third-party implementer). This is to ensure full operation

(cooling/freezing water for a refrigerator; freezing capability for a freezer) when inspected at the time of pick-up.

- In-home pickups must have doorways/hallways that are big enough for the unit to fit through. Customers may be asked to sign a liability waiver on the pickup day if the implementer deems the doorways/hallways to be a tight fit.
- Refrigerator/Freezer must be no smaller than 10 cubic feet or no larger than 30 cubic feet.
- There will be a limit of two refrigerators and/or freezers per household per year.
- Room air conditioners may be picked up if the third-party implementer is already at a customer's home to collect a refrigerator or freezer.

F. Stakeholder Involvement

The Company is a proud partner of the EPA's Responsible Appliance Disposal ("RAD") Program. This voluntary partnership program began in 2006 to help protect the ozone layer and reduce emissions of greenhouse gases through the responsible disposal of appliances.

The Company has been responsibly recycling appliances for many years. The Company's voluntary participation in the RAD Program further underscores its commitment to helping customers make responsible technology and appliance choices. The Company has been published within the RAD annual report and recognized at annual events for product accomplishments.

G. Rebates & Incentives

Participants will receive an incentive to remove their inefficient primary and/or secondary refrigerators and freezers. The primary and secondary refrigerator or freezer will be removed and properly recycled at no cost to the customer.

Residential Heating & Cooling

A. Description

The Residential Heating & Cooling product provides incentives to the Company's customers who purchase a variety of qualifying heating and cooling equipment for residential use, including evaporative coolers, heat pumps, natural gas furnaces, natural gas boilers, natural gas water heaters, electric heat pump water heaters, and smart thermostats.

The Residential Heating & Cooling product combines offerings from several types of equipment. This holistic approach to residential customers' heating and cooling needs is designed to improve the experience for customers and trade partners to improve participation, energy savings, and customer satisfaction. The smart thermostat offering can also assist customers in managing the timing of their energy usage to assist customers in saving money on the Company's Time of Use rates.

More details regarding the specific types of equipment rebated in this product are provided below:

- **High Efficiency Ducted or Partially Ducted Air Source Heat Pump systems with Quality Installation** – This product is defined as new central Ducted or Partially Ducted Air Source Heat Pump systems with "matched" indoor and outdoor components, and thermostatic expansion valves, in new or existing homes, that meet certain energy efficiency standards as outlined in Section G below. The High Efficiency ASHP systems with Quality Installation are eligible for a rebate. The rebate intent is to encourage consumers to purchase units that meet or exceed the high efficiency standard of at least 15.2 SEER2, 9.6 EER2, and 7.8 HSPF2. Trade partners who have met the ASHP participation requirements can offer this rebate. To be eligible for a cold climate heat pump rebate, units must have a 15.2 SEER2, 10 EER2, 8.1 HSPF2, 1.75 COP at 5 degrees Fahrenheit, and a maximum capacity at 5 degrees Fahrenheit that is at least 70 percent of the rated capacity at 47 degrees Fahrenheit. Customers with preexisting natural gas heating systems must maintain natural gas heating as a backup heat source to qualify for rebates, except for customers installing cold climate heat pumps.

- **Evaporative Coolers** - Qualifying equipment must be new, permanently installed evaporative cooling units. Portable coolers or systems with vapor compression backup are not eligible, neither is used or reconditioned equipment.

Non-Ducted Air Source Heat Pumps – The non-ducted air source heat pump equipment serves residential customers who either cannot install traditional ducted air source heat pump systems or have hard-to-heat/cool areas of their homes, or who simply prefer this technology. To be eligible to participate, residential electric customers must purchase and install a unit that has a rated efficiency of 15.2 SEER2, 11.7 EER2, and 7.8 Heating Seasonal Performance Factor ("HSPF2"). Variable-speed systems which meet these requirements are eligible for a rebate. The unit must be used for cooling and heating purposes. There is not a QI component, nor is certification a requirement. Thus, any trade partner can offer this rebate. To be eligible for a cold climate heat pump rebate, units must have a 16 SEER2, 9 EER2, 9.5 HSPF2, 1.75

COP at 5 degrees, and a maximum capacity at 5 degrees Fahrenheit that is at least 70% of the rated capacity at 47 degrees Fahrenheit. Customers with preexisting natural gas heating systems must maintain natural gas heating as a backup heat source to qualify for rebates, except for customers installing cold climate heat pumps.

- **Ground Source Heat Pump with Quality Installation ("GSHP")** – The GSHP equipment measure serves a small market niche of consumers who seek out the most highly efficient technology. To be eligible to participate, residential customers must purchase and install a unit that is ENERGY STAR® certified. The ENERGY STAR® certified GSHP performance criteria are a minimum of 3.3 Coefficient of Performance ("COP") and 16 EER2. Equipment must be Air-Conditioning, Heating, and Refrigeration Institute ("AHRI") performance-certified at standard rating conditions. Rebates will be given for GSHPs that are installed as closed loop systems and are used for both heating and cooling. Trade partners who are registered participating contractors for the ASHP rebates may offer this rebate.

- **Natural Gas Furnaces** – Furnace rebates are offered for a minimum furnace efficiency of 95% Annual Fuel Utilization Efficiency ("AFUE"). Equipment must be AHRI performance-certified at standard rating conditions. A customer is only eligible for a rebate if replacing a non-condensing furnace. Additionally, the equipment must be invoiced and installed on or before December 31, 2026.

- **Natural Gas Boilers –** Boiler rebates are offered for a minimum boiler efficiency of 95% AFUE. Equipment must be AHRI performance-certified at standard rating conditions. Higher rebates are available for boilers with a sidearm water heater, if the equipment is invoiced and installed on or before December 31, 2024. A customer is only eligible for a rebate if replacing a non-condensing boiler. Additionally, the equipment must be invoiced and installed on or before December 31, 2026.

- **Water Heaters** - The product is applicable only for the purchase of qualifying new natural gas standard storage tank water heaters, natural gas tankless water heaters or electric heat pump water heaters installed in new or replacement applications. Qualification for an incentive is a minimum efficiency of 0.64 Uniform Energy Factor ("UEF") for medium draw standard tanks, 0.68 UEF for high draw standard tanks, or 0.87 UEF for tankless natural gas water heaters. ENERGY STAR® electric heat pump water heaters also qualify for an incentive. All customers may choose their own independent residential water heating contractor or installer or install the unit themselves. A midstream incentive approach will be offered for energy efficient Heat Pump Water Heaters. A customer is only eligible for a rebate for a natural gas water heater if the equipment is invoiced and installed on or before December 31, 2024.

- **Smart Thermostat** - The concept of realizing energy savings by programming a thermostat is straight-forward: scheduling temperature setting changes (setbacks) during times when home occupants are away or asleep ensures no energy is wasted when no one is home or awake. Thermostats meeting the ENERGY STAR® Connected Thermostat specification have demonstrated the ability to achieve energy savings through HVAC equipment runtime reductions, specifically an 8% or higher reduction in heating equipment runtime and a 10% or higher reduction for cooling equipment runtime.

These runtime reductions are achieved by smart thermostats through a variety of methods, starting with the ease of scheduling. These devices make it easier to program efficient setback schedules compared to their non-communicating predecessors.

In addition to ongoing product innovations by thermostat manufacturers, software firms have begun to provide additional optimization functionality that promises to proactively manage customer thermostats for deeper energy efficiency and demand management functionality without negatively impacting customer comfort.

B. Forecasts, Participants & Budgets

Forecasts and Participants

Participation and energy savings levels for this product are based on 2021-2022 participation, as well as increased marketing efforts to the most cost-effective equipment within the product and working through trade partners and stakeholders to engage customer participation.

Budgets

The budget forecast is based upon forecasted participation, and most of the budget is for direct customer incentives. For some equipment, contractors and/or retailers are also paid an incentive, to further encourage their support of these products. The budget also includes costs for verifying a percentage of the new equipment installations in the field to ensure they meet expected energy savings, including (where applicable) ACCA standards for quality installation; for advertising and marketing; and for other administrative expenses including labor and contractor training.

C. Application Process

The typical sales cycle begins with a customer hiring a contractor, learning about energy efficient models, and purchasing and installing the unit. Following installation, the customer or trade partner submits a completed Company rebate application and equipment invoice. Invoices must reflect the same information provided on the application form, specifically the model number, serial number, installation address, and purchase date. Other information gathered on the application form includes the customer's account number, mailing address if different from installation address, customer signature, trade partner signature and information related to the equipment such as efficiency ratings, heating and cooling capacity, and size.

The Company is pursuing a more comprehensive rebate application form to minimize paperwork for the customer and trade partners while still collecting all the information needed to thoroughly review and process the applications as quickly as possible. The Company's online application tool will remain available and will comply with these requirements. The Company may also offer

"instant rebates" at point of sale for certain types of equipment through various retail and wholesale distribution partners, including (but not limited to) an online, Company-branded marketplace.

All information requested on the rebate applications must be provided for the rebate process to be completed. Information needed on the invoice is specified on the back of each rebate application form; this information must be provided for the rebate process to be completed.

Equipment eligibility is determined by using the AHRI Directory of Certified Product Performance, the list of ENERGY STAR® Qualified Products on the ENERGY STAR® website, or on the list of qualified model numbers maintained by the Company and available on the Company's website, as specified on the rebate application for the equipment. Rebates are typically mailed within eight weeks.

The Company reviews each rebate application and verifies that all the required data has been provided and that all product requirements have been met. When corrections are needed to rebate applications, the Company sends a request to the contractor. Applications may be resubmitted. Customers applying for instant rebates enter information that is verified through a third-party vendor partner's software, which validates the customer's premise, type of service, and eligibility before the instant rebate coupon is generated.

D. Marketing Objectives & Strategies

The Residential Heating & Cooling product seeks to increase awareness and the demand for a variety of heating and cooling products within the Company's service area, help customers and participating contractors offset costs associated with high efficiency equipment and quality installation practices, reduce customers' energy costs, meet customers' environmental goals (such as reducing carbon emissions), and increase their comfort. To support these goals, the Company plans to implement the following marketing strategies to increase product awareness:

- Use of the HVAC contractor community as the primary marketing channel. The Company's Channel Manager is responsible for conducting trade partner training, meetings, telephone calls, emails, and sending newsletters to keep the trade informed and engaged in the product. In addition, a qualified contractor list is available on the Company's website and participating contractors are expected to assist in promoting the product. The Company provides brochures for contractors to distribute to customers as well.
- Company marketing and advertising strategies will be used to create customer awareness. This may include, but is not limited to, e-mail, bill onserts, direct mail, bundled marketing campaigns, community newsletters, webinars, promotional booths at public events, radio and/or television advertising, sponsorships.
- The Company's website also includes information regarding the product and is updated as needed to reach customers more effectively. This includes information on product details, quality installation practices, and where to find qualified contractors. The site also hosts webpages designed specifically for contractors to obtain information about the product.
- When appropriate for a particular type of equipment, the Company will provide Point of Purchase displays at big box stores and appliance retailers.

E. Product-Specific Policies

Contractors who do not comply with the product requirements and guidelines are not allowed to participate in the product. Requirements may include taking and passing Company-provided training classes, for the purpose of increasing the energy savings and/or increasing customer satisfaction with the rebate process.

These rebates are available to residential Xcel Energy account holders, with electric or natural gas service (depending on the type of equipment) provided by Xcel Energy. All equipment must be new and permanently installed. Used or reconditioned equipment is not eligible for a rebate.

For the following types of equipment, customers must have residential electric service with Xcel Energy: Evaporative Coolers.

For the following types of equipment, customers must have residential natural gas service with Xcel Energy: Natural Gas Furnaces, Natural Gas Boilers, Natural Gas Water Heaters.

For the following types of equipment , customers must have residential electric and/or natural gas service with Xcel Energy: Electric Heat Pump Water Heaters and Heat Pumps.

To be eligible for the Smart Thermostat offering, participants must be a residential customer of the Company. For electric service customers, participants must have central air conditioning or a ducted or partially ducted air source heat pump; for gas-only customers, participants must have central natural gas heating. Electric and gas service customers must have central air conditioning (or a ducted or partially ducted air source heat pump) and/or central natural gas heating.

To be eligible for High-efficiency ducted or partially ducted equipment with QI rebates:

- The customer must use a registered contractor for the installation of the new system and who annually pass required online classes. These contractors have agreed to the terms of the product and meet the requirements related to quality installation practices. A list of registered contractors can be found on the Xcel Energy website.
- The "matched system" must be listed in AHRI's Residential Directory. This directory is used to identify product classification, determine efficiency ratings, and confirm matched systems.
- To verify that the equipment has been properly installed, the equipment must be installed and tested as specified in the Xcel Energy QI guidelines based on ACCA standards. The equipment installation and testing for QI must be completed before the rebate application is submitted for processing by the Company.
- The use of a furnace's variable speed fan to increase the SEER2 rating above the nominal rating is allowed for determining rebate eligibility, provided that the overall furnace and ducted or partially ducted air source heat pump combination rating can be found in the AHRI's Residential Directory (www.ahridirectory.org). The furnace does not have to be new to use it for an increased efficiency rating. The homeowner or contractor must supply the furnace model number and serial number on the application and invoice.

To be eligible for a non-ducted air source heat pump rebate, the unit must be used for cooling and heating purposes; therefore, non-ducted air conditioners (cooling only units) do not qualify. The AHRI certificate must be in the residential category of "Variable-speed Mini-Split and Multi-Split Heat Pumps." Multiple head non-ducted systems qualify.

To be eligible for an evaporative cooler rebate, qualifying equipment must be a permanently installed direct, indirect, or two-stage evaporative cooling unit. Customers can replace an existing evaporative cooler or central AC system, or purchase a first-time installed evaporative cooling unit, to qualify for a rebate.
There are three equipment tiers available for evaporative coolers:

- *Standard Evaporative Coolers* - Qualifying evaporative cooling units with airflow output of 2,500 CFM or greater.
- *Premium Evaporative Coolers* - Qualifying evaporative cooling units with media saturation effectiveness of 85% or greater. The units must be manufactured with remote thermostat control and periodic purge water control (*e.g.*, purge pump) or have these two items purchased and included on an invoice.
- *Multi-Ducted Evaporative Coolers* - In addition to 85% saturation effectiveness, remote thermostat control and periodic purge water control, qualifying evaporative cooling units must be indirect/directly cooling the whole house with a minimum of three supply ducts

installed, and at least one of the supply ducts must be newly installed along with the new cooler.

To be eligible for a natural gas storage water heater rebate, the storage tank must be no larger than 55 gallons.

To be eligible for a 95% AFUE natural gas furnace rebate, an AHRI certificate must be available, and the customer must be replacing a non-condensing furnace.

To be eligible for a 95% AFUE natural gas boiler rebate, an AHRI certificate must be available, and the customer must be replacing a non-condensing boiler.

To be eligible for a smart thermostat rebate, the customer must install a thermostat which meets the ENERGY STAR® Connected Thermostat standard and is eligible to participate in the Company's demand management products for smart thermostats, AC Rewards. The Company maintains a list of eligible model numbers, which is available on the Company's website.

F. Stakeholder Involvement

The Company considers its stakeholders for the Residential Heating and Cooling product to be contractors, distributors, manufacturers, retailers, SWEEP, EEBC, CEO, WRA, RMI, local municipalities within the service area, and other environmental organizations. Stakeholders can share their product suggestions during the Company's quarterly DSM Roundtable Meetings. In addition, the Company is a member of the CEE, and monitors its initiatives related to residential heating and cooling equipment.

G. Rebates & Incentives

Rebates are payable to residential account holders with electric or natural gas service (depending on the type of equipment), or to an alternate rebate recipient of their choosing. All types of equipment must meet all requirements to receive the rebate. For rebates which are based upon multiple measures of efficiency, the rebate is paid according to the lesser value of the technical requirements of the various measures, including SEER2, EER2, HSPF2, and COP. The rebate amount shall not exceed the purchase price.

For certain types of equipment, the Company will also pay incentives associated with customer rebates to participating, registered contractors or retailers in good standing.

Homeowners may receive the equipment rebate directly or may provide written permission for the rebate to be paid directly to the contractor or to another designated alternate rebate recipient. Builders, as the original purchaser of equipment, are eligible to receive an equipment rebate; however, the rebate will only be issued once so builders should coordinate with the homeowners as to who will receive the rebate. Contractor incentives are paid to the contractor company while

the associated rebate is paid to the account holder or alternate rebate recipient. Retailer incentives are paid on a quarterly basis.

Customers, contractors, or retailers who receive an incentive through another DSM product (*e.g.*, Whole Home Efficiency or ENERGY STAR® New Homes) for the same equipment are not eligible to receive a rebate through this product. By accepting a rebate, the customer agrees to reasonably accommodate M&V consultants.

Additionally, the Company will offer a bonus rebate of $600 for customers who install insulation and air sealing first and then install a Company rebate qualifying heat pump within two years of installation of the insulation. The insulation must qualify for the requirements of the Company's Insulation and Air Sealing program. Providing this bonus and requiring the completion of the measures in this order promotes best practices for minimizing the heating load of the home, which minimizes upfront costs and bill impacts for the customer, as well as saving energy and peak demand for the utility. The two-year period is intended to allow for time for customers and contractors to address challenges such as availability of funds, equipment, and labor.

Residential New Home Construction

A. Description

The Residential New Home Construction (f/k/a ENERGY STAR® New Homes) product will provide builders of single-family and small multifamily homes with substantial incentives to build high performance, all-electric homes. Homebuilders are encouraged to design and build homes that preclude the use of natural gas. This single-fuel design is a new component to the program. Homeowners benefit with lower energy bills, fewer maintenance concerns, higher resale value, and a more comfortable, quiet home. With interval data, homeowners will also see how efficient their home is starting out and gain a deeper appreciation and understanding of that efficiency.

This product structure represents a paradigm shift in residential new construction in the Company's service territory. Formerly a mass-market program designed to capture much of the residential new construction market, the new program is designed to demonstrate market leadership with program objectives narrowly focused on driving a quantum leap in build quality and beneficial electrification for new homes in Colorado.

The new program structure simplifies program delivery, with three tiers of high-performance, all-electric building for new homes in the Company's service territory.

The first tier carries forward the all-electric bonus incentive established in the 2023 DSM & BE Plan. The two higher tiers, based on the MassSave all-electric new construction program, represent discreet improvements over the introductory tier. This product structure continues to give builders the flexibility to mix and match building envelope design to meet the performance requirements and qualify for a rebate.

The savings mechanism for residential new construction will change to reflect the expectations around all-electric construction and beneficial electrification. These changes are outlined below in *Product-Specific* Policies.

The product also encourages and supports jurisdictions to adopt the latest building codes within the residential new construction sector. It gives those communities the tools to improve compliance with updated energy codes and helps them reach their energy performance and economic development goals. This support meets each jurisdiction where they are in the code adoption cycle and address current gaps in new code adoption across the state including: a lack of resources, lack of knowledge, and internal and external opposition to progressing energy codes. The Company utilizes a third-party implementer to work with code enforcement jurisdictions.

The rebate values involved increase the risk for misrepresentation of the energy savings in participating homes. Thus, product implementation will be solely handled by the third-party implementer. The Company will utilize a third-party implementer to evaluate energy savings in participating homes. The third-party implementer will model and test each home to measure the level of energy efficiency achieved. The third-party implementer will determine if the home meets the product requirements and is eligible for a rebate.

This product also helps manage utility bills for customers on TOU rates. As building assemblies improve and builders qualify for higher incentives, electric use decreases, and the equipment installed results in a more consistent load factor throughout the day versus significant differentiation in usage over time. Comfortable indoor temperatures can be maintained for a longer period, so shifting load to hours of lower energy cost can be done without affecting customer comfort. As control systems improve, this can be done automatically with imperceivable effects on occupants.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The product forecasts the construction of single-family and small multi-family homes up to four units. Energy savings and participation forecasts are based on the count of homes that have achieved analogous performance in the past. While participation is forecasted to be nascent vis a vis historical participation in ENERGY STAR® New Homes, the size of the rebates available will drive the workforce to develop the skills necessary in envelope construction and mechanicals installation to meet program requirements. Moreover, the customer marketing efforts should drive increased demand for participating, high performance new homes. Thus, participation is forecasted to double year-over-year for the duration of the plan.

The forecasts also include carryover projects for homes with permit dates prior to the required cutoff date of June 30, 2024. Homes permitted prior to that date will be subject to 2023 program year requirements and qualify for the 2023 program rebates. This will allow for smoother transition for homebuilders in the Company's service territory.

The forecast also includes gas and electric savings tied to increased adoption of higher building codes. These savings are built on advancing code, increased compliance, and how Company efforts have contributed to both.

Budgets

The product budget is primarily driven by forecasted participation, although the revised product design will require significant additions to the marketing and builder trade training budget.

The marketing budget will be utilized to advertise the participating builders in the Company's service territory, highlighting the benefits and features of rebated homes. The training budget will be used to offset the costs of training for builders and their employees to develop the skills necessary to meet the new performance expectations for homes to participate.

The additional costs include product administration and measurement and verification. Product administration costs include Company labor and third-party implementer services. Builder rebates comprise most of the product budget, followed by promotion, training and administration.

C. Application Process

Enrollment for this product will be handled by the third-party implementer. The implementer will contact builders to encourage their participation, or the builder will contact the Company or the third-party implementer to express interest in constructing an energy-efficient qualifying home.

The implementer will explain the product offering and potential rebates available, review the home's design and building schedule, and enter the home details into a tracking database. The implementer will consult with builders throughout the construction process to ensure the home is built to program specifications.

When the home is completed, the third-party implementer will perform field verification on the house to determine the energy impacts using OpenStudio. The builder will receive a rebate based on which of the performance tiers the home achieves based on the observations and data collected by the third-party implementer. Specific gas and electric energy savings are determined by the Company using the data collected by the third-party implementer on the participating home. There is no rebate application for the builder to complete since all required information is entered into the third-party implementer's database. Once the data is deemed complete, the third-party implementer is responsible for entering selected portions of the collected data for each home into the Company's database.

D. Marketing Objective & Strategies

Product marketing will be focused on educating customers, who are purchasing or building a new home, about the benefits of choosing a home that meets program specifications. After program launch, the Company expects a limited number of homes to meet the program requirements. As a result, marketing efforts will focus on engaging new home customers and pointing them toward the homes that meet the program's exceptional standards.

The Company will brand the three performance tiers with the objective of simplifying customer communications. The Company will build a marketing campaign to educate customers on the exceptional performance they can expect from the homes. This will set the homes, and their builders, apart from other new homes. Ideally, customers will seek out and pay a premium for homes that meet the higher performance standard, which will demonstrate the market viability of high-performance, all-electric homes. Inducing this demand will bring other builders to the marketplace and jumpstart high-performance, all-electric new construction in the State.

Marketing for the revised Residential New Home Construction product will require a dedicated campaign. Specific channels and collateral will be identified as part of the Company designing that campaign.

The Company's third-party implementer will engage in outreach activities with participants and stakeholders. The outreach objectives are intended to maintain good working relationships with builders, ensuring they are satisfied with the product offering and to provide education and training support where needed.

The third-party implementer will facilitate training to program builders on the product requirements. These activities are expected to encourage energy-efficient building practices resulting in increased beneficial electrification and energy savings. The Company is seeking partnerships with national organizations to extend the impact that energy efficiency measure implementation can have on market value of homes.

To support building code compliance, the Company will continue and improve its one-on-one support for local officials, marketing materials available through various channels, and trainings designed to support awareness and implementation.

E. Product-Specific Policies

This product currently applies to builders of residential single-family buildings, small multifamily buildings and townhomes with year-round electric space conditioning and water heat from Public Service. Structures that have common conditioned space such as hallways and elevator shafts are not eligible to participate in the product. Additional product requirements are:

1. The third-party implementer will model each home.
2. All references to code minimum or reference home are based on the Colorado Model Electric Ready and Solar Ready Code established on June 1, 2023
3. Builders must meet all performance criteria to qualify for a rebate. Homes meeting some or most of the requirements will not qualify.
4. Energy and beneficial electrification savings will be calculated using OpenStudio.
5. Energy and beneficial electrification savings will be determined by three distinct calculations.
    a. Building envelope savings
        i. HVAC systems between the reference home and the as-built home will be set to equal, both code-minimum and split fuel.
        ii. The energy model will compare the code-minimum reference building envelope to the as-built building envelope. The delta between the as-built gas consumption and the reference home gas consumption will be attributed to beneficial electrification. The delta between the as-built electric consumption and the reference home electric consumption will be attributed to energy efficiency.
    b. Fuel switching savings
        i. The building envelope for the reference home and the as-built home will be set to equal, using the values of the as-built home.
        ii. The energy model will compare the energy consumption of code-minimum, split fuel HVAC and gas water heater to code-minimum, all-electric HVAC and electric water heater. The gas savings that result from the equipment swaps will be attributed to beneficial electrification.
    c. Efficient mechanicals savings
        i. The envelope for the reference home and as-built home will be set to equal, using the values of the as-built home. The all-electric HVAC and water heat systems of the reference home will be set to code minimum.
        ii. The energy model will compare the energy consumption of the as-built HVAC and water heat systems to the code minimum HVAC and water heat systems. The resulting electric savings will be attributed to energy efficiency.
6. Homes qualifying for a product rebate are not eligible for Company's separate prescriptive rebates for the same measures (*e.g.*, Residential Heating & Cooling (including water heaters), Whole Home Efficiency, or Insulation & Air Sealing).
7. Impacts from on-site generation, energy storage, or other renewable generation systems credited to the home will not be included in energy savings calculations.

F. Stakeholder Involvement

The Company has received several ENERGY STAR® awards for this product.[54] The Company maintains ongoing relationships with the EPA and DOE in development of the Energy Star NextGen certification and with DOE on the development of the Zero Energy Ready Home version 2 ("ZERHv2") and has contributed significantly to the development of these standards via Marshall Fire Recovery.

This product receives significant interest and input from external Colorado stakeholders in preparation of Plan filings and through quarterly stakeholder meetings. This input has been valuable and taken under consideration for the product design.

The Company serves on the new home construction committee of the Consortium for Energy Efficiency, which meets regularly and works closely with the EPA. The third-party implementer attends RESNET conferences on behalf of the Company. The Company has established partnerships with national organizations like the Energy & Environmental Building Alliance, Construction Instruction, the Passive House Network, and Phius to bring top class training and events to Colorado builders.

Public Service will strive to work with and engage Colorado stakeholders, such as the Colorado Energy Office, Southwest Energy Efficiency Project, Energy Efficiency Business Coalition, the Colorado Energy Code Collaborative, the City of Denver, and others to partner when possible and continue the product's success.

The Company will issue monthly communications to current and potential program participants, providing year-to-date product updates on participation, achievement, expenditures, and other important product information as it arises. The Company's third-party implementer communicates regularly with participating energy raters and builders, including requests for their input on training and education gaps related to energy efficiency and more specifically, how the product can assist filling those gaps.

G. Rebates & Incentives

Builders with qualifying homes are eligible to receive a rebate if the home meets all requirements of the performance tier (see *Product-Specific Policies* for details).

Performance Tier	Rebate
Tier 1	$10,000
Tier 2	$12,000
Tier 3	$15,000

[54] View the ENERGY STAR Awards Archive: https://www.energystar.gov/about/awards/awards-archive.

To qualify, homes must meet all criteria set out in the performance tiers.

Requirement	Tier 1	Tier 2	Tier 3
Energy Star NextGen and ZERHv2	Must meet both	-	-
Phius or PHI qualified	-	-	May meet either performance standard
Envelope UA with respect to IECC 2021 code minimums	-	At least 10% better	At least 25% better
ENERGY STAR v6.1 ccASHP or v3.2 GSHP with address-specific Manual J	-	Required	Required
Heat Pump Water Heater	-	Required	Required
All-electric cooking	-	Required	Required
Infiltration rate (ACH50)	-	≤1.5	≤1.0
Balanced ventilation	-	Required	Required
Continuous envelope insulation	-	Optional	Required

Marshall Fire Recovery

In its continued effort to help the communities affected by the 2021 Marshall Fires, the Company will maintain incentives for high-performance housing for rebuilding customers. Upon completion of the home and following final inspection, the paperwork verifying the performance threshold is submitted to the company and the customer in the home receives the rebate. To qualify, a home must be built on a premise that was once occupied by a home that was a total loss in the Marshall Fire. The Company has a comprehensive list of eligible premises and is working actively with local officials to double check eligibility. Customers qualify for one of the incentives below. Homes that meet multiple performance criteria qualify for the highest incentivized performance tier.

Customer Incentives

Building Standard	Rebuilding Customer	New Resident
Permitted and built to IECC 2021	$7,500	N/A
ENERGY STAR® version 3.2	$10,000	$1,250
Department of Energy Zero Energy Ready Homes version 2	$12,500	$2,500
ENERGY STAR® NextGen	$17,500	$5,000
Passive House (PHI or Phius compliant)	$37,500	$15,000

All Marshall Fire Recovery homes permitted prior to June 30, 2025 will be subject to 2023 Program requirements and expectations.

Rebuilding customers are defined as customers who, prior to the Marshall Fire, owned a premise that was destroyed in the Fire and take possession of a new home on a premise that was destroyed by the Fire. The incentives are paid directly to the customer.

School Education Kits

A. Description

The School Education Kits product offers a multi-component kit that combines classroom activities and in-home projects to teach students and parents about energy and water conservation. The kits include energy efficiency and water conservation measures for students to install in their home. The primary School Kits product is targeted for fifth or sixth grade students, with a secondary Innovation Kits product targeted for high school students, in Public Service's electric and natural gas service territory. The Company works with a third-party implementer to implement this product. The third-party implementer will recruit and train teachers, provide associated educational materials, and track participation by the students and teachers.

Along with various classroom materials, each School Kit participant receives a kit containing the following:

- LED bulbs;
- High Efficiency Showerhead;
- Kitchen Faucet Aerator;
- Bathroom Faucet Aerator;
- LED Night Light;
- Furnace Filter Whistle;
- Digital Water / Air Thermometer; and
- Parent Evaluation Card.

Each Innovation Kit participant receives a kit containing the following:

- LED bulbs;
- High Efficiency Showerhead;
- Bathroom Faucet Aerator;
- Advanced Power Strip;
- LED Night Light; and
- Digital Water / Air Thermometer.

This product has many advantages. It enables an educational product to have direct impacts on energy conservation, helps build awareness of energy conservation among children, and can impact customers at all income levels. Similar products are offered in the Company's New Mexico and Minnesota service territories.

The Company will work with the third-party implementer to provide several "bonus" kits. These bonus kits will contain a variety of specialty LED light bulbs, which will provide customers an

opportunity to conserve more energy in additional rooms in their homes and will also allow the Company to evaluate new items for potential inclusion in School Kits in the future.

B. Forecasts, Participants & Budgets

Forecasts and Participants

School enrollment data has identified approximately 58,000 students in the service territory served by the Company. Historical data indicated that approximately 71% of teachers offered participation in the product choose to participate. School districts within the electric and gas territory served by the Company are eligible to participate. Participation forecasts for School Kits are verified by market research conducted by the product vendor.

Budgets

Kit costs are all-inclusive, made up of not only the kit items but also the curriculum support materials for the teacher, the pre- and post-surveys, teacher incentives, marketing and outreach to teachers, and third-party implementer administrative cost and website support. The product budget was developed based on participation forecasts and the cost per kit. Internal labor and administration costs have been added to the budget. M&V of installation will be conducted by the third-party implementer and those costs are included in the kit cost as well.

C. Application Process

Teachers may enroll through various means (*i.e.*, phone, email, direct mail, or *via* the website). If the response to enrollment calls is insufficient, the third-party implementer will redesign the marketing materials and/or offer incentives to teachers to participate. Examples of incentives may be gift cards to select retailers.

Upon enrollment, the teachers indicate to the third-party implementer the time during the school year at which they would like to use the product materials and will subsequently provide enrollment/participant numbers. The third-party implementer will send the teachers the School Education Kit materials in advance of the selected product date. Third-party implementer staff will remain in contact with the teachers via phone, email, and mail at various times throughout the product to provide support for the teachers and to request return of audit forms. Participants are provided with a toll-free number to call if they need help.

The Company receives the results from participating schools in a summary report from the third-party implementer at the end of each school semester.

D. Marketing Objectives & Strategies

The third-party implementer will manage all aspects of marketing and outreach for the product, including:

- Identifying the schools that are within the Company's service territory and determining the approximate number of eligible teachers and students;

- Sending out customized marketing materials to help enroll the classrooms. These materials explain the product, and that it is offered free of charge to their classroom thanks to the sponsoring agency (the Company);
- The third-party implementer will work with the Company to determine the eligibility of interested schools.

E. Product-Specific Policies

Only those schools that participate in the product can distribute the School Education Kits. All kits must come directly from the Company's third-party implementer.

F. Stakeholder Involvement

In the past the Company has worked with the third-party implementer to conduct focus groups to gather feedback around the kits and the associated classroom materials.

G. Rebates & Incentives

The Company will fund 100% of the cost of the School Education Kits. Teachers may be offered an incentive to participate if enrollment is slow, or an incentive may be offered to encourage completion of student installation surveys. Examples of incentives include gift cards to select retailers for teachers or energy-themed toys for students.

Whole Home Efficiency[55]

A. Description

The Whole Home Efficiency product is targeted toward existing single-family homes in need of multiple energy efficiency improvements. By providing these customers with rebate incentives, the Company can incorporate a bundled, whole home approach to energy efficiency. Whole Home Efficiency is available to residential Xcel Energy account holders with combination electric and natural gas, electric only, or gas only service. Eligibility is dependent on the type of equipment installed. The program also offers rebates including potential bonus rebates to offset upfront project costs, and independent verification of the improvements after completion. Due to the emphasis on weatherization measures along with the inclusion of beneficial electrification measures and advisory services, the program is well suited to providing a potential pathway for those customers who wish to fully electrify their home.

The concept of the product is to provide the customer with one-stop for all their home efficiency needs. This comprehensive approach requires an energy audit as a prerequisite which is then used to generate a list of recommendations. The customer may choose to complete this prerequisite through the Home Energy Audit product or a Home Energy Squad Plus visit. The contractor, who may also be the auditor, reviews the recommended improvements and completes the work. Some projects may receive an independent verification of the improvements after completion if a Quality Control inspection is performed. The contractor and homeowner may also request advice on recommended upgrades and rebates from the Energy Advising service offered through the Home Energy Audit product. Since this product requires an audit and deeper engagement from the customer, advanced meter interval data would greatly enhance the conversation and allow auditors to give customers an even better analysis of the energy usage within their home.

The product relies on a network of contractors to deliver the improvements to customers. Participating contractors must complete the appropriate contractor trainings depending on the services they offer. These trainings provide contractors with information on the product components, process, and diagnostic testing required as part of the efficient measure installations. All participating contractors must become a participating trade partner within Whole Home Efficiency before providing installations for participants in the product. A random sample of 10% of the contractor's jobs will be inspected and verified. Once contractors have completed all necessary trainings and signed the agreement, they will be included on the approved contractor list, which is included in the customer packet and on the Company's website.[56]

B. Forecasts, Participants & Budgets

Forecasts and Participants

The product forecasts were developed based on the 2022 product results and the Company's forecasted assumptions for increased participation as a result of the product redesign.

[55]Changes to product write-up introduced via the 60-day notice filed June 30th, 2023. https://www.xcelenergy.com/company/rates_and_regulations/filings/colorado_demand-side_management.

[56]www.xcelenergy.com/cotrades.

Budgets
The budget for this product is based on the 2022 expenditures and includes costs for third-party implementation, software, measurement and verification inspections, trade incentive rebates, and minimal product promotion.

C. Application Process

Customers interested in participating in Whole Home Efficiency must first complete a Home Energy Audit with blower door test or a Home Energy Squad Plus visit. The customer will be provided information on the Whole Home Efficiency product, tying the specific product requirements into the audit recommendations. The customer may then sign up for Whole Home Efficiency through their auditor at the time of the audit or any time thereafter using the online signup form. The customer will have two years from the Whole Home Efficiency enrollment date to complete the equipment installs and submit applications for rebates. Rebate applications can be submitted after each individual improvement is made to the home. After three qualifying measures are completed within the two-year time frame and applied for, the recipient will also receive the bonus for completing the program.

The Whole Home Efficiency product information, approved contractor list, and signup form are on the Company's website. Customers can only receive applications through their registered and approved contractor. Customers may also contact the Residential Customer Care center to request product information or guidance on how to obtain rebates.

D. Marketing Objectives & Strategies

The Company will provide product information through multiple channels and implement cost effective marketing tactics as applicable. The Company will also provide Whole Home Efficiency information to the Customer Education team to promote at several community events throughout the year. Trade partners may also be incentivized to identify participants that may not be aware of the "whole house option" through Whole Home Efficiency.

Other products such as the Company's Home Energy Audit product and Home Energy Squad Plus offering will offer information on Whole Home Efficiency. The Company will monitor product participation monthly and implement additional marketing tactics, if necessary, to achieve the year-end forecast.

In addition, the Company will attempt to utilize the trade partners who have been trained and contracted to deliver this product to customers. This is viewed as the most important marketing channel for building awareness and participation in the product. As a result, the Company is offering incentives to participating installation contractors designed to increase the number of projects performed. These incentives provide contractors with additional motivation to promote the Whole Home Efficiency product. The program implementer is responsible for program promotion support, sign-ups, customer follow-up, verification visits, paperwork administration, contractor management and program tracking. The Company is also exploring targeted marketing by collaborating with communities in Xcel Energy's Partners in Energy program.

E. Product-Specific Policies

The Whole Home Efficiency product leverages the Company's Home Energy Audit and Home Energy Squad Plus offerings, requiring an advanced in-home blower door audit as a prerequisite to product participation. Customers are eligible for a Home Energy Audit every two years. The Company will provide the customer a list of contractors participating in the product; however, the Company does not guarantee the contractor's expertise or warrant any of the products or services, nor is one contractor promoted over another. The Company shall have no liability for contractor work or negligence. After the customer completes the audit and meets the product eligibility requirements, the customer may sign up to participate in Whole Home Efficiency.

Customers will receive the standard prescriptive rebate for all installed measures, with the exception of insulation product envelope measures. Incentives for building envelope (air sealing and insulation) performance measures will be based on the deemed energy savings comparing pre and post measure installation building envelope conditions and are based on savings achieved. If a customer installs three or more qualifying measures, the customer will receive an additional bonus rebate on each measure completed within the two-year time period. The bonus rebate is a one-time offer for each measure completed.[57] The Company will not rebate pre-existing efficient equipment. Self-installations or installations done by non-registered contractors do not qualify for rebates.

The Company is looking into ways to provide a more comprehensive experience for our residential customers that simplifies the process of installing capital intensive energy efficient equipment. This may include an end-to-end solution where the customer chooses from any, or all, of the following as applicable:

- Advice and analysis of the available equipment options
- Financing
- Assistance with choosing qualified contractors

F. Stakeholder Involvement

The Company periodically meets with the Cities of Denver, Boulder, Fort Collins, Greeley, and Colorado Springs, the Center for Resource Conservation, the Platte River Valley Authority, the Colorado Energy Office, the DOE, Electric & Gas Industries Association, SWEEP, and the EEBC for product feedback. The Company plans to continue meeting with these organizations, and other stakeholders, for feedback to improve the product.

G. Rebates & Incentives

Whole Home Efficiency product rebates are prescriptive, with the exception of the attic insulation product envelope measure and based on the specific measures installed. Incentives for attic insulation will be based on the deemed energy savings comparing pre and post building envelope conditions and are based on savings achieved. The rebate amounts and eligibility requirements

[57]Qualifying equipment is subject to change and customer must participate under current product rules designated by the current year in which the install the additional measures.

will be communicated through the Whole Home Efficiency collateral including the rebate application.

Additionally, the Company will offer a bonus rebate of $600 for customers who install insulation and air sealing first and then install a Residential Heating and Cooling program rebate qualifying heat pump within two years of installation of the insulation and within two years of Whole Home Efficiency program enrollment. The insulation must qualify for the requirements of the Company's Insulation and Air Sealing program. Providing this bonus and requiring the completion of the measures in this order promotes best practices for minimizing the heating load of the home, which minimizes upfront costs and bill impacts for the customer, as well as saving energy and peak demand for the utility.

Income Qualified Program

A. Description

The IQ Program includes Public Service's products to promote energy efficiency, beneficial electrification, energy awareness and behavior change targeted to income-qualified customers. This program represents an unprecedented level of commitment to driving gas and electric energy efficiency for IQ customers, as well as tools and resources that can be leveraged to support other underserved markets. The Company recognizes that income qualified products offer a unique opportunity to both substantially improve the efficiency with which customers use energy and provide other non-energy related benefits like health, safety, and comfort. Reductions in IQ customers' utility bills can have a significant, beneficial effect on household income as compared to market rate customers because a larger percentage of income qualified customer's income is spent on energy.

In addition to the four products included in the 2024-2026 DSM & BE Plan, we have expanded our offering to include a tiered program that provides services broadly to disproportionately impacted communities ("DIC"), with services added at each level, with the intent of delivering the greatest level of resources to those with the greatest need and who will realize the greatest benefit. It is intended to provide additional channels for customers to access energy resources and provides an additional platform to broadly reach the IQ community while delivering resources to other segments of underserved markets. This product complements those already in place that deliver services to the IQ market through existing IQ market service providers and leverages resources already in place to serve this customer group. The Company has also added a new construction product designed to drive increased access to ultra-high performing all-electric single-family housing for income qualified customers. This product will also provide the building trade training and experience in construction of this type of home that will benefit not only the IQ market but the broader residential customer base. Finally, we have added a program that packages our Home Energy Squad product for the income qualified market. It will be marketed through the tiered program described above and will provide audit services and the installation of energy-saving measures.

This portfolio of products represents the Company's work to develop opportunities to expand our offerings to a broader IQ market and incorporate input from stakeholders on how best to deliver resources to this group. In addition to new delivery channels for rebates to drive installation of efficient equipment there will be expanded outreach and education for both customers and trade. The Company will deliver geo-targeted marketing campaigns to support our program in DICs and will amplify our efforts to promote cross-portfolio delivery of solutions that include IQ offerings from our bill payment assistance, renewable, and clean transportation programs. These will include not only direct outreach to our customers but promotion of our programs and services through a network of community organizations already engaged and working with our underserved markets.

Products

The IQ Program consists of the following seven products serving electric and natural gas customers:

- Energy Savings Kit
- Multi-family Weatherization
- Non-Profit
- Single-Family Weatherization
- Tiered Geographic Prequalification
- All-electric Affordable New Home Construction
- Income Qualified Home Energy Squad

The IQ product rankings are shown in Table 15 below.

Table 15: IQ Program Product Rankings[58]

2024-2026	Rank
Single-Family Weatherization	7
Tiered Geographic Prequalification	8
Energy Savings Kit	14
Non-Profit	25
Multifamily Weatherization	28
Income Qualified Home Energy Squad	29
All-Electric Affordable New Home Construction	30

B. Forecasts, Participants & Budgets

Forecasts and Participants

The Company developed participation and energy savings forecasts based on historical experience and anticipated demand for the new offerings. Participation rates were established in partnership with CEO, EOC, IQ agencies, and vendors to further refine the forecasts and budgets.

Historically Public Service relied on customers who request and qualify for energy assistance on their energy bills to determine documented eligibility. Customers applying for other benefits, such as medical, Supplemental Nutrition Assistance Program, cash assistance or other State of Colorado benefits can also apply for energy assistance through the Colorado PEAK application, providing another source of potential income-qualified energy efficiency participants. We will be working to implement alternative paths for income verification for IQ customers to enable their participation in our Tiered Geographic Prequalification product.

[58]All products in the DSM portfolio were ranked through the same process and the full results can be found in Appendix C of this Plan.

Budgets

Budgets for IQ DSM & BE product portfolio will be higher than the 2023 DSM & BE Plan due to pricing increases and expanded product offerings. Although there is an increase at the portfolio level, funding for individual programs and incentive levels have declined to accommodate budget restrictions in anticipation of expanded third party resources. The DSM & BE Plan is consistent with Commission guidance received in Decision No. C23-0413[59] as well as the BE minimum spend/budget requirements outlined in SB 21-246.

Table 16a: 2024 Electric IQ Program Budgets and Forecasts

2024	Electric Budget	Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Income Qualified Program						
All-Electric Affordable New Home Construction	$203,499	0	0	N/A	-$203,499	N/A
Energy Savings Kit	$417,648	224	2,528,633	4,310	$1,227,525	3.15
Income Qualified Home Energy Squad	$1,098,049	151	883,378	1,533	-$282,471	0.76
Multifamily Weatherization	$913,329	386	2,230,925	4,289	-$512,787	0.84
Non-Profit	$627,139	407	1,640,236	3,149	$389,723	1.20
Single-Family Weatherization	$3,282,187	2,097	15,228,529	31,140	$11,079,787	2.97
Tiered Geographic Prequalification	$2,096,140	1,911	15,002,399	30,724	$10,932,043	3.85
Income Qualified Program Total	**$8,637,992**	**5,176**	**37,514,099**	**75,146**	**$22,630,321**	**2.37**

Table 16b: 2024 Natural Gas IQ Program Budgets and Forecasts

2024	Gas Budget	Net Annual Dth Savings	Net Targeted Peak Dth/hr Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	mTRC Test Net Benefits (WACC)	Gas mTRC Test Ratio
Income Qualified Program								
All-Electric Affordable New Home Construction	$25,218	0	0.0	0	N/A	N/A	-$25,218	N/A
Energy Savings Kit	$161,906	7,559	0.7	46,687	3,958	21.74	$1,289,050	7.72
Income Qualified Home Energy Squad	$527,502	5,695	0.3	10,796	3,510	19.28	$266,151	1.46
Multifamily Weatherization	$271,762	10,104	6.9	37,181	11,618	63.83	$1,203,799	2.03
Non-Profit	$298,494	10,177	7.1	34,093	12,572	69.06	$1,550,416	2.78
Single-Family Weatherization	$5,014,219	60,060	23.3	11,978	55,690	305.94	$4,664,808	1.48
Tiered Geographic Prequalification	$1,631,890	24,860	8.3	15,234	22,194	121.92	$1,522,019	1.45
Income Qualified Program Total	**$7,930,992**	**118,455**	**46.7**	**14,936**	**109,542**	**601.77**	**$10,471,024**	**1.66**

Table 16c: 2025 Electric IQ Program Budgets and Forecasts

2025	Electric Budget	Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Income Qualified Program						
All-Electric Affordable New Home Construction	$203,904	0	0	N/A	-$203,904	N/A
Energy Savings Kit	$418,506	224	2,528,633	3,325	$1,146,891	3.00
Income Qualified Home Energy Squad	$1,996,251	349	1,973,307	2,641	-$258,134	0.88
Multifamily Weatherization	$918,826	433	2,172,571	3,266	-$898,808	0.77
Non-Profit	$685,872	432	1,662,413	2,494	$183,911	1.08
Single-Family Weatherization	$3,354,071	2,111	15,260,654	24,724	$10,627,948	2.84
Tiered Geographic Prequalification	$2,175,251	1,922	15,024,125	24,387	$10,449,447	3.63
Income Qualified Program Total	**$9,752,681**	**5,470**	**38,621,702**	**60,835**	**$21,047,352**	**2.12**

[59] Decision No. C23-0413 at 59, ¶ 148 (mailed June 22, 2023).

Table 16d: 2025 Natural Gas IQ Program Budgets and Forecasts

2025	Gas Budget	Net Annual Dth Savings	Net Targeted Peak Dth/hr Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	mTRC Test Net Benefits (WACC)	Gas mTRC Test Ratio
Income Qualified Program								
All-Electric Affordable New Home Construction	$25,975	0	0.0	0	N/A	N/A	-$25,975	N/A
Energy Savings Kit	$162,551	7,559	0.7	46,502	3,958	21.74	$1,308,404	7.80
Income Qualified Home Energy Squad	$1,015,962	12,393	0.7	12,199	7,519	41.30	$769,087	1.70
Multifamily Weatherization	$330,056	12,903	8.8	39,094	14,427	79.26	$1,519,709	1.98
Non-Profit	$336,332	13,004	9.4	38,663	16,636	91.39	$2,206,358	3.09
Single-Family Weatherization	$5,003,576	60,060	23.3	12,003	55,690	305.94	$4,958,765	1.51
Tiered Geographic Prequalification	$1,976,256	29,862	10.1	15,110	27,360	150.31	$1,913,840	1.45
Income Qualified Program Total	**$8,850,708**	**135,781**	**52.9**	**15,341**	**125,590**	**689.93**	**$12,650,189**	**1.71**

Table 16e: 2026 Electric IQ Program Budgets and Forecasts

2026	Electric Budget	Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Income Qualified Program						
All-Electric Affordable New Home Construction	$512,709	35	126,111	160	-$278,192	0.69
Energy Savings Kit	$419,389	224	2,528,633	2,362	$1,059,191	2.85
Income Qualified Home Energy Squad	$2,462,581	462	2,706,748	2,614	-$253,825	0.91
Multifamily Weatherization	$1,383,603	560	2,287,487	2,536	-$1,995,891	0.65
Non-Profit	$846,009	480	1,706,363	1,885	-$233,378	0.92
Single-Family Weatherization	$3,404,759	2,125	15,293,617	18,555	$10,171,673	2.73
Tiered Geographic Prequalification	$2,203,783	1,933	15,041,650	18,296	$10,000,227	3.46
Income Qualified Program Total	**$11,232,834**	**5,819**	**39,690,608**	**46,407**	**$18,469,806**	**1.81**

Table 16f: 2026 Natural Gas IQ Program Budgets and Forecasts

2026	Gas Budget	Net Annual Dth Savings	Net Targeted Peak Dth/hr Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	mTRC Test Net Benefits (WACC)	Gas mTRC Test Ratio
Income Qualified Program								
All-Electric Affordable New Home Construction	$26,754	0	0.0	0	N/A	N/A	-$26,754	N/A
Energy Savings Kit	$163,215	7,559	0.7	46,313	3,958	21.74	$1,279,172	7.62
Income Qualified Home Energy Squad	$1,200,303	14,225	0.9	11,851	8,610	47.30	$809,094	1.63
Multifamily Weatherization	$380,574	15,298	10.3	40,197	16,805	92.32	$1,699,833	1.90
Non-Profit	$370,276	15,493	11.0	41,843	19,859	109.09	$2,600,031	3.13
Single-Family Weatherization	$5,052,475	60,060	23.3	11,887	55,690	305.94	$4,792,217	1.49
Tiered Geographic Prequalification	$1,866,754	25,906	8.5	13,878	24,377	133.92	$1,478,137	1.37
Income Qualified Program Total	**$9,060,352**	**138,541**	**54.7**	**15,291**	**129,298**	**710.31**	**$12,631,730**	**1.69**

C. Application Process

Application processes vary by product. See individual product summaries following this overview for more information.

D. Marketing Objectives & Strategies

The IQ portfolio aims to educate income qualified customers on the importance of and value provided by energy efficiency. Messaging is being expanded to include beneficial electrification with an emphasis on the potential impacts to the overall cost of energy being delivered and opportunities to manage energy usage to minimize your electric bill. To help further reduce carbon emissions, lower customer costs, and support the efficient use of the power grid, the IQ Program

will engage with implementers, stakeholders, and industry partners to promote the electrification of end uses like space heating, water heating, and other applications. The products in this program will incorporate learnings from the BE pilot and the Tiered Geographic Prequalification pilot to optimize both the mix of measures delivered as well as the tactics and vehicles used to communicate with our IQ customers.

The Company will work with IQ providers, cities/counties, and other community organizations to promote all available services, including Percentage of Income Payment Plan enrollment and renewable offerings. Marketing and promotion activities will occur primarily through partners, community events, and direct marketing vehicles, with collateral material developed primarily by Public Service. Xcel Energy's call center agents are also trained to provide useful information with which to direct potentially eligible customers to participate in the program's products.

E. Program-Level Policies

Customers participating in the Energy Savings Kit and Single-Family Weatherization products must purchase retail electricity or gas from Public Service on a residential tariff. Participants in the Multifamily Weatherization product must manage or own multi-family buildings whose units are a minimum 66% occupied by customers identified as income qualified per product guidelines. Non-Profit participants must purchase electric or retail gas service from Public Service. Specific products within the Program may have different eligibility requirements depending on the services offered, funding partners or customers served.

The Company defined all-electric, electric-only, and gas-only customers as follows:

- All-electric: customers who only receive electric service from the Company and space condition and water heat with electricity;
- Electric-only: customer who receive electric service from the Company and natural gas service, or the fuel commodity, from another provider for use in space conditioning and/or water heating; and
- Gas-only: customer who receive retail natural gas service from the Company and electric service from another provider.

F. Stakeholder Involvement

Public Service received significant input and assistance in originally developing and modifying products for the IQ Program and will rely heavily on stakeholders to deliver successful product offerings. Perhaps more than any other Program, the IQ Program depends on outside expertise in the form of government agencies and non-profits to provide product benefits to customers. In this sense, Public Service is the facilitator that provides financial and energy efficiency resources to complement the services provided by state and local organizations.

The Company will continue to work with the CEO, EOC, vendors, outside consultants, Commission Staff, and local weatherization organizations to ensure that its IQ Program products are delivering promised benefits and producing effective results. These interactions will also guide mid-year performance adjustments that may be necessary to keep products on track.

G. Rebates & Incentives

IQ rebates are unique in that the incentive level historically assigned for the measures offered through DSM products covered up to 100% of the incremental capital cost. This will continue for customers who have completed an IQ application process but will rely more frequently than in the past on opportunities to co-fund projects with dollars from third party sources. There will be lower levels of incentives available for IQ customers who self-attest, and more broadly to all customers living in a DIC. Rebates based solely on geographic prequalification of living in a DIC will not be tracked as IQ spend.

All commercial prescriptive market measures, along with their associated deemed savings, will be accessible for use within the IQ programs without requiring custom analysis as a prerequisite subject to the following clarifications:

1. Such measures shall be eligible for an enhanced IQ prescriptive rebate, which at a minimum shall be the commercial market rate prescriptive rebate level plus a minimum 25 percent adder.
2. The program will include non-energy benefit adders for all prescriptive measures when considering project level cost effectiveness.
3. The program will implement a rebate structure designed for flexibility, allowing Public Service to determine suitable incentives between the minimum rebate level and up to the full cost of the measure.
4. Rebate determinations will consider available complementary funding, such as the Inflation Reduction Act, as well as programmatic savings goals and budgets.

H. Evaluation, Measurement & Verification

The specific product measurement and verification plans are included in the EM&V section of this Plan.

Energy Savings Kits

A. Description

The Energy Savings Kit product provides bundled home energy efficiency measures for IQ customers that they can install in their homes. The kits offer electricity and natural gas saving measures and customer education materials to help lower customer bills and improve the comfort and safety of their dwellings.

IQ customers will receive an offer through email, mail, or community partners informing them of their eligibility to receive a free Energy Savings Kit. The offer details the contents of the kit and savings opportunities associated with the measures. If the customer chooses to receive a kit, they will send their response to the third-party implementer. Customers will receive a kit within six to eight weeks.

The standard Energy Savings Kits will include the following electric and natural gas efficiency measures:

- Eight (8) LED bulbs
- One (1) 1.5 gpm High Efficiency Showerhead
- One (1) 1.5 gpm Kitchen Faucet Aerator
- One (1) 1.0 gpm Bathroom Faucet Aerator
- One (1) 0.5 LED Night Light

Keeping bills low is very important to IQ customers. With the installation of smart meters and the transition to the TOU rate in Colorado, the product will include a bilingual educational insert on the smart meter, the new rate, and how to save money by shifting electricity use to off-peak hours when rates are the lowest.

In addition to the standard Energy Savings Kits, the Company will continue to offer a secondary customized kit in 2024 - 2026 to provide additional measures to serve the customers' needs. Customers will have the option of ordering a certain number of additional items, including specialty lightbulbs.

Additional measures available in the customizable kits may include:

- Advanced power strips
- Weatherstripping
- Window film

B. Forecasts, Participants & Budgets

Forecasts and Participants

The Company set the participation forecast (number of kits to be sent out) based on historical product performance and participation projections. Energy savings forecasts were developed based on the installation rate of the kit measures in 2020.

Budgets

The budget is based on the number of forecasted kits. The budget includes the costs of kit contents, production, distribution, and fees from the third-party implementer. The budget also includes costs for labor, marketing materials and M&V.

C. Application Process

Customers who have received Low Income Home Energy Assistance Program ("LIHEAP") funding, any energy assistance funding (including county assistance and fuel fund assistance), Low-Income Energy Assistance Program ("LEAP") funding, or other state assistance programs and live in the Public Service electric and/or natural gas service territory will receive solicitation to apply for the kit. The third-party implementer will track customer participation so that customers do not receive more than one kit. This tracking information will also be provided to the Company on a regular basis.

D. Marketing Objectives & Strategies

The overall objective of the product is to increase and expand education among the income-qualified customers on the importance of energy efficiency and the value of acting to improve efficiency in their homes. The Company will work with local and state agencies to obtain customer mailing lists to reach more customers annually and explore opportunities to market to a broader IQ market.

E. Product-Specific Policies

To participate, customers must receive LIHEAP, LEAP, energy assistance funding (including county assistance and fuel fund assistance), other state assistance programs, or be identified as eligible using other reliable data sources.

F. Stakeholder Involvement

The Company will continue to work with local and state agencies to identify eligible customers and determine additional kit content needs.

G. Rebates & Incentives

The Company will fund 100% of the cost of the Energy Savings Kits. There will be no rebate provided to customers.

Multi-Family Weatherization

A. Description

The Multi-Family Weatherization product is designed to provide funding for a wide variety of equipment and process improvements for electric and natural gas efficiency measures, as well as beneficial electrification, in income-qualified multi-family buildings. This offering differs from the Single-Family Weatherization product in that these dwellings have common areas and potential shared equipment, greater overall square footage, more appliances, other potential energy-saving, and demand-reduction measures. The end customer or tenant is traditionally different than the landlord or property owner who makes the decision to improve the property and the financial energy savings are often not seen by those renting in the building, although they consistently benefit from the improved operations and comfort provided by the upgrades.

The product will be implemented in partnership with Energy Outreach Colorado ("EOC"). EOC works jointly with several government and non-profit partners to identify and qualify multi-family units for participation. Details of measures, rebates, reporting processes, and M&V procedures will be evaluated on a per-project basis using a detailed engineering analysis.

In addition to these measures, customer education is offered with this product. EOC staff provides educational materials, historical energy usage information, and bill analysis to these customers during the weatherization process to help them identify additional changes they can make in their day-to-day lives to further reduce energy use and demand in their building. With the installation of smart meters and the transition to the TOU rate in Colorado, the Company will work with EOC on bilingual educational efforts regarding the smart meter, new rate, and how customers may save money by shifting electricity use to off-peak hours when rates are the lowest.

B. Forecasts, Participants & Budgets

Forecasts and Participants

Participation and energy savings forecasts were developed by evaluating past project completions and information provided by EOC on anticipated participants. Participation can vary from building to building as many properties are master metered.

Budgets

Historical project costs and participation information were tracked and analyzed to develop a budget estimate. Additional consideration was made for anticipated supplemental funding from 3rd party sources, including those programs and offerings delivered as a result of the IRA. Most of the budget is allocated to electric and natural gas rebates for equipment benefiting tenants in

income qualified multi-family buildings. Other external variables contributing to costs, such as outreach, material costs and staffing, were also evaluated.

C. Application Process

To participate in the product, customers must submit an application to EOC. Applications are reviewed by EOC. Once approved a comprehensive audit is performed on the building. IQ households must comprise at least 66% of the building's total households for the building to be eligible to apply. EOC will determine which applicant locations have the greatest need for weatherization services. In some cases, if the need is very high, the application may be approved for buildings that are occupied by 50% IQ households.

D. Marketing Objectives & Strategies

The overall marketing objective is to increase education among IQ customers and building owners on the importance of energy efficiency, thereby driving product participation. Public Service will also work to educate customers on the value of taking further actions to improve efficiency and drive savings in their homes in conjunction with EOC and other low-income customer advocates.

E. Product-Specific Policies

Eligible customers for this product are building owners or property managers of multi-family housing complexes with at least 66% of the rental units occupied by IQ customers whose income is below 80% of the local area median as defined by the Colorado Housing and Finance Authority. Customers meeting the DOE Weatherization Assistance Program funding guidelines,[60] as determined by the CEO, EOC, local governments, or their agencies, are automatically deemed income eligible.

F. Stakeholder Involvement

When designing the plan, Public Service worked with EOC to determine forecasts, budgets and participation based on current pipeline and future opportunities. Public Service will continue to evaluate historical projects with EOC to determine measure implementation and needs trending.

[1] http://energy.gov/eere/wipo/where-apply-weatherization-assistance.

G. Rebates & Incentives

The product does not provide a rebate to customers, but rather provides project funding in the form of grants. The estimated average incentive amounts for electric and natural gas energy improvements can be found in Appendix H: Technical Reference Manual.

Public Service will evaluate each project on a custom basis to determine funding levels using a detailed engineering analysis. Engineers review the project information to determine the projected energy savings, demand reduction, benefit/cost ratio and payback. A mTRC greater than 1.0 at the project level will be required even if individual measures proposed for the project have a mTRC below 1.0. Testing, study, engineering, and project management fees may be included in the project costs.

Non-Profit

A. Description

The Non-Profit product is designed to provide funding on a wide variety of equipment and process improvements for electric and natural gas efficiency measures to qualified non-profit organizations within the Company's Electric and Natural Gas service territory. The product's focus is on helping organizations that serve IQ individuals, such as shelters, safe houses, and residential treatment centers.

The product will be implemented in partnership with EOC. EOC utilizes funding through their existing Non-Profit Energy Efficiency Program grants targeting non-profits. EOC identifies and qualifies non-profit facilities for the product. Details of energy-saving, beneficial electrification and/or demand-reduction measures, rebates, reporting processes, and M&V procedures will be evaluated on a per project basis using a detailed engineering analysis.

In addition to these measures, customer education is included with this product. EOC staff provides educational materials, historical energy usage information, and bill analysis to these customers during the weatherization process to help them identify additional changes they can make in their day-to-day lives to further reduce energy use and demand in their facility. With the installation of smart meters and the transition to the TOU rate in Colorado, the Company will continue to work with EOC on bilingual educational efforts regarding any applicable information for the smart meter, TOU rate, and how customers may save money by shifting electricity use to off-peak hours when rates are the lowest.

B. Forecasts, Participants & Budgets

Forecasts and Participants

Participation and energy savings forecasts were developed by evaluating past project completions and information provided by EOC on anticipated participants.

Budgets

Historical costs and participation information were tracked and analyzed to develop a budget estimate. Additional consideration was made for anticipated supplemental funding from third party sources, including those programs and offerings delivered as a result of the IRA. Most of the budget is allocated to electric and natural gas rebates benefiting non-profit facilities. Other external variables contributing to costs, such as outreach, material costs, and staffing were also evaluated.

C. Application Process

Customers can learn about the product through information that is available on EOC's website[61] and Xcel Energy's website.[62] EOC reaches out to those customers who may not be aware of funding and educates them on the benefits of an energy-efficient retrofit improvement and beneficial electrification. Customers who are interested in the product can apply online through the EOC website. The online application must be completed and includes a description of existing equipment in the facility, confirmation of building ownership/facility usage, proof that the building is registered with the Colorado Secretary of State as a 501(c)(3) and documentation showing the financial stability of the organization. A committee made up of non-profit industry leaders then determines the applicant's needs and how EOC and Public Service funding can help.

D. Marketing Objectives & Strategies

The overall marketing objective is to increase and expand education among IQ customers and building owners on the importance and benefits of energy efficiency and beneficial electrification, thereby driving product participation. Public Service will also work to educate customers on the value of taking further actions to improve efficiency at the facility. EOC markets the product through various channels, including communications through non-profit association literature, community resource center announcements, and local IQ foundations.

E. Product-Specific Policies

To receive funding, the following customer and facility eligibility requirements must be met:

- Customers must receive electricity and/or natural gas from Public Service;
- Customer must operate the non-profit facility on a property they own and for which they pay energy bills, or have a long-term lease that requires only non-profits to occupy the space with plans to be in current location for at least the next ten years; and
- The property must provide services to vulnerable populations including but not limited to: transitional housing, homeless shelters, affordable housing, domestic violence shelters and day shelters, organizations that provide services (substance abuse, health and mental health services, child care, education and/or emergency services) for special needs populations, including IQ families, the disabled, senior, and youth communities.

In addition, the following project requirements must be met:

- Be recommended by an independent energy auditor based on energy conservation calculations that are available for review; and
- Reduce the use of energy or demand (electricity, natural gas, or both) provided by Public Service to the facility.

[61] energyoutreach.org/nonprofit-energy-efficiency.

[62] xcelenergy.com/business/cost-savings/income-qualified-multi-family-nonprofits.

Participating income qualified agencies must agree to the following:

- Installation of an energy use monitoring and reporting system;
- A comprehensive energy audit by a qualified entity;
- Set forecast energy use goals for each facility;
- Consider installation of all qualifying efficiency measures;
- Engage appropriate contractors and manage the installation and completion of efficiency measures;
- Provide a summary project report at the completion of the installations;
- Provide all insurance and legal protections requested by Public Service; and
- Annually review the energy use of the retrofitted facility and formulate a plan for further improvement using available and appropriate assistance.

F. Stakeholder Involvement

When designing the plan, Public Service worked with EOC to determine appropriate product forecasts, budgets and participation based on current pipeline and opportunities. Public Service will continue to evaluate historical projects with EOC to determine specific measure trends.

G. Rebates & Incentives

The product does not provide a rebate to customers, but rather provides project funding in the form of grants. The estimated average incentive amounts for the energy improvements can be found in Appendix H: Technical Reference Manual.

Public Service will evaluate each project on a custom basis to determine funding levels using a detailed engineering analysis. Engineers review the project information to determine the projected energy savings, demand reduction, benefit/cost ratio and payback. A mTRC greater than 1.0 at the project level will be required even if individual measures proposed for the project have an mTRC below 1.0. Testing, engineering, and project management fees may be included in the project costs.

Single-Family Weatherization

A. Description

The Single-Family Weatherization product targets IQ customers who are receiving assistance on their energy bills. The product works with weatherization agencies and contractors around the state to provide this at-risk customer segment with free or low-cost home audits and electric and/or natural gas efficiency measures, as well as equipment to support beneficial electrification when appropriate. Public Service offers significant rebates toward the incremental cost of these upgrades including:

Natural Gas Measures

- Efficient furnace
- Wall insulation
- Attic insulation
- Crawl space insulation
- Water heaters
- Storm windows
- 1.5 GPM showerheads
- 1.5 GPM aerators
- 0.5 GPM aerators
- Air Sealing
- Thermostat Installation and Programming
- Other cost-effective measures to be determined

Electric Measures

- Refrigerator replacements
- LEDs (A-19 and BR-30 bulbs)
- Cooling savings for building shell measures
- Water heater blanket
- Evaporative Coolers
- Heat Pump Water Heaters
- Air Source, Mini-Split Heat Pumps
- Other cost-effective measures to be determined

In addition to these measures, a major focus of this product is customer education. Auditors will provide educational materials, historical energy usage information, and bill analysis to these customers during the weatherization process to help them identify additional changes they can make in their day-to-day lives to further reduce energy use and demand in their home. Furthermore, the implementer will offer educational workshops in collaboration with local housing authorities, and other engaged community organizations.

Keeping bills low is very important to serving IQ customers. Savings can be driven through both equipment selection and operation. With the installation of smart meters and the transition to the TOU rate in Colorado, the Company will continue to work with the third-party implementer on

bilingual educational efforts regarding the smart meter, the TOU rate, and how customers may save money by shifting electricity use to off-peak hours when rates are the lowest.

The Single-Family Weatherization product is delivered in partnership with a third-party implementer. The third-party implementer will work to secure public grants and private funds to match with Public Service funds. They will also develop annual contracts with weatherization agencies in the Public Service electric and gas service territories. Processes for reporting measure detail, rebates, and M&V are managed by the third-party implementer.

B. Forecasts, Participants & Budgets

Forecasts & Participants

Energy savings and participation forecasts were established in partnership with the third-party implementer using historical product participation as a guide. Recommendations from the third-party implementer on expected workflow were also considered when developing energy savings forecasts and participation rates.

Budgets

Budgets for the product were developed based on the cost of measures installed in IQ homes. The Company also allocated funds for necessary health and safety upgrades in special situations. These funds will be used at the discretion of the third-party implementer when critical to implement efficiency upgrades and with proper documentation.

C. Application Process

Participating customers must receive residential electricity and/or natural gas from the Company and have a household income below 80% of the area median income, which varies by county. Customers will be informed of the Single-Family Weatherization product when they sign up for Colorado LEAP, among other outreach avenues. LEAP qualification is, currently, at 60% of State Median Income, while the DOE Weatherization Assistance Program allows for 200% Federal Poverty Level. Other reliable data sources may be used to determine eligibility.

Once the customer's income and energy assistance status are verified, they will be qualified by their local weatherization agency, and the third-party implementer, to receive weatherization services.

D. Marketing Objectives & Strategies

The primary marketing objective of this product is to deliver energy savings, beneficial electrification benefits and/or demand reduction, all which help IQ customers reduce energy costs and increase comfort in their homes. A secondary objective is to provide IQ customers with access to materials and workshops educating them on the importance of energy efficiency and the value of taking action to improve efficiency in their homes. The Company will work with IQ providers,

such as local weatherization agencies and community organizations, to promote available services. Customers can find information on local weatherization agencies on Xcel Energy's website.[63]

E. Product-Specific Policies

The third-party implementer will contract with subcontracted agencies to perform weatherization services. All contractors will be trained to follow BPI installation requirements for weatherization services. These contractors receive funding from the third-party product implementer and other state funding and have agreed to weatherize homes following state regulations and guidelines.

F. Stakeholder Involvement

When designing the product, the Company worked with external consultants to define energy savings measures to help customers save money on their energy bills, while also improving the comfort of their home. The product is delivered in partnership with federal, state, and nonprofit IQ weatherization organizations. The Company collaborated with EOC on the development of weatherization forecasts and budgets.

G. Rebates & Incentives

The Company will pay rebates toward the equipment and installation costs of predetermined electric and natural gas energy efficiency measures available to income-qualified, single-family customers. The Company will also pay for necessary health and safety upgrades associated with the installation of these weatherization measures which may include fixing gas leaks, updating electrical, or adding ventilation. The prescriptive rebates offered will be "up to" amounts to cover the incremental cost.

[63] https://www.xcelenergy.com/programs_and_rebates/residential_programs_and_rebates/affordable_energy/income-qualified_weatherization_program.

Tiered Geographic Prequalification

A. Description

This is a new product designed to target underserved customers and bring additional resources to provide concentrated outreach and education, as well as greater financial incentives, to these markets to drive energy-efficiency and beneficial electrification. Resources will be delivered to these customers to provide additional access and education to save energy and reduce their bills, while assuring that those most in need receive the greatest support. This will be done through a tiered program structure where the level of benefits available to a customer increases as the qualification parameters of a tier increase and the anticipated level of customer need also increases.

The product will leverage the Colorado EnviroScreen mapping tool to identify qualifying geographic areas for four incremental tiers of service.

- *Tier 4* – Customers living in a one-to-four unit residence within an area identified as a DIC.
- *Tier 3* – Customers living in a one-to-four unit residence within an area identified as a DIC that self-attest they are IQ (household income levels at or below 80% of Area Median Income ("AMI"), 60% of State Median Income ("SMI") or 200% of Federal Poverty Level ("FPL").
- *Tier 2* – Customers that don't live in a DIC but have provided documentation proving they are IQ.
- *Tier 1* – Customers that live in a DIC or a manufactured home park and have provided documentation proving they are IQ.

There is an implied fifth tier consisting of the Company's full Colorado service territory, where the market rate portfolio of products is available.

The product will include:

1. Education and outreach targeted at DICs. Messaging will not only address the product offering but also provide additional information on how to save energy through behavioral changes targeted at lowering bills. This will be delivered through multiple channels including local newsletters, community-based organizations, local faith organizations, and social media. In addition, we will leverage the Xcel Energy RED Truck initiative and expanded Company funded outreach to deliver comprehensive solutions that includes information on bill payment assistance, renewable energy, and clean transportation offerings. Materials will be delivered in multiple languages.
2. A free Home Energy Squad® Plus visit or a rebate designed to cover the cost of a home energy audit. Additional efforts will be made to assure potential safety risks in the home are identified, as well as opportunities for beneficial electrification. This will be tracked as an Income Qualified Home Energy Squad® visit for those self-attesting or providing documentation that they meet qualifying criteria.
3. Rebates for energy-efficient retrofits and beneficial electrification upgrades. Rebate levels will be higher than market rate for Tier 4, increasing to cover a greater portion of the incremental cost for Tiers 3, 2 and 1. As an alternative, customers in Tiers 1 and 2 have the option to participate in Single-Family Weatherization.

4. A pre-qualified trade network. On measures requiring professional installation, to receive the increased rebate levels the customer will need to work with a trade member who has received training on this product on potential financing options available to IQ customers and overcoming installation barriers they may find more frequently in DIC households. The trade member will be trained to assist the customer in completing the necessary rebate and encouraged to leverage the ability to assign the rebate to the trade to minimize the upfront cost of the measure installation to the end customer. There will be a trade incentive to cover the incremental cost associated with providing this additional support.
5. Additional Point of Sale incentives for energy saving measures. Incentives will parallel the tier structure and provide customers additional channels to obtain equipment. This will include online access to order easy-to-install measures at reduced prices. Additional incentives may be provided to leverage local retail in the DICs to distribute equipment.

This program will work to better leverage current Company offerings to provide underserved markets greater access while building incremental demand for services delivered to IQ homes. In addition to providing additional access to resources for the DIC/IQ markets it will ultimately lead to additional workforce with the skills to deliver and install products to these homes, as well as the remainder of the market.

B. Forecasts, Participants & Budgets

Forecasts & Participants

Energy savings and participation forecasts were established based on the equipment and market demand for Single Family Weatherization and Low-Income Kits. This product is new to the Company's IQ portfolio and will have significant outreach support in the DIC markets. Participation and rebate incentives for Tier 4 will be tracked outside of the IQ offerings.

Budgets

Budgets for the product were developed based on the historical cost of measures delivered to or installed in IQ homes, as well as expenses tied to outreach and education. Additional consideration was made for anticipated supplemental funding from third party sources, including those programs and offerings delivered as a result of the IRA.

C. Application Process

Participating customers must receive residential electricity and/or natural gas from the Company. Customers participating in Tier 4, 3, or 1, must have a premise in a DIC area. Customers participating in Tiers 3, 2, or 1, must have a household income below 80% of the area median income, which varies by county, meet LEAP qualification is, currently, at 60% of State Median Income, or qualify for the DOE Weatherization Assistance Program which allows for 200% Federal Poverty Level. Other reliable data sources may be used to determine eligibility.

If the customer's income requires formal verification to receive services (Tiers 1 and 2), they will be qualified by their local weatherization agency or a third-party implementer.

D. Marketing Objectives & Strategies

The primary marketing objective of this product is to deliver IQ and DIC customers greater access and additional opportunities to save energy and reduce demand to help lower energy costs and increase comfort in their homes. A secondary objective is to provide IQ and DIC customers with access to resources and information educating them on the importance of energy efficiency and the value of taking action to improve efficiency in their homes. The Company will work with IQ providers, and community organizations, to promote available services.

E. Product-Specific Policies

Rebates and incentives for this program will be designated to enhance services delivered to DIC while maintaining that the highest level of resources is provided to IQ customers who reside in these areas. The technologies rebated through this product will include those designated for the IQ portfolio, including gas fired appliances and residential air conditioning. Where applicable contractors will be trained to follow BPI installation requirements for weatherization services. Although contractors participating in this product need to be pre-qualified, the pre-qualification process will be open to all trade members.

F. Stakeholder Involvement

The Company incorporated stakeholder input into designing the product and will continue to solicit input on improvements as the product is launched and matures in the market. The Company anticipates continued stakeholder involvement in education and outreach, as well as delivery and design of trade training,

G. Rebates & Incentives

The Company will pay rebates toward the equipment and installation costs of predetermined electric and natural gas energy efficiency measures available to IQ, single-family customers and those customers residing in DICs. The prescriptive rebates offered will be “up to” amounts to cover a significant portion of purchase and installation cost, with the highest incentives levels reserved for qualified IQ customers (Tiers 1 and 2) where the intent is to cover the full cost of the measure. Dollars will not be available through this product for health and safety measures, although identification of potential threats will be incorporated into the home audit or HES/IQHES visit.

All-Electric Affordable New Home Construction

A. Description

This new product is designed to target home builders contributing to the affordable homes housing segment and provide significant training and financial incentives for building ultra-high performance, all-electric, affordable housing.

For affordable housing builders, this program will fully fund training to design and build homes that meet the Phius CORE[64] standard. This will be provided through two models. For non-profit affordable housing builders, the cost of training will be fully paid for by the Company. For market-rate builders interested in participating, the Company will reimburse training costs upon completion of the first home that complies with the All-electric Affordable New Home Construction program requirements.

Phius is the selected performance criteria because it will minimize the energy burden of these all-electric homes reducing the need to identify or install additional renewable energy resources to maintain bill affordability. This eliminates the potential initial cost, maintenance requirements and distribution grid impacts of adding rooftop solar. All-electric homes built to lower standards would result in higher electric operational costs which would be a disservice for the customers who will occupy these homes. It would also challenge equity considerations for income-qualified programs.

Given the significant materials costs and lead time associated with some components required for Phius, the Company proposes to provide the option to enter MOUs with participating affordable housing builders. These MOUs will allow the Company to pre-fund half of the rebate to facilitate procuring the necessary materials. The MOU will accompany a Design Certification Letter from Phius.

The Company will utilize a third-party administrator to evaluate the program requirements and energy savings in participating homes. For the purposes of consistency and simplicity, the program will be jointly administered with *Residential New Home Construction*.

B. Forecasts, Participants & Budgets

Forecasts & Participants

As a new program and given the significant training, knowledge, and implementation requirements, the Company anticipates a measured growth in this program. The first two years will consist of providing affordable housing builders with the skills to meet program requirements. The third year includes the first homes expected to participate in the program.

[64] Phius is a passive building certification, with strict requirements for insulation, building tightness, ventilation, and strategic window placement and shading. More information is available at https://www.phius.org/.

Budgets

Budgets will be driven primarily by outreach initiatives, training, and incentives. For the duration of this Plan, the first two years will be dominated by training as the Company puts effort into building up the knowledge and skills necessary to build high performance, all-electric, affordable housing. The third year includes the first homes completed to Phius requirements.

C. Application Process

Enrollment for this program will be handled by the third-party administrator. Interested builders can contact either the implementer or the Company for information. The builders will receive information on the product, the requirements that need to be met, and the education and training resources available to meet the requirements. Participating homes must have electric service from the Company.

Non-profit, 501(c)(3) builders and all market rate builders can enroll in the program. Details about which houses can participate are outlined in Product-Specific Policies

The implementer will perform field visits to verify the performance of the potential participating home. As in the market-rate program, savings will be calculated using OpenStudio.

D. Marketing Objectives & Strategies

Marketing for this program will consist of direct outreach to affordable housing builders throughout Company service territory. The objectives of this outreach will be to connect with affordable housing builders across the state to generate awareness of the new program and to advertise the training necessary for builders to meet the advanced standards.

E. Product-Specific Policies

Homes that qualify must provide all the following to the Company via its administrator.[65]

1. Design Certification Letter from Phius.
2. The Verification Report from the Certified Passive House Consultant ("CPHC") reflecting the as-built conditions and test results that demonstrate project compliance with Phius, including blower door and ventilation results.
3. A statement from the CPHC that the envelope meets the Phius hygrothermal requirements found in Appendix B of the Phius 2021 Certification guidebook.
4. A statement from the Phius Certified Verifier or Rater that the project test results, and other Phius verification requirements are met.
5. A copy of the Phius workbook listing all testing results and the as-built conditions.

The Company will provide a Phius-Certified Rater via the third-party administrator and assist throughout the projects with ensuring the proper documentation is completed and collected.

[65] This documentation is borrowed from Massachusetts code 225 CMR 22.

All home builders are eligible to participate in the All-Electric Affordable New Home Construction program.

Builders may be 501(c)(3) non-profits. Organizations that have broad community support, provide affordable home ownership or rental opportunities to income-qualified customers, provide nondiscriminatory services to recipients, can measure the impact and effectiveness of projects, and the ability to issue financial statements to demonstrate their financial stability, are allowed to participate in the program. For these affordable housing builders, all homes being built within the Company electric service territory and that meet the performance expectations will qualify.

Market rate builders can also participate in the program by partnering with an affordable housing public authority. There are no geographic requirements for these homes.

Finally, market rate builders can participate by building affordable homes in areas identified by Colorado's EnviroScreen tool as DICs. Out of an abundance of concern for contributing to gentrification and inequity, the Company may route homes to the market rate program (*Residential New Home Construction*) if the Company determines the as-built home is not intended for an income-qualified homeowner.

F. Stakeholder Involvement

The Company incorporated stakeholder input into designing the product and will continue to solicit input on improvements as the product is launched and matures in the market. The Company anticipates continued stakeholder involvement in education and outreach, as well as delivery and design of trade training,

G. Rebates & Incentives

Program rebates are estimated to cover the full incremental cost of the measures required to move from a code-built home to achieve the Phius standard.

Performance Tier	**Rebate**
Phius CORE	$30,000

Income Qualified Home Energy Squad®

A. Description

The new IQ Home Energy Squad® product is designed to target underserved customers in the Company's service territory. The product provides concentrated outreach and education aligned with the Tiered Geographic Prequalification product and will provide a critical service to participating IQ customers in providing basic energy saving measures and helping customers identify what more extensive projects need to be completed in a home to save additional energy and properly prepare to convert to electric heating technologies.

The product offers delivery and direct installation services of energy conservation measures to qualified customers who seek to improve their home's energy efficiency, increase their comfort, and lower their utility bills. There is also the ability for customers to include an energy audit. This will be delivered at no cost to the customer with the Company paying for the cost of the measures, installation, audit, and the trip charge.

The Home Energy Squad® team will install several moderate-impact, low-cost measures for customers. The product seeks to enhance customer knowledge and assist customers in overcoming barriers related to making energy improvements, including customer confusion about product choices, varying costs, and additional programs serving the IQ and DICs. The Home Energy Squad® product offers three visit types.

The Home Energy Squad® visit includes:

- LED bulbs of various types and wattages
- Installation of a new smart thermostat with enrollment in the Company's AC Rewards program
- Advanced power strips
- High efficiency showerheads
- Low flow faucet aerators for the kitchen and bathroom
- Weather-stripping of one exterior door
- Weather-stripping of one attic hatch
- Temperature assessment and setback of the water heater

The Home Energy Squad® Plus visit includes:

- All the direct install conservation measures of the Home Energy Squad visit
- An Energy Audit for diagnostic testing which may include a blower door test and infrared camera test when applicable

The Home Energy Squad® Virtual visit:

- Virtual visits are conducted via a videoconferencing tool provided by the third-party implementer, with a Home Energy Squad® technician remotely accompanying a customer on a walkthrough of their home.

- Virtual visits are intended to lead to follow-on interactions, such as an in-home installation visit from the Home Energy Squad®, a Home Energy Audit, or participation in other Company products.

In addition to the diagnostic testing and installation of energy efficient measures, the product technicians will help customers identify smart meters, answer questions regarding time-of-use rates, and access online and phone resources provided by the Company.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The product participation and savings forecasts were developed based on Colorado residential market size, historical participation in the Home Energy Squad product, and experience with similar products in the Company's other jurisdictions. The Company does anticipate a greater proportion of the home visits will be Home Energy Squad® Plus versus the market rate offering.

Budgets

Budgets were determined by evaluating vendor cost estimates and potential participation levels in Colorado. A marketing budget is included for advertising, promotion, and outreach to generate awareness and drive participation in targeted areas. Primary budget drivers are:

- *Administration* – administration costs for the third-party implementer; internal labor and administrative costs; and the installation costs associated with energy efficient measures installed in customer homes.
- *Customer Incentives* – materials costs associated with the energy efficient measures installed in customer homes.
- *Advertising and Promotion* – print, radio, broadcast, direct mail, interactive media, and event promotion.

C. Application Process

Participating customers must receive residential electricity and/or natural gas from the Company. Qualifying homes are single family homes or multiplex homes with up to 4 units with independent metering. The product will follow the Tiered Geographic Prequalification program and leverage the Colorado EnviroScreen mapping tool to identify qualifying geographic areas for four incremental tiers of service.

- *Tier 4* – Customers living in a one-to-four unit residence within an area identified as DIC. Participants and costs for this tier will be tracked with the market rate Home Energy Squad® product.
- *Tier 3* – Customers living in a one-to-four unit residence within an area identified as a DIC that self-attest they are IQ (household income levels at or below 80% of Area Median Income ("AMI"), 60% of State Median Income ("SMI") or 200% of Federal Poverty Level ("FPL").
- *Tier 2* – Customers that don't live in a DIC but have provided documentation proving they are IQ.
- *Tier 1* – Customers that live in a DIC or a manufactured home park and have provided documentation proving they are IQ.

Additional participation may come from IQ customers who do not reside in a DI Community. Qualified Customers will schedule a visit with the third-party implementer. During an in-home visit, the Home Energy Squad® technician will work directly with the customer to determine which energy-saving measures will make their home more energy efficient. The installation labor, materials costs, and trip fee are paid to the third-party implementer by the Company.

D. Marketing Objectives & Strategies

Marketing objectives will focus on building awareness and product interest in underserved communities through targeted outreach. The Company intends to utilize multiple marketing channels for this product, including bill onserts, email, event marketing, the Company website, door hangers and community outreach.

Local outreach products, such as Partners in Energy, are an important channel for building awareness and driving participation. Cross-marketing opportunities exist with other products such as Single-Family Weatherization, Energy Assistance, Budget Alerts, Home Energy Insights and School Education Kits.

This product will explore multilingual marketing collateral and marketing channels to reach the Company's customers and create awareness of the product.

E. Product-Specific Policies

The Company will connect customers with the third-party implementer to begin the product engagement.

The technical assumptions reflect those of the Home Energy Squad® program and other residential products such as Home Lighting & Recycling, Energy Efficient Showerheads, and Residential HVAC to consistently report measure costs and energy savings. Where technical assumptions from other residential products do not apply in direct install situations, direct installation-based technical assumptions will be utilized.

F. Stakeholder Involvement

The Company partners with its existing array of customer and trade stakeholders regarding product design and implementation, awareness building and ongoing product feedback.

G. Rebates & Incentives

The product is free to qualified customers meeting the Tiered Geographic Prequalification product requirements and IQ customers outside DI communities. The Company will pay the third-party implementer rebates toward the equipment and installation costs of predetermined electric and natural gas energy efficiency measures available to qualified customers. This process differs from most prescriptive rebate products where the customer submits a rebate application after equipment is installed and operational. The third-party implementer will report the installed measures to the Company, and the Company pays the implementer directly for the equipment and installation costs. Therefore, the customer does not need to submit a post-project rebate application.

Indirect Products & Services

A. Description

Indirect Products and Services support planning, analysis, administration, and evaluation of products with direct savings impacts as well as development and implementation of the Plan. Most of these indirect products and services are not independently evaluated for cost-effectiveness except for pilots with measured savings impacts that are being assessed for potential future transition to a product—those do undergo a cost-benefit evaluation. Pilot implementation and evaluation approaches are fully discussed in each written pilot summary, following the Product Development description. All the Indirect Products and Services costs are included in the overall DSM portfolio cost-benefit analysis.

Indirect Products and Services play a critical role in ensuring that the overall DSM portfolio is effectively researched, managed, and operated. These products and services provide valuable information and support for the direct impact products and offer innovative approaches for inciting change in the DSM marketplace. These innovative approaches, manifested in education and market transformation products, may not produce readily quantifiable energy and demand savings, but still play a very important role in shifting markets and attitudes to be more energy efficiency and demand reduction oriented.

There are two main areas of Indirect Products & Services:

1. Education/Market Transformation and
2. Planning and Research.

Education/Market Transformation

The Company offers seven customer-facing education and market transformation products, including: Business Education, Business Energy Analysis, Consumer Education, Energy Benchmarking, the Home Energy Audit, and Partners in Energy. The definition of market transformation in the Public Service gas DSM Rulemaking is:

> *…a strategy for influencing the adoption of new techniques or technologies by consumers. The objective is to overcome barriers within a market through coordinating tactics such as education, training, product demonstration and marketing, often conducted in concert with rebates or other financial incentives.*[66]

Planning and Research

The Company will operate four internal DSM services: Product Evaluations, Measurement, and Verification; Market Research; Planning & Administration; and Product Development.

[66]Rule 4751(n).

B. Forecasts, Participants & Budgets

Forecasts and Participants

Most indirect products and services do not have savings or participation forecasts, except for some pilots, whose energy savings and participation forecasts are described within each pilot's written summary which follows this section.

Budgets

Because the majority of Indirect Products and Services do not directly produce energy and demand savings and, therefore, may reduce the overall cost-effectiveness of the DSM & BE portfolio, there is a natural tendency to limit activity and spending in this area to only the most essential elements. The Company will not limit its spending in this area to a specific percentage of the overall portfolio but will remain vigilant about limiting the Indirect Products and Services overall size.

The budget consists primarily of labor, educational material, and study costs. Most studies are conducted by outside experts, generally selected through a competitive bid process. Tables 17a through 17b provide the overall Indirect products and services energy savings and participation forecasts, if applicable, and budgets, broken out by each product/service.

Table 17a: 2024 Electric Indirect Products & Services Budgets and Forecasts

2024	Electric Budget	Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Indirect Products & Services						
Education/Market Transformation						
Business Education	$186,341	0	0	0	$0	
Business Energy Analysis	$728,857	0	0	0	$0	
Community Energy Reporting	$37,052	0	0	0	$0	
Consumer Education	$1,074,955	0	0	0	$0	
Energy Benchmarking	$158,777	0	0	0	$0	
Home Energy Audit	$599,959	0	0	0	$0	
Partners in Energy	$1,472,060	0	0	0	$0	
Education/Market Transformation Total	**$4,258,003**	**0**	**0**	**0**	$0	
Planning and Research						
EE Market Research	$650,818	0	0	0	$0	
EE Evaluation, Measurement & Verification	$1,215,568	0	0	0	$0	
EE Planning & Administration	$646,298	0	0	0	$0	
EE Product Development	$925,014	0	0	0	$0	
EE Product Development Total	**$925,014**	**0**	**0**	**0**	**$0**	
EE Planning and Research Total	**$3,437,698**	**0**	**0**	**0**	**$0**	
EE Indirect Products & Services Total	**$7,695,700**	**0**	**0**	**0**	**$0**	

Table 17b: 2024 Natural Gas Indirect Products & Services Budgets and Forecasts

2024	Gas Budget	Net Annual Dth Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	mTRC Test Net Benefits (WACC)	Gas mTRC Test Ratio
Indirect Products & Services							
Education/Market Transformation							
Business Education	$25,805	0	0	0	0.00	$0	
Business Energy Analysis	$29,880	0	0	0	0.00	$0	
Community Energy Reporting	$38,258	0	0	0	0.00	$0	
Consumer Education	$77,661	0	0	0	0.00	$0	
Energy Benchmarking	$46,959	0	0	0	0.00	$0	
Home Energy Audit	$629,622	0	0	0	0.00	$0	
Partners in Energy	$167,491	0	0	0	0.00	$0	
Education/Market Transformation Total	**$1,015,676**	**0**	**0**	**0**	**0.00**	**$0**	
Planning and Research							
EE Market Research	$320,617	0	0	0	0.00	$0	
EE Evaluation, Measurement & Verification	$376,476	0	0	0	0.00	$0	
EE Planning & Administration	$145,572	0	0	0	0.00	$0	
EE Product Development	$449,199	0	0	0	0.00	$0	
EE Product Development Total	**$449,199**	**0**	**0**	**0**	**0.00**	**$0**	
EE Planning and Research Total	**$1,291,863**	**0**	**0**	**0**	**0.00**	**$0**	
EE Indirect Products & Services Total	**$2,307,539**	**0**	**0**	**0**	**0.00**	**$0**	

Table 17c: 2025 Electric Indirect Products & Services Budgets and Forecasts

2025	Electric Budget	Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Indirect Products & Services						
Education/Market Transformation						
Business Education	$197,714	0	0	0	$0	
Business Energy Analysis	$730,741	0	0	0	$0	
Community Energy Reporting	$36,967	0	0	0	$0	
Consumer Education	$1,173,552	0	0	0	$0	
Energy Benchmarking	$190,573	0	0	0	$0	
Home Energy Audit	$722,658	0	0	0	$0	
Partners in Energy	$1,513,687	0	0	0	$0	
Education/Market Transformation Total	**$4,565,892**	**0**	**0**	**0**	$0	
Planning and Research						
EE Market Research	$496,770	0	0	0	$0	
EE Evaluation, Measurement & Verification	$1,208,879	0	0	0	$0	
EE Planning & Administration	$665,687	0	0	0	$0	
EE Product Development	$950,514	0	0	0	$0	
EE Product Development Total	**$950,514**	**0**	**0**	**0**	**$0**	
EE Planning and Research Total	**$3,321,851**	**0**	**0**	**0**	**$0**	
EE Indirect Products & Services Total	**$7,887,743**	**0**	**0**	**0**	**$0**	

Table 17d: 2025 Natural Gas Indirect Products & Services Budgets and Forecasts

2025	Gas Budget	Net Annual Dth Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	mTRC Test Net Benefits (WACC)	Gas mTRC Test Ratio
Indirect Products & Services							
Education/Market Transformation							
Business Education	$26,835	0	0	0	0.00	$0	
Business Energy Analysis	$35,026	0	0	0	0.00	$0	
Community Energy Reporting	$39,369	0	0	0	0.00	$0	
Consumer Education	$87,931	0	0	0	0.00	$0	
Energy Benchmarking	$60,028	0	0	0	0.00	$0	
Home Energy Audit	$809,029	0	0	0	0.00	$0	
Partners in Energy	$177,006	0	0	0	0.00	$0	
Education/Market Transformation Total	**$1,235,224**	**0**	**0**	**0**	**0.00**	**$0**	
Planning and Research							
EE Market Research	$205,368	0	0	0	0.00	$0	
EE Evaluation, Measurement & Verification	$297,867	0	0	0	0.00	$0	
EE Planning & Administration	$149,939	0	0	0	0.00	$0	
EE Product Development	$332,790	0	0	0	0.00	$0	
EE Product Development Total	**$332,790**	**0**	**0**	**0**	**0.00**	**$0**	
EE Planning and Research Total	**$985,965**	**0**	**0**	**0**	**0.00**	**$0**	
EE Indirect Products & Services Total	**$2,221,189**	**0**	**0**	**0**	**0.00**	**$0**	

Table 17e: 2026 Electric Indirect Products & Services Budgets and Forecasts

2026	Electric Budget	Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Indirect Products & Services						
Education/Market Transformation						
Business Education	$206,957	0	0	0	$0	
Business Energy Analysis	$733,641	0	0	0	$0	
Community Energy Reporting	$37,165	0	0	0	$0	
Consumer Education	$1,228,451	0	0	0	$0	
Energy Benchmarking	$230,692	0	0	0	$0	
Home Energy Audit	$796,889	0	0	0	$0	
Partners in Energy	$1,561,313	0	0	0	$0	
Education/Market Transformation Total	**$4,795,109**	**0**	**0**	**0**	$0	
Planning and Research						
EE Market Research	$500,847	0	0	0	$0	
EE Evaluation, Measurement & Verification	$1,256,335	0	0	0	$0	
EE Planning & Administration	$685,658	0	0	0	$0	
EE Product Development	$976,780	0	0	0	$0	
EE Product Development Total	**$976,780**	**0**	**0**	**0**	**$0**	
EE Planning and Research Total	**$3,419,620**	**0**	**0**	**0**	**$0**	
EE Indirect Products & Services Total	**$8,214,729**	**0**	**0**	**0**	**$0**	

Table 17f: 2025 Natural Gas Indirect Products & Services Budgets and Forecasts

2026	Gas Budget	Net Annual Dth Savings	Annual Dth/$M	Lifetime Carbon Emissions Savings (Tons CO2)	Lifetime Methane Emissions Savings (Tons CH4)	mTRC Test Net Benefits (WACC)	Gas mTRC Test Ratio
Indirect Products & Services							
Education/Market Transformation							
Business Education	$29,183	0	0	0	0.00	$0	
Business Energy Analysis	$40,177	0	0	0	0.00	$0	
Community Energy Reporting	$38,717	0	0	0	0.00	$0	
Consumer Education	$98,784	0	0	0	0.00	$0	
Energy Benchmarking	$78,763	0	0	0	0.00	$0	
Home Energy Audit	$905,674	0	0	0	0.00	$0	
Partners in Energy	$182,093	0	0	0	0.00	$0	
Education/Market Transformation Total	**$1,373,391**	**0**	**0**	**0**	**0.00**	**$0**	
Planning and Research							
EE Market Research	$178,607	0	0	0	0.00	$0	
EE Evaluation, Measurement & Verification	$416,262	0	0	0	0.00	$0	
EE Planning & Administration	$154,437	0	0	0	0.00	$0	
EE Product Development	$280,954	0	0	0	0.00	$0	
EE Product Development Total	**$280,954**	**0**	**0**	**0**	**0.00**	**$0**	
EE Planning and Research Total	**$1,030,260**	**0**	**0**	**0**	**0.00**	**$0**	
EE Indirect Products & Services Total	**$2,403,651**	**0**	**0**	**0**	**0.00**	**$0**	

C. Application Process

Most indirect products and services do not have rebate applications, except for some pilots, whose rebate applications and/or participation parameters are described within each pilot's written summary which follows this section.

D. Marketing Objectives & Strategies

Indirect Products & Services serve all markets addressed by Public Service's direct impact products. During 2023, market research activities will be focused on customer and market characterization. Each process evaluation conducted by Market Research includes the quantification of product penetration, provides segment and target market information, determines trends and barriers affecting participation, and investigates best practices observed by peer utility programs. This information provides a basis from which product and program decisions can be made.

Through membership in consultative organizations such as E Source, Market Research receives vendor-neutral and reliable market intelligence overall, and specific to a product/program or by targeted segments. Other general research provides demographic and firmographic data about the characteristics of our customer base, attitudinal and awareness information which informs market strategy, and levels of customer satisfaction which address program vitality.

Marketing, advertising, and promotion activities under Indirect Products and Services are primarily focused on the Education/Market Transformation area. The very nature of these products suggests that they will use customer contacts in the form of newsletters, bill inserts, community events, energy efficiency workshops, direct mail and email campaigns, and

communications to new residents, and advertising through radio, television and print to educate customers and transform markets. Promotional costs are also budgeted to create awareness and generate enrollments in the Home Energy Audit and Business Energy Analysis products.

E. Program-Specific Policies

The Company will make every effort to focus its Education and Market Transformation messages and promotions on Public Service customers, yet there will likely be spillover benefits to non-Public Service customers particularly with those activities that convey information to general audiences (like the Company website, partnerships with regional agencies, and community-based events).

F. Stakeholder Involvement

Indirect Products and Services rely heavily on input from internal and external stakeholders, and, as such, manage the Company's interaction with "official" stakeholder groups such as the DSM/BE Roundtable. Market Research and Education/Market Transformation activities actively engage internal and external stakeholders including employees, customers, trade allies, and vendors to ensure that product objectives are met.

G. Rebates & Incentives

Most indirect products and services do not have energy savings forecasts or offer rebates except for some pilots, whose rebates and incentives are described within each pilot's written summary which follows this section.

H. Evaluation, Measurement and Verification

The Indirect offering includes the Company's EM&V plan for 2024-2026, which describes the EM&V approach for all the DSM/BE products included in the Plan. The majority of Planning and Research services themselves are not subject to EM&V, with the exception of pilots, where their EM&V is described within each pilot's written summary which follows this section.

The DSM Planning & Administration group is responsible for developing and implementing the EM&V methodologies. These efforts are described in more detail within the EM&V and Market Research sections below.

Business Education

A. Description

The Business Education product focuses on creating awareness of energy efficiency and providing business customers with information about what they can do to reduce energy use in their buildings. The product encourages customers to make Xcel Energy their first contact when considering equipment or process upgrades and engages customers to make changes that lower their energy use. It focuses on removing the barriers to adoption of energy efficiency measures by educating customers and their employees on the impacts of their energy use and offering information on how to take action to achieve long-term energy savings.

The product is primarily marketed to small and mid-sized business customers through sponsorships, customer outreach and advertising campaigns.

The product's main offerings include the following:

- Sponsorship and Customer Outreach; and
- Digital Communications

B. Forecasts, Participants & Budgets

Forecasts and Participants

The Business Education product targets small- to medium-sized Colorado customers *via* a variety of community events, sponsorships, workshops, and business expos to promote energy efficiency rebates and energy conservation strategies to a wide range of business customers. These opportunities allow for in-person, one-on-one customer outreach which is critical to driving onsite customer leads and product signups.

Budgets

The product's participation forecasts and budgets were determined by estimating, educational material requests, community outreach events and sponsorships.

The main budget drivers include the following:

- *Administration* – This category represents the labor needed for product planning and implementation.
- *Advertising and Promotion* – This budget includes funds for printed materials, community outreach events, sponsorships, and digital advertising.

C. Application Process

This product does not include an application process.

D. Marketing Objectives & Strategies

The primary objective of Business Education is to heighten business customers' awareness about energy efficiency and conservation empowering customers to take proactive steps to reduce energy consumption by upgrading to high efficiency measures.

E. Product-Specific Policies

This indirect product has no specific policies.

F. Stakeholder Involvement

The Company will create and leverage strategic partnerships and alliances with governmental, non-governmental, and trade partners to reach target businesses in Colorado.

G. Rebates & Incentives

This indirect product does not offer customer rebates.

Business Energy Analysis

A. Description

The Business Energy Analysis or Commercial Streamlined Assessment product is an indirect impact product that offers analysis services, or audits to identify energy saving opportunities for Colorado business and industrial customers. The product's savings roll up to the Business Energy Assessment product. The product's goals are to provide a method and entry way for commercial and industrial customers to learn how their businesses use energy today and to identify measures that will help them save energy and reduce operating costs in the future. This service is a first step for customers to uncover energy saving opportunities with little capital investment and risk. Audits have the capability to use interval usage data to identify opportunities where customers can shift their energy usage from peak to off-peak periods. Public Service representatives use this as a selling point for engagement in other energy efficiency products. Participation is heavily dependent upon promotion by internal Public Service representatives, as well as the trade partners and outside business customer assistance programs.

The Business Energy Analysis product offers two types of assessments (walk-through audits and Commercial Streamlined Assessments). The two offerings vary in the extent of customer involvement and level of costs and paybacks detail, which will assist the customer in creating a business case to make energy efficiency upgrades.

- *Walk-through energy audit* - Public Service sends an energy advisor from a contracted third-party vendor to a customer's facility to conduct an audit to provide an overview of the customer's energy usage and energy conservation opportunities. The customer receives a simplified report including energy conservation opportunities with the associated payback, savings, cost, and available rebates.

- *Commercial Streamlined Assessment* - Public Service sends an energy advisor from a contracted third-party vendor to a customer's facility to conduct an ASHRAE Level 1 energy audit, which is a comprehensive audit of the facility and its energy use. Additionally, this audit will include building commissioning measures for energy management systems. The customer receives a detailed report including energy conservation opportunities with the associated payback, savings, cost, and available rebates.

For both types of assessments: qualified third-party contractors are selected through an RFP process to perform the onsite energy audits. Customers with an annual peak demand of less than 100 kW may qualify for free direct install services through the Small Business Energy Solutions ("SBES") product, to be completed by the third-party implementer during the audit. Customers with an annual peak demand greater than 100 kW can also receive a direct installation of select ENERGY STAR® smart thermostats through the SBES product, however additional costs to the customer may apply.

B. Forecasts, Participants & Budgets

Forecasts and Participants
The forecasts were developed by analyzing historical participation data, and the commercial and industrial customer market segment.

Budgets
The budget was developed based on historical data, auditor pricing, forecasted participation and the presumed size and location of participating buildings, to estimate an average assessment cost.

Labor, promotions, and consulting drive the budget level.

- *Consulting* - Developed using average auditor pricing and participation forecast.
- *Labor Charges* - Estimated costs for product management, execution of the marketing strategy, and rebate processing.
- *Promotions and Advertising* - The estimated promotional budget anticipates several customer and trade communications during the year and support for general energy efficiency advertising campaigns.

C. Application Process

Customers may become aware of this product through their Account Manager or the Business Solutions Center, contracted trade allies, external customer assistance products, and/or marketing efforts including mailings, emails, newsletters, and the Company's website. All avenues are essential for increasing product awareness in conjunction with marketing efforts.

Walk-through audits do not require preapproval. Customers under 400 peak demand kW may request a walk-through audit on the Company's website or by contacting the third-party implementer over the phone. Once the customer has submitted their request an auditor will be assigned to assess the building. The customer will typically receive their audit report within two weeks of their audit to allow for creation of the report and internal processing.

Commercial Streamlined Assessments require preapproval prior to project initiation. Customers may access the onsite audit preapproval application on the Company's website[67] and work with Public Service to complete the process by collecting their billing history information. Once the application is complete with customer and building information, an auditor will be assigned to assess the building. The customer will typically receive their final report from the auditor within three months of applying for preapproval. This time allows for internal processing, onsite walkthrough of the facility, creation of the report, and a final review by Public Service internal engineering staff, as needed.

[67] Xcel Energy Audits and Assessments.

D. Marketing Objectives & Strategies

The main goal of the Business Energy Analysis product is to raise awareness and knowledge of Public Service's other energy efficiency products. The Company will rely heavily on trade partners and stakeholder resources, such as city- and county-driven projects throughout Colorado, to increase awareness of the Business Energy Analysis product. Though the target markets will differ by assessment type, walk-through audits and Commercial Streamlined Assessments are popular with small business customers. Methods used to reach and educate customers include:

- *Company website* - Provides a description of the product offering, and links to product collateral and study brochures;
- *Collateral* - Product brochure, case studies, applications, frequently asked questions, and study templates that give the customer an idea of the resources they will receive by participating;
- *Direct mailings* - Informational pieces to build awareness and understanding of the product offerings;
- *Email campaigns* - Brief emails from Public Service representatives to drive interest in the product from customers;
- *Newsletters* - Another medium to build customer awareness and drive participation in the product; and
- *Customer seminars* - Educate customers about the product offering and benefits.

E. Product-Specific Policies

Products in the Company's Indirect Program, such as Business Energy Analysis, have no immediate savings attributed to them. Business Energy Analysis is meant to open the door for customers to participate in Public Service's other energy efficiency offerings and rebates that have direct impacts on energy savings. Once the onsite walk-through or Commercial Streamlined Assessment report is complete, the customer will receive a summary of energy efficiency opportunities available in their facility. When a customer moves forward with implementation, they follow the guidelines of the specific product in which they participate (*i.e.*, Motor & Drive Efficiency), based on the opportunities identified in the report.

F. Stakeholder Involvement

Public Service worked closely with the contracted audit trade partners to develop and streamline the audit process. The Company also receives recommendations and feedback from stakeholders via the quarterly DSM & BE Roundtable. The Company will work with the different cities implementing building performance ordinances and standards to help customers reach their ordinance or standard compliance.

G. Rebates & Incentives

Customers do not receive a rebate for participation in the Business Energy Analysis product, but they do receive study funding assistance. Business Energy Analysis offers two types of study funding based on whether a walk-through or Commercial Streamlined Assessment was completed. Walk-through audits are free and available for small business customers under 400 peak demand kW. Commercial Streamlined Assessment participants with facilities under 50,000 square feet receive the audit free of charge, while larger square footages may be responsible for paying a small fee dependent on square footage.

Community Energy Reporting

A. Description

The Community Energy Reporting is a new program in the Company's 2024-2026 filing. Previously, this program existed under the Energy Benchmarking program. As a result of increased participation, the Company has broken out this funding to account for specific costs for Community Energy Reporting.

B. Program Details

The focus of the Community Energy Reporting program is to provide aggregated data at the city, county, and state levels in the form of Community Energy Reports, which are published on the Company's website each year by June 1. These Community Energy Reports contain a variety of useful data tables such as: energy consumption, utility systems characteristics, renewable program participation, demand management program participation, energy efficiency program participation and electric vehicle program participation. These reports are automatically produced for cities with populations larger than 50,000 residents and counties with populations larger than 100,000 residents. New cities and counties can be added to the annual production upon request,[29] and the Company anticipates a significant growth in this program over the next several years. There are key processes that are followed in the production of the annual Community Energy Reports:

Boundary Mapping
The Company has received requests in the past from several cities to use a specially curated boundary map for running the respective city/county community energy report. Each year during annual development, the Community Energy Reporting Team reaches out to this running list of communities and asks for an updated shapefile of the community boundary or for confirmation that the previous shapefile is still current. All custom shapefiles are mapped by the Company's Geospatial Team and a premise list is generated based off the customized boundary. Any community may request to be added to this list and provide a customized shapefile. All boundary mapping done for communities without a customized boundary will have their premises gathered based off jurisdictional tax code.

Data Privacy Rule Implementation
The community energy reporting system is designed to implement thresholds based on both the premise count and individual premise usage percentage. Currently the data set must contain fifteen premises and no one premise can contain 15% of the aggregated total consumption. Any violators will be removed from the data set and the number of failures will be noted next to its respective data table.

Data Quality & Accuracy Checks
A key process in the final stages of community energy report development is data quality and accuracy checks. Prior to any publication of community energy reports, a group of city and county community energy reports will be analyzed for data accuracy and consistency from the previous two years.

Additionally, the Company processes community-level ad hoc requests that may fall outside of the traditional report structure that is published annually. Each request is vetted, and all data provided in these ad hoc requests are subject to the Company's aggregated data privacy standards.

C. Program Changes

Community Energy Reporting is a new program in this Plan.

D. Budget, Participation & Target Considerations

The Community Energy Reporting program's participation and budgets were determined by current participation rates of cities and counties, anticipated increases in participation and the labor associated with creating community energy reports.

The main budget drivers include administration for labor, customer service as well as ongoing software upgrades and maintenance.

E. Stakeholder Involvement

The Community Energy Reporting team engages community sustainability coordinators and third-party service providers across the Company's service territories regarding the development and output of the community energy reports and ad hoc community-level data requests.

Consumer Education

A. Description

The Consumer Education product is an indirect-impact product that provides residential customers with the information and resources to reduce their energy usage. Because the residential segment is demographically varied, the Company employs a variety of resources to communicate the conservation message.

Communication strategies include:

- Annual community and conservation events and local community outreach;
- Digital media;
- Direct mail marketing to communicate energy conservation messages;
- Sponsorship of local conservation publications and local events that support the mission of protecting our environment, such as Earth Day events
- Publication of reference materials;
- Sponsorship of seminars and conferences supporting residential conservation and energy efficiency; and
- Power and Draft Check tools available at local libraries.

The product focused on renewing existing partnerships that have provided consistent customer participation and engagement as well as building new relationships that have the potential to engage underserved segments, such as income qualified customers. In addition, the product employs digital media strategies to drive active engagement in energy efficiency. By continuing to diversify the communication channels, the product increases residential customer knowledge base and provides a greater variety of resource options and services.

B. Forecasts, Participants & Budgets

Forecasts and Participants

Consumer Education is widely targeted to all Colorado natural gas and electric residential customers. The product will target a variety of high traffic events throughout the year to reach a wide-ranging demographic of the Company's customers. Events include professional and regional sports games, county fairs, arts and cultural festivals and a variety of other community events.

Budgets

The product budgets were developed through identification of customer segments, costs to produce materials, and event and sponsorship costs. The participation forecasts were established through targeted outreach to customer segments and use of multiple channels for delivery of energy efficiency messaging. Budgets reflect the expansive reach and impact of digital media and sponsorships with the Company's premier partnerships and community partnerships yielding direct product participation leads.

The main budget drivers include the following:

- *Administration* – This category represents the labor needed for product planning and implementation.
- *Advertising and Promotion* – This budget includes funds for printed materials, community outreach events, sponsorships, and digital advertising.

C. Application Process

This product does not include an application process.

D. Marketing Objectives & Strategies

The primary objective of the Consumer Education product is to heighten residential customers' awareness about energy efficiency and conservation and empower them to proactively take steps to reduce their energy consumption. The Consumer Education product drives awareness and education to the Company's direct impact products with the intention of increasing product signups to support the energy efficiency portfolio.

Our strategy will continue to utilize a wide variety of communications channels including social media, print and event outreach. The product will use engaging event activations to provide information and resources that help residential customers reduce their energy usage at home. The common theme, in messaging, will convey the importance of everyone's role in becoming more energy efficient.

E. Product-Specific Policies

This product has no specific policies.

F. Stakeholder Involvement

The Company will create and leverage strategic partnerships and alliances with governmental, non-governmental, and trade partners to reach residential customers in Colorado.

G. Rebates & Incentives

This product does not offer customer rebates.

Energy Benchmarking

A. Description

Energy Benchmarking of commercial and multi-family buildings is an established and growing trend in the energy efficiency sector. Through the City of Denver's City Energy Project and several local efforts, Colorado building owners are especially engaged in the practice, which allows building owners, policy makers, and product administrators to target buildings more effectively with the highest energy efficiency potential by identifying those properties that are performing below a portfolio average, or benchmark. According to the DOE:

> *Energy benchmarking is a standardized process of measuring building energy efficiency. Benchmarking helps building owners identify cost-effective energy upgrades, realize the energy and cost savings benefits from those upgrades, document the savings achieved, and communicate these accomplishments to stakeholders. A 2012 study found that energy performance benchmarking prompted energy efficiency investments through improved energy management processes (62% of those who participated in a benchmarking product) or building upgrades and behavioral efficiency projects (84% of benchmarking participants).*
>
> *To date, more than a quarter-million buildings representing almost 30 billion square feet have been benchmarked. This number continues to grow thanks to multiple drivers, including the private sector adoption of benchmarking, state and local voluntary benchmarking initiatives, utility energy efficiency products incorporating benchmarking, and state and local legislation requiring that buildings be benchmarked and that the results be disclosed to the public.*
>
> *As more building owners begin benchmarking, these building owners seek streamlined, consistent processes for obtaining whole building energy usage data. Building owners and managers want easy, automated ways to get utility data into their benchmarking software. In addition, many owners of multi-tenant commercial buildings and multifamily buildings cannot access energy consumption data for their entire building due to separately metered tenant spaces.* [68]

In response to this need, the Company offers an Energy Benchmarking product to all territories.

Program Details

The Energy Benchmarking program offers a streamlined and accessible approach to aggregated whole building energy data. The service relies upon the U.S. Environmental Protection Agency's ENERGY STAR® Portfolio Manager ("ESPM") to assist customers in benchmarking their buildings. The program is primarily marketed to those customers falling under a municipal benchmarking ordinance, such as Building Performance Colorado. This ordinance currently covers commercial and multifamily buildings 50,000 square feet and greater. Cities in Colorado also have additional reporting requirements, such as Boulder, Denver, and Fort Collins. As a result, the Company expects program participation to expand continually over the next several years.

[68]Factsheet associated with the Company's participation in the DOE Energy Data Accelerator.

Energy Benchmarking

Key features of the Energy Benchmarking product include Building Owner Authorization, Tenant Identification, Data Privacy Rule Implementation, Consumption Data Aggregation and Normalization, and Automated Data Transfer to the ENERGY STAR® ESPM. Each of these elements is discussed in more detail below.

Building Owner Authorization

Upon registration to an online portal, building owners or their contracted agents will be verified using publicly available records as well as information available within the Company's Customer Information System.

Tenant Identification

Using the property address, the Company will return a list of tenants (premises) that appear to be associated with the building. If verified as accurate by the building owner, this list will be used to permanently associate those premises to the property in the Company's Customer Information Systems.

Data Privacy Rule Implementation

The system is designed to implement thresholds based on either the tenant count, individual tenant usage percentage, or both, as is currently the cast under Commission Rule 3034[69]. No energy data will be shared with the building owner until these rules have been satisfied.

Consumption Data Aggregation and Normalization

Acknowledging that most building owners seek whole-building aggregate data, the company will automatically combine data across meter readings and normalize those readings to a common calendar month cycle. Building owners can also request data for individual tenants, or sub-sets of tenants as desired; however, these requests will be subject to aggregation methodologies outlined in Commission Rule 3034 and will be more likely to require individual tenant consent.

Automated Data Transfer to ENERGY STAR® Portfolio Manager

The service relies upon ESPM to standardize the transfer of energy data from the Company's systems. This decision was made primarily from the fact that ESPM is well-established as the industry standard tool to perform energy benchmarking, and that this standard further allows a consistent, free, robust option for building owners to gain valuable information about their buildings.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The Energy Benchmarking product does not have any energy, or demand savings forecasts because this product does not measure direct savings. Expected participation numbers are drawn from previous program growth and taking the future of potential benchmarking ordinances into consideration. The Company plans to promote this offering to building owners in the Commercial and Multi-Family sectors. The Company will coordinate with local stakeholders to ensure training

[69] https://puc.colorado.gov/electricrules.

materials and Energy Efficiency product offerings are communicated to building owners as they complete the task of Benchmarking. Building owners subject to local Benchmarking ordinances make up most product participants.

Budgets

The budget was derived from historical costs as well as future building count estimates from new or expanded benchmarking ordinances. It is used to support marketing, promotion, and the administrative activities required to facilitate building owners in setting up data transfer as well as interpreting and using the results to identify cost-effective energy-saving measures.

C. Application Process

Any building owner or contracted agent of the building owner is eligible for participation in the product. Users will register via the Company's web portal and be granted access to property-specific information once their status has been verified.

D. Marketing Objectives & Strategies

The Company will employ a variety of strategies to promote the product. Many municipalities and corporations encourage the practice of energy benchmarking to their constituents. The Company plans to work closely with these entities to ensure appropriate training and promotional materials are shared. More broadly, the Company will market the product via its public website and through participants or interested participants in its existing Energy Efficiency products. Through the practice of Benchmarking, the Company plans to promote its existing Commercial and Multi-Family building products.

E. Product-Specific Policies

The product will follow the regulations identified in Commission Rule 3034.

F. Stakeholder Involvement

Throughout development of the product as well as during the formal hearing process, which resulted in Commission Rule 3034, the Company solicited and received input to inform the design of the system.

The Company continues to engage with customers and municipal implementers to continuously improve the capabilities and performance of the product.

G. Rebates & Incentives

As an indirect impact product, no rebates are proposed. Rebates for projects resulting from the product will be delivered through the established direct impact products.

Home Energy Audit

A. Description

The Home Energy Audit product offers the Company's residential customers a rebate on three types of auditing services: a Standard Audit, a Standard Audit with Blower Door Test, and an Infrared Audit. The purpose of this product is to educate homeowners and renters about their homes and identify energy saving opportunities and equipment upgrades that will help them save money on their energy bills.

Standard Audit
The essential elements of the in-home Standard Audit are:

- Customer energy bill analysis
- Client assessment and education
- Shell assessment
- Mechanical and electrical equipment review
- Energy savings recommendations derived from energy modeling software

The audit includes a billing history review and analysis since this is often an indication of what the customer may need to address first. The auditor will also discuss any concerns or questions the customer may have regarding their home's energy usage and related comfort. Once the areas of concern are identified, the auditor initiates the home inspection. This process includes the following: a shell assessment of the exterior of the home, identifying cracks, exterior signs of air leakage or maintenance needs, and an interior evaluation with inspection of the attic or crawl space. These steps determine what insulation has been installed prior to the audit, and any upgrades the customer should consider. Suggested upgrades could include items such as additional insulation and sealing bypass areas.

The auditor will review the home's heating and/or air conditioning systems for efficiency ratings and discuss maintenance best practices. The auditor will also inform the customer about how to implement suggested maintenance options (*e.g.*, changing air filters on a regular basis). As the audit moves through the home, they will continue to educate the customer on how they can implement energy efficiency measures. The auditor will inspect and provide information on the efficiency of their appliances, as well as on possible replacement options that are ENERGY STAR®-qualified.

Finally, the Standard Audit ends with a review of the top three to five recommendations to the homeowner and a final review of the customer's questions and concerns. The auditor will email the completed report and scope of work to the customer and email or leave behind efficiency product collateral on relevant rebate products. If appropriate technology is available, and if the Company's requirements are met, the Standard Audit may be completed in-person or remotely through video conferencing services.

Standard Audit with Blower Door Test
The Standard Audit with Blower Door Testing includes all components listed above, as well as a blower door test and a CAZ test. The blower door test will be conducted in those homes where

there is no risk of asbestos or other hazardous materials becoming airborne and the CAZ test will be performed only if atmospherically vented appliances are present.

The blower door test is a diagnostic tool designed to measure the air tightness of a home and identify air leakage locations. The test includes use of a calibrated fan for measuring the airflow rate and a pressure-sensing device to measure the pressure created by the fan's airflow. The combination of this pressure and the fan's airflow measurements are used to determine a home's air tightness. Before the test is performed, customers must go through their home closing and locking all exterior windows. Once the fan is turned on, a vacuum effect is created, and customers can then check windows and interior bypasses by holding up their hands and feeling the airflow created. Because this test provides such a visual image for customers, they are often motivated to address air sealing opportunities they may have overlooked prior to the testing. This tool can also identify potential venting issues around a home's heating system.

If appropriate technology is available, and if the Company's requirements are met, the Standard Audit portion of this service may be completed remotely through video conferencing services, with the Blower Door and CAZ testing done in-person at the customer's home.

Infrared Audit

The Infrared Audit includes all Standard Audit with Blower Door Test components as well as an infrared scan. The infrared scan evaluates internal structures such as drywall and insulation, and determines temperature differences where insulation is present, missing, or not working effectively. Blower door testing is also a mandatory part of the Infrared Audit. Infrared testing benefits include identifying insulation needs, air leakage paths within walls, attics, windows, and doors, and a quality check on existing insulation. Infrared testing, along with the required blower door test, gives customers a visual understanding and detailed list of structural conservation improvements available to them through non-invasive testing thus identifying additional savings potential. The Infrared Audit rebate will be available to natural gas customers and to electric-only customers with electrically heated homes. Electric-only customers with gas provided by another utility for heating or customers who use propane as a heat source are not eligible for the Infrared Audit rebate because it is primarily used as an inspection to detect where the home is losing heat. As with the Standard Audit, customers receive a cash rebate from the Company and pay the auditor directly.

If appropriate technology is available, and if the Company's requirements are met, the Standard Audit portion of this service may be completed remotely through video conferencing services, with the Blower Door and CAZ testing done in-person at the customer's home.

The Company uses the Home Energy Audit product to support and drive participation in the Whole Home Efficiency product. Customers must begin the Whole Home Efficiency process with a home audit to identify areas for improvement and to educate them as to whether their house is a good candidate for participation. If they are a good candidate, customers may sign up for the Whole Home Efficiency product through their auditor. The audit also assists in developing a scope of work for their project and encourages completion of the recommended improvements.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The Home Energy Audit product includes a participant forecast, but no energy or demand savings forecasts because this product does not measure direct savings.

Budgets

The Home Energy Audit budget was developed based upon the desired participation level, associated product software, and administration costs. Using the product's previous years' performance along with the Companies future desired increase in audit services and marketing needs as a proxy, the cost of the rebate, product collateral, and all necessary marketing efforts are included.

C. Application Process

The customer will contact the third-party implementer and speak with an Energy Advisor or visit the Company's website[70] to find a qualified and participating auditor. The customer contacts the auditor to schedule the appointment. Once the audit is complete and the customer has received the audit report, the customer or the auditor submits the rebate paperwork to the Company with proof of purchase. A rebate takes at least six to eight weeks to process once the application is received. Customers are limited to one audit per two-year period unless they move to a new address.

The customer may also choose to schedule their audit in tandem with a visit from the Home Energy Squad, which can be scheduled through the third-party implementer at the customer's request.

D. Marketing Objectives & Strategies

This product will be marketed primarily through seasonal bill onserts, social media, trade partners, media relations, and bundled residential campaigns. Further, the Company will market this product through general customer inquiries regarding their energy bill and cross-marketing efforts with other Company residential energy efficiency products, especially the Home Energy Squad product. In addition, the Company identifies event opportunities within the community and provide product collateral. Product activity will be monitored monthly to quickly implement the above strategies, if warranted.

The Company will offer customers Energy Advising as additional support toward completing retrofits. The purpose of the advising is to encourage customers to complete and implement findings within their Home Energy Audit reports, regardless of the product they participate in (*e.g.*, Whole Home Efficiency, Saver's Switch, Refrigerator & Freezer Recycling, etc.). The Energy Advising service helps homeowners make upgrades and utilize the Company rebate programs. By necessity, the Energy Advising service provides rebate assistance to standalone as well as Whole Home Efficiency rebates.

[70] http://www.xcelenergy.com/Save_Money_&_Energy/Residential/Energy_Audits/Home_Energy_Audit_-_CO.

E. Product-Specific Policies

To qualify for the product, participants must be residential customers living in the Company's Colorado service territory. Infrared Audit customers must be residential customers that receive natural gas service or electric service with electric heat from the Company to qualify for participation. Qualifying customers may receive an audit rebate once every two years.

Participating trade partner companies must have a technician on staff with a minimum of a BPI or certification and training/in-field experience to provide audit services for this product. All auditors are also required to attend product training, which includes training on the product modeling software. There will be a $150 per auditor membership fee which is allocated to costs associated with software and quality assurance provided by the third-party; this one-time fee will be paid directly to the software vendor. An auditor's certification may not be used by another trade partner company to meet the product requirements. All registered contractor companies must also be listed on the Company's trade partner website.[71] These contractors have agreed to the terms of the Company's trade partner agreement and meet the requirements related to quality installation practices per BPI.

Auditors will be required to utilize the scope of work tool within the software to deliver actionable recommendations to the customer. This is a critical part of the product as the third-party administrator will be tracking the conversion rate of audit-to-improvements. To maintain consistency, training, audit quality, and overall quality assurance between the auditors, the Company will require auditors to use a specific energy modeling software package.

F. Stakeholder Involvement

The Company collaborates with trade allies, other utilities, local communities, and contractors. The Company also provides updates to interested parties at the quarterly DSM/BE Roundtable Meetings.

G. Rebates & Incentives

To simplify product participation for homeowners, the Company offers the following audit rebate schedule:

Audit type	**% of cost**
Infrared Audit	60% up to $200 rebate
Blower Door Audit	60% up to$160 rebate
Standard Audit	60% up to $100 rebate

*Rebate amounts determined by the average audit cost for the Colorado market.

The Company understands the actual price for an in-home audit will vary based on the location and complexity of the residence, but the purpose of this product is to provide customers with a straight-forward process to improve their knowledge on energy efficiency and options they have within their home.

[71] www.xcelenergy.com/cotrades.

Partners in Energy

A. Description

Partners in Energy is an indirect product that provides community leaders and stakeholders the opportunity to jointly develop and implement energy conservation, demand management, beneficial electrification, and renewable energy goals that are community specific. The program guides and assists communities to create and implement action plans to incorporate strategies that target municipal sites, commercial and industrial facilities, and homes within the community's boundaries. It is customized to address a community's specific needs and provide the appropriate level of support to facilitate a community meeting their unique energy goals. The Company works with a third-party consultant who provides tools and resources to enable community-driven energy planning and implementation that influences market transformation and drives participation in our direct impact products.

The Partners in Energy product team works with each community stakeholder team to support implementation or development of an individualized plan to engage municipal, commercial, and residential constituents in energy-related activities, and to help identify project funding via rebates, financing, and other sources.

Delivery of Partners in Energy to participating communities can include:

1. Establishing a baseline of community-specific energy information including Company-provided municipal, commercial, industrial, and residential data and decision-making tools to:
    a. Profile existing energy use and historic product participation;
    b. Benchmark against other communities;
    c. Set goals;
    d. Identify and prioritize opportunities; and
    e. Forecast potential product participation, energy savings, and GHG reductions to the community.
    f. Integrate data provided by other area utilities to help communities evaluate their local energy landscape.

2. Facilitating stakeholder workshops to:
    a. Help community workgroups identify and develop short- and long-term energy reduction targets;
    b. Prioritize energy conservation activities – for example, best return-on-investments first; and
    c. Identify target markets within the community and potential outreach channels to engage each market.

3. Supporting the communities through development of the plan document, building consensus, and obtaining approval from community stakeholders and leaders and implementation of energy-related initiatives.

4. Providing plan implementation support through joint marketing, targeted outreach, project management, subject matter expertise, and organized education and networking opportunities with other product participants.
5. Measuring, tracking and reporting results to the community workgroups and facilitating communications to the community's key constituents.

Through this product the Company will continue working with the third-party consultant on educational efforts regarding the smart meter, new rate, and how customers can save money by shifting electricity use to off-peak hours when rates are the lowest.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The Company will target up to six new participating Partners in Energy communities annually through a quarterly application process for work that incorporates energy-efficiency and beneficial electrification. Given the extended participation cycle of the program in any given year participants include those being onboarded, as well as the various cohorts of Partners in Energy communities who began the process in prior years.

The product's target market consists of communities that have not initiated a comprehensive energy planning process, those who have stalled in their past planning and implementation efforts, or those who have developed a plan or goal around energy but need support to successfully transition to implementation – all groups can benefit from the structured and facilitated Partners in Energy process. The product also engages with communities that previously participated in Partners in Energy and now want to expand or revise their work to reach their updated energy goals.

Budgets

The product's budget is primarily administration and product delivery – community facilitation, planning, implementation, measurement, and reporting including third-party consulting services – with a smaller proportion dedicated to outreach, customer education and promotion. Some Partners in Energy projects may involve higher rebate and incentive levels on a promotional basis to drive targeted, increased energy efficiency participation. The budget is determined based on the number of communities participating and the level of time, effort, and resources necessary to deliver the product to new communities as well as follow through with the implementation phase of previous cohorts. Over the history of the product the number of communities supported after the implementation phase of the plan is completed has increased. While some communities re-engage to create a new plan to pursue new goals, many request additional support to continue in efforts to better manage their energy use at their sites and at their constituents' sites. These communities leverage the data access and interpretation as well as product outreach and marketing support to increase participation in other Company products.

C. Application Process

Community leaders interested in working with Partners in Energy must include the following information in their application:

1. Community profile;
    a. Population, counts of businesses and homes
    b. Geographic boundaries and area
2. Utility providers including the Company and others, if applicable;
3. Energy-related issues facing the community (*e.g.*, population growth, aging housing stock or infrastructure);
4. Community approvals needed to begin the planning process (*e.g.*, City Council, economic development, City departments or committees);
5. Past or current-active energy action plans, initiatives or policies;
6. Community resources, including paid staff, who would be involved in energy initiatives and could act as the main point person during the planning and implementation phases; and
7. Other potential community representatives such as city or town staff members, local businesses, non-profits, schools, government officials and citizens.

D. Marketing Objectives & Strategies

The product's primary marketing objective is to drive increased levels of DSM & BE participation, energy savings, demand reduction, societal benefits and market transformation through community-driven energy planning and implementation.

Once the Partners in Energy communities are established through a quarterly application process, marketing efforts including personalized municipal and business customer outreach, residential mailings, email, social media outreach and community events designed to raise awareness of and participation in DSM & BE offerings.

Past Partners in Energy community workgroups have identified opportunities to partner with a community's existing communication channels and planned events to get the word out about rebates, studies, and other services available to municipal, business, and residential customers.

Marketing approaches that have been effective are:

1. Presentations to local business development organizations, trade groups, chambers of commerce or other networking opportunities;
2. Incorporating Partners in Energy goals, available rebates & incentives and timing in community newsletters and news releases to increase awareness and interest;
3. Including product messaging in the community's existing websites, social media networks, outreach, digital signage and forums;
4. Personalized direct mailings and email campaigns to increase DSM/BE awareness and participation;
5. In-person tabling events, demonstrations, giveaways and special offers coordinated with the community's calendar of events and meetings;
6. Developing local business recognition for increased DSM/BE participation; and,
7. Facilitating conference calls, webinars, and online forums for participating Partners in Energy communities to exchange useful information and share best practices.

E. Product-Specific Policies

Partners in Energy does not have any specific policies.

F. Stakeholder Involvement

The product has leveraged collaboration with state and county resources to deliver subject matter expertise on energy related topics at the community level.

Current and potential communities participating in Partners in Energy choose their key decision makers to give input and help facilitate energy planning and implementation. Examples of key decision makers and key community points of contact include:

1. Economic Development & Business Services;
2. Representatives of large local businesses and employers;
3. Community Development;
4. Public Works;
5. City Manager's or Mayor's office;
6. Representatives from equity focused non-profits or social service organizations;
7. Interested and engaged citizens; and
8. Community members of boards & commissions.

G. Rebates & Incentives

Generally, rebates and incentives for the product's participating communities are paid by the Company's Business, Residential and/or IQ products that are targeted for increased participation via Partners in Energy's planning and implementation process. Some community-targeted projects may involve higher rebate and incentive levels on a promotional basis to drive targeted, increased DSM & BE participation.

Evaluation, Measurement, & Verification

A. Description

The Company's Evaluation, Measurement & Verification ("EM&V") plan was developed to evaluate, measure, and verify direct savings for electric and natural gas DSM & BE products. The Company's EM&V approach is separated into performance year and post-performance year activities. Performance year activities are conducted during the reporting year, as products are in operation, and may include rebate application validation, field inspections, on-site or remote verification of equipment installation, and engineering calculation review. Post-performance year activities include verified savings calculation and reporting; comprehensive product evaluations; and portfolio-wide technical assumption evaluations. Section I of this document describes our performance year EM&V activities in greater detail. Section II of this document describes our post-performance year EM&V activities further. Table 18 at the end of the EM&V Plan summarizes each product's planned EM&V. The Company will report any modifications to this EM&V plan in a 60-Day Notice posted to the Xcel Energy website. Notifications of new DSM & BE products (or pilots that will claim savings), launched via a 60-Day Notice, will include a detailed EM&V process consistent with the approach described herein.

Section I – Performance Year M&V

M&V is conducted on an ongoing basis on measures implemented throughout the product performance year. These ongoing M&V activities ensure that rebate application forms contain complete and correct information, the specified equipment is installed, and the claimed energy savings are accurate. These performance year activities include:

Rebate Application Validation

This validation procedure applies to residential and business products (electric and gas) offered in Colorado. The procedure is comprised of the following two steps, both performed by Rebate Operations:

Step 1: Front-End Validation – Rebate Operations reviews prescriptive business and residential product rebate applications and vendor invoices, including those for indirect impact products. They check the customer information, equipment eligibility, and proper rebate amounts. If information is missing or incorrect, the Rebate Operations Specialist communicates with the account representative, customer, or trade partner to resolve the discrepancy. For custom products, engineering staff reviews the project documentation to verify customer information, equipment eligibility, and proper rebate amounts, and delivers final numbers to Rebate Operations.

Step 2: Daily Audit – Rebate Operations audits business and residential applications to verify the information was correctly entered. This is the final review prior to issuing the rebate. If errors or issues are found, they are corrected. The daily audit report is re-run after the problems are corrected and filed for permanent storage.

Ongoing M&V of Savings

Ongoing M&V of savings differs between prescriptive products, custom products, upstream/midstream approaches, behavioral change, and pilots. The following sections

describe the general M&V methods that will be used for each. (In addition, products having characteristics requiring unique M&V approaches are detailed below).

1. Prescriptive DSM Product M&V

For direct impact prescriptive products, the Company contracts with third-party verification contractors ("VCs") and third-party implementers to perform M&V. VCs will use remote or onsite verification information gathered between November 1 and October 31 to verify energy efficiency measure installation rates for each calendar year (reported in the Annual DSM & BE Status Reports). Using an offset calendar will allow the VC to provide the required information in sufficient time for it to be incorporated into the Annual DSM/BE Status Report each year.

Prescriptive products use stipulated or deemed technical assumptions assigned to each measure to calculate energy and demand savings. The VCs will follow a deemed savings approach when conducting verification activities for prescriptive products, where the primary goal of M&V is to use field or remote inspections to sample projects to determine that the measures are properly installed and have the potential to generate savings. This approach corresponds to the basic rigor method outlined in the International Performance Measurement and Verification Protocol ("IPMVP") – *Option A: Retrofit Isolation: Key Parameter Measurement*.

Information gathered at customer sites or remotely will vary based on the product and sector but will generally confirm that the installed equipment matches equipment listed on rebate application. For example, as applicable, the VC may confirm the manufacturer, model number, efficiency rating, equipment size, capacity or output, application of measure (*e.g.*, motors that operate fans versus pumps, versus other mechanical systems), business sector (*e.g.*, restaurant versus college, versus office building), quantity (*e.g.*, number of light bulbs), or any concerns regarding the operation of the fixtures or deviations from the customer application.

For most prescriptive products, the VC will select a statistically valid number of projects to verify through field inspections or phone surveys. The sample size is designed to achieve accuracy levels of between 10% and 20% given a confidence level of 90% around the "realization rate," and is weighted to select larger projects. The number of randomly selected participants in the sample may increase or decrease during the year to ensure that the realization rate accuracy exceeds the accuracy goal for the product. Sampling bias will be reduced using a random selection of sample points. Rebate forms notify all customers that their respective premises and measures are subject to verification inspections.

The "realization rate" for a project is the ratio of the verified savings to the savings reported on the rebate application. The realization rate for the measure type is the ratio of total verified savings to the total rebate reported savings. The realization rate is applied to gross savings to determine gross product impacts. The net-to-gross ("NTG") factor is then applied to the verified gross savings to yield net product impacts. The following products, or prescriptive components of these products, adhere to the prescriptive M&V process:[72]

[72]These products may have both prescriptive and custom components, in which case they will be subject to both prescriptive and custom M&V.

Business Products

- Business HVAC+R Systems
- Compressed Air Efficiency
- Data Center Efficiency
- Lighting Efficiency
- Small Business Solutions

Residential Products

- Insulation & Air Sealing
- Residential Heating and Cooling

The general M&V process for the following prescriptive products, or prescriptive components of products, is outlined below.

1(a). General Prescriptive DSM & BE Project M&V Process

General prescriptive M&V includes validation of individual rebate applications as well as ongoing M&V.

Rebate Application Validation

1. Customer submits rebate application and required documentation to Public Service after measure is installed.
2. Rebate Operations reviews the business and residential product rebate application and associated vendor invoices, checking the customer information, equipment eligibility and proper rebate amounts. If information is missing or incorrect, the application is sent back to the account representative or customer to make changes.
3. If the project qualifies for a rebate, Rebate Operations enters the rebate application data into Salesforce (customer relationship management system) and authorizes the rebate payment. Prior to authorizing rebates, all applications are verified in a daily audit.

Ongoing M&V

4. Public Service will send the VC a list of projects completed to-date on an agreed to schedule.
5. The VC will select a statistically valid sample of projects to inspect, weighted towards the larger projects. The sample size is designed to achieve 90% confidence with 10-20% precision.
6. The VC will contact each customer to schedule the inspection or complete the phone survey.
7. The VC will visit or remotely contact each customer site and verify the savings factors or checkpoints for that measure.
8. The VC will use the verified savings factors to calculate the project's verified energy savings and realization rate ("RR"), which is calculated by dividing the recalculated or verified savings by the reported or rebated savings. At 1.0 or 100%, the verified and rebated savings are considered equal.
9. The VC will calculate the product's RR, which is the sum of all verified savings divided by the sum of all rebated savings for all projects in the product sample. The product's RR is applied to the rebate application savings captured in Salesforce to determine gross verified savings.
10. NTG factors are applied to the gross verified savings to determine net savings.

1(b). Exceptions to the Prescriptive Product M&V Process

Certain prescriptive products have special design elements that require verification processes unique to those products. The following products, or components of these products, require exceptions to the prescriptive M&V process:[73]

Business Products

- Data Center Efficiency
- Strategic Energy Management

Residential Products

- Energy Efficient Showerhead
- Home Energy Squad
- Multi-Family Buildings Efficiency
- Refrigerator & Freezer Recycling
- Residential Heating and Cooling (high efficiency air conditioning component)
- School Education Kits

Low-Income Products

- Energy Savings Kits
- Multifamily Weatherization
- Non-Profit
- Single Family Weatherization

The unique M&V processes for these products are described below:

Data Center Efficiency

For verification of the High Efficiency CRAC units measure installation, the VC will maintain a log of any refusals for site entry for M&V and will subsequently seek out and document verbal confirmation of installation from the customer and/or installer.

Energy Efficient Showerhead

The third-party implementer will report on the quantity of showerheads distributed. Xcel Energy will utilize the third-party survey platform or another independently contracted company to survey customers for the purpose of determining the installation rate of each kit component.

Home Energy Squad

The third-party implementer will verify, and report implemented measures (and baseline equipment being replaced, where applicable) to the Company. The Company will track this information in Salesforce. Due to the direct installation nature of this product, the realization and installation rates are set at 100%.

Multi-Family Buildings Efficiency

The third-party implementer of the Multi-Family Buildings Efficiency product will report the number of direct installation measures completed to the Company. This information will be entered and tracked in Salesforce.

Refrigerator and Freezer Recycling

The Refrigerator & Freezer Recycling third-party implementer will send monthly reports to Public Service of all customers who participated in the product. The VC will conduct phone

[73]These products may have both prescriptive and custom components, in which case they will be subject to both prescriptive and custom M&V.

surveys to verify removal of each unit and that the refrigerator/freezer was operable at time of removal.

Residential Heating and Cooling (high efficiency air conditioning measures)

The air conditioning measures have three energy saving components that are calculated and rebated separately, including:

- New Equipment – Purchase of high efficiency equipment.
- Quality Installation – The proper installation of new standard or high efficiency residential air-conditioning equipment.
- Trade-Ins – Replacement of low efficiency units with high efficiency units.

The M&V process for the New Equipment and trade-in components will follow the standard prescriptive product M&V process above.

The Quality Installation component requires slight deviations from the standard prescriptive process. To verify a quality installation, the VC will verify that a Public Service-approved load calculation was performed, that the unit is sized properly, and that refrigeration charge, airflow, and duct leakage are within acceptable ranges. Each component of the savings calculation for Quality Installation will be verified independently. The process includes the following steps:

1. Public Service will send the VC a list of projects completed to-date on an agreed to schedule.
2. The VC will select a statistically valid sample of projects to inspect. The sample size is designed to achieve 90% confidence with 10-20% precision.
3. The VC will contact each customer to schedule the inspection.
4. The VC will verify that a Company-approved load calculation was used to size the equipment.
5. The VC will visit the customer site and test the loaded, equilibrium performance of installed air conditioning equipment for proper refrigerant charge and air flows.
6. The VC will verify duct sealing by observation of sealing mastic or other ACCA-approved sealing means on accessible joints.
7. The VC will compare airflow, refrigerant charge, and duct leakage results to the range of values deemed acceptable for the specified equipment. If the actual values are within the acceptable range, the verified savings are 100% of the rebated values. If the actual values are outside of the acceptable range, the savings will be reduced according to the deviation from the acceptable range. Details on the savings reductions are provided in the Deemed Savings Technical Assumptions sheets within the Technical Reference Manual (see Appendix H).
8. The VC will input the verified savings factors into an M&V calculator spreadsheet to calculate the project's verified energy savings.
9. The VC will calculate the project's RR by dividing the recalculated or verified savings by the reported or rebated savings. At 1.0 or 100%, the verified and rebated savings are equal.
10. The VC then will calculate the product's RR, which is the weighted average RR of all projects in the product sample. The product's RR is applied to the rebate application savings captured in Salesforce to determine gross verified savings. For purposes of determining and applying the RR, the M&V calendar year will run from November 1

to October 30 of each product year. The realization rate determined for this 12-month period will be applied to the product values for the calendar year corresponding to the September 30th date (as described above).

11. NTG factors will be applied to the gross verified savings to determine net savings.

School Education Kits

The School Education Kits third-party implementer will send follow-up surveys to a sample of the participants to determine the equipment installation rates which are then applied to the gross savings for the calendar year.

Energy Savings Kit (IQ)

The Company will use a survey provider or other third-party partner to conduct phone and/or web surveys with a sample of participants for the purpose of determining the installation rate of each kit component.

Single-Family Weatherization (IQ)

The Single-Family Weatherization product offers standard payments to the product's third-party implementer for the installation of specific, predetermined prescriptive energy efficiency measures. Verification is built into the product design, as the third-party implementer and its subcontracted agencies install the measures. The specific product process, including verification, is outlined below.

1. The third-party implementer guides IQ customer to sign up for weatherization services.
2. The third-party implementer arranges for an energy auditor to visit the customer's home to identify savings opportunities.
3. The crew returns to the home within 14 days to implement the identified measures.
4. The third-party implementer submits documentation of the measures that were installed to the Company, along with a request for payment for the installed measures.
5. Public Service reviews the documentation and issues payment for the installed measures.

Multifamily Weatherization (IQ)

The Multi-Family Weatherization product offers payments to the third-party implementer for the installation of custom energy efficiency measures. Verification is built into the product design, as the contracted weatherization agency installs the measures. The specific product process, including verification, is outlined below.

1. IQ customer (multi-family building owner) signs up for weatherization services through the third-party implementer.
2. The third-party implementer arranges for the contracted consultant to visit the building and identify savings opportunities.
3. Consultant produces an audit report outlining savings opportunities and potential savings.
4. A Public Service engineer reviews project specifications as provided by the consultant.
5. The third-party implementer arranges for the weatherization crew to install measures approved by Public Service.
6. The third-party implementer arranges for the contracted consultant to visit the building to verify measure installation and calculate final savings.

7. Contracted consultant submits completed audit report with final savings to the third-party implementer.
8. The third-party implementer submits this documentation to Public Service, along with a request for payment for the installed measures.
9. Public Service reviews the documentation and issues payment for the installed measures.

Non-Profit (IQ)

The Non-Profit Energy Efficiency product provides funding for energy efficiency retrofit improvements to qualified non-profit organizations within the Company's service territory. Verification is built into the product design, as the contracted weatherization agency installs the measures. The specific product process, including verification, is outlined below:

1. An IQ customer signs up for weatherization services through third-party implementer.
2. The third-party implementer arranges for the contracted consultant to visit the building and identify savings opportunities.
3. A consultant produces an audit report outlining savings opportunities and potential savings.
4. A Public Service engineer reviews project specifications as provided by the consultant.
5. The third-party implementer arranges for the weatherization crew to install measures approved by Public Service.
6. The third-party implementer arranges for the contracted consultant to visit the building to verify measure installation and calculate final savings.
7. The contracted consultant submits completed audit report with final savings to the implementer.
8. The implementer submits this documentation to Public Service along with a request for payment for the installed measures.
9. Public Service reviews the documentation and issues payment for the installed measures.

2. Custom DSM Product M&V

Custom products use technical assumptions that are specific to each project to calculate the energy and demand savings. For all Custom projects, the Company's energy efficiency engineers will calculate the demand and energy savings at the pre-approval stage. Senior and managing engineers will audit the pre-approval calculations for all projects, as outlined in Step 3 of the General Custom Project M&V Process below. In addition, a random sample of all pre-approved projects will be sent to an outside engineering firm for review, as shown in Step 4 below.

All measures with anticipated savings greater than or equal to 1 GWh or 20,000 Dth require a project-level M&V plan, outlining the scope and methods of the M&V activities at the specific facility. The methods, such as pre- and post-metering, will be aligned with the appropriate IPMVP options. The duration of the metering will vary depending upon the load variability or project complexity, but typically, these projects will be metered for a minimum of two weeks pre- and post-installation. If metering is too costly or physically impossible, engineering modeling or building simulation modeling may be substituted.

Metering also may be used to verify savings of smaller projects at the discretion of the engineer. Typically, metering is performed on smaller projects with new or uncommon technologies, or

where the calculated energy savings or rebate is significantly impacted by assumptions for which there is not ample supporting information at the time of pre-approval.

The general Custom project approval process is described below and applies to the following products, or certain custom components of these products:

Business Products

- Business HVAC+R Systems
- Compressed Air Efficiency
- Custom Efficiency
- Data Center Efficiency
- Energy Management Systems
- Lighting Efficiency
- Small Business Solutions
- Strategic Energy Management

Residential Products

- Multi-Family Buildings Efficiency

Low-Income Products

- Multifamily Weatherization
- Non-Profit

2(a). General Custom Project M&V Process:

The general custom project M&V process includes pre-approval, M&V onsite or remote verification, rebate approval and payment.

Pre-Approval Process:

1. The customer submits a custom application describing the proposed project, purpose, and potential for energy savings.
2. A Public Service energy efficiency engineer or outside engineering firm will review the application and calculate the anticipated energy and demand savings based on the technical assumptions specific to that measure and the potential rebate. Calculations on small projects completed by Public Service energy efficiency engineers may proceed to Step 4 without review from a senior energy efficiency engineer if the engineer conducting this step has been approved by Public Service for direct sign-off for the type and size of project in question.
3. A Public Service senior energy efficiency engineer reviews the calculations completed by external engineers.
4. Public Service randomly selects a sample of all projects to send to an outside engineering firm (if Public Service engineer performed Step 2) to review the calculations.
5. If the outside engineering firm disagrees with the Public Service engineer's analysis, they discuss the project and reach consensus on the calculations.
6. Public Service sends out a pre-approval or rejection letter stating the pre-approved demand and energy savings along with the rebate amount.

Monitoring & Site Verification:

1. If monitoring is required, a Public Service energy efficiency engineer will draft a project-specific M&V plan, which is sent out for customer review and signature.
2. If the customer does not have the appropriate meter structure, an outside engineering firm will install metering equipment and collect the pre-data as set forth in the project-specific M&V Plan and forward the data to Public Service.

3. After the designated pre-monitoring period, the customer will complete the project installation and submits all required documents.
4. Outside engineering firm collects post-installation monitoring data and sends post data to Public Service.
5. For managed accounts, the customer's account manager confirms project installation, which may include visiting the site or reviewing invoices and other project documentation. The project documentation is then submitted to Public Service.
6. For non-managed customers completing custom projects, the Company's Business Solutions Center and Program Manager will review project documentation.

Savings Reconciliation:

1. For non-metered projects, final documents are reviewed for compliance with the initial pre-approval. If the project costs or the project savings vary by greater than 10%, the project is reevaluated.
2. For metered projects, Public Service's energy efficiency engineer, or outside engineering firm, determines actual savings based on metering results. All metered projects previously reviewed only by internal engineers will be sent to an outside engineering firm for review. If the outside engineering firm disagrees with Public Service engineer's analysis, they will discuss the project and reach consensus on the calculations.
3. If the post-project kW and kWh savings and incremental cost are within 10% of the pre-approved values, values, the preapproved rebate will be paid. If the post-project quantities are not within 10% of the pre-approved values, then the rebate will be based on the post-M&V results. In all cases, the post M&V results for kW, kWh, Dth, and incremental cost will be booked for the project.

2(b). Exceptions to Custom Product M&V

The following Business products, having special design elements, are verified using processes unique to the product or component:

- Business Energy Assessments
- New Construction
- Self-Direct
- Strategic Energy Management

The M&V process for each of these products is described below:

New Construction

The New Construction product is comprised of two components: Energy Design Assistance and Energy Efficient Buildings.

The Energy Design Assistance component provides design assistance to the architects and engineers designing new buildings. Public Service contracts with a third-party product implementer to complete the energy modeling and measurement and verification. The rebate is not paid until project savings are verified. The specific product process, including verification, is outlined below.

1. The customer submits an application describing the proposed project.
2. The third-party implementer conducts an introductory meeting with the design team/customer.
3. The third-party implementer completes energy modeling to identify efficiency opportunities.
4. The third-party implementer reviews construction documents for qualifying energy efficiency measures identified through the energy model. The design team and customer are notified whether or not these measures were found within these documents.
5. The third-party implementer provides Public Service with a verification plan for each project.
6. The third-party implementer visits site or remotely verifies that specified measures were installed. Equipment and systems are monitored for a two-week timeframe, as appropriate, to evaluate performance variables against modeling assumptions.
7. For projects with individual measures that have savings greater than or equal to 1.0 GWh or 20,000 Dth per year, data logging is required for a time period of four weeks.
8. The actual results are compared to the estimated savings to determine the final rebate. If the actual results are not within 15% of the energy savings identified within the previous model, the consultant completes an as-built model to determine final energy savings.
9. Rebate is issued to customer based on final savings.

The Energy Efficient Buildings component provides customers a review of their new construction, major renovation, or additions for potential energy efficiency measure opportunities before the building is built. The specific product process, including verification, is outlined below.

1. The customer submits an application describing the proposed project.
2. The third-party implementer conducts an introductory meeting with the design team/customer.
3. The customer applies for rebates based on the energy efficiency measures they have incorporated into their design plans.
4. The third-party implementer reviews construction documents compared to application submitted.
5. The third-party implementer visits site or remotely verifies that specified measures were installed.
6. For projects with individual measures that have savings greater than or equal to 1.0 GWh or 20,000 Dth per year, data logging is required for a time period of four weeks.
7. The third-party implementer determines final savings based on data logging and verification.
8. Rebates are issued to customer based on final savings.

Business Energy Assessments (recommissioning component)

The Business Energy Assessments product identifies existing functional systems that can be "tuned up" to run as efficiently as possible through low- or no-cost improvements. The specific product process, including verification, is outlined below.

Implementation & Approval

Xcel Energy will identify a mutually acceptable methodology for identifying and implementing low- and no-cost savings opportunities with the RFP-selected vendor(s). Vendor(s) in the closed network will follow this methodology, resulting in pre-approval of the savings.

Self-Directed Custom Efficiency

The Self-Directed Custom Efficiency product provides rebates to customers who identify, scope, and verify the energy savings for qualifying projects to offset their costs to implement energy efficiency projects. The specific product process, including verification, is outlined below.

1. Public Service pre-qualifies customers who are eligible for participation in the Self-Directed Product.
2. Once pre-qualified, a customer identifies the opportunity, then develops and submits a project application. For projects over 250,000 kWh, the customer is required to develop a project-level M&V plan and submit it with their application. Specific components of the plan will be determined by the customer and agreed upon by Public Service. At a minimum, the plan should employ sound engineering judgment and follow standard industry practices such as the IPMVP.
3. Public Service provides confirmation of application receipt, reviews the application, and asks for additional information if necessary. Public Service notifies the customer of approval or denial of the application, expected rebate, and mutually agreed on M&V plan.
4. If the customer chooses to implement the pre-approved project, they must follow the requirements detailed in their M&V plan and conduct all necessary steps to verify energy savings. Any data required for pre-installation monitoring detailed in their M&V plan should be submitted to the Company and approved before the customer implements the efficiency measures. Upon acceptance of the data, the customer can then implement the measures and perform any follow-up monitoring as described in their M&V plan.
5. The customer then submits a project completion report. Public Service reviews the report, requests any additional data, and calculates the final rebate. The rebate is paid upon completion of project and Public Service's approval of project completion report.
6. A random sample of all pre-approved projects will be selected by the Company and sent to an outside engineering firm for metering and verification.

Strategic Energy Management Custom Efficiency

The SEM product, which offers visualization and analysis of real-time energy data from across a customer's facility to capture low-cost recommissioning opportunities as well as behavioral and operational energy savings, will use the following unique Custom M&V processes:

M&V for SEM Measures

Measure Categories	Description	M&V Protocol
New system or process automation	Measures that consist of equipment and processes whose automation capabilities don't currently exist or are underutilized. By identifying and applying appropriate control measures, incremental energy savings can be achieved.	Follow General Custom M&V Process
Low cost / no cost recommissioning	Measures that address failure or underperformance of installed systems and equipment that can be fixed by making small adjustments, typically not requiring new equipment.	Follow the Unique Custom M&V Process used for the Business Energy Assessments product.
Systemic O&M	New system or process automation measures that consist of equipment and processes whose automation capabilities don't currently exist or are underutilized.	EIS tracking mechanisms or Process path re-measurements will be established to check the ongoing performance of the measures. Annually, the third-party implementer, with review by the Company's engineers, will analyze the data in accordance with IPMVP criteria and the Company's custom M&V process, to ensure persistence of the measure's savings. These savings will be reported annually for the duration of the customer's involvement in the SEM product.
Behavioral	Measures that require manual intervention with repeated decision-making to achieve energy savings. Behavioral measures rely on the choice of individuals to change the way they use equipment. Savings is the reduction in energy use by customer personnel that is statistically attributable to measures conducted as part of the product.	EIS tracking mechanisms or Process path re-measurements will be established to check the ongoing performance of the measures. Annually, the third-party implementer, with review by Xcel Energy engineers, will analyze the data in accordance with IPMVP criteria and the Company's custom M&V process, to ensure persistence of the measure's savings. These savings will be reported annually for the duration of the customer's involvement in SEM.

3. M&V Process for Products Delivering Upstream/Midstream Incentives

The Home Lighting & Recycling product was launched from the outset as an upstream product. Beginning in 2015, the Company started offering midstream incentives to distributors for Business Cooling and Lighting Efficiency measures. The rebate treatment (administration vs. participant incentive) and NTG are based on actual, verified participant costs and market penetration rates observed through the products. The rebate will only be recorded as a participant incentive if the verified Net Participant Costs (based on invoices) are equal to the sum of the incremental capital costs and baseline capital costs, less the rebate; otherwise, the rebate will be recorded as an administration cost. M&V for these approaches will be conducted as follows:

<u>Business HVAC+R Systems (cooling measures)</u>

Distributors will be offered incentives in return for increasing their stock and promotion of high efficiency HVAC equipment. The NTG for this approach will be deemed within the DSM

Plan and verified through periodic product evaluations. The M&V process for the midstream component of the cooling measures is as follows:

1. Participating distributors provide biweekly reports of products sold, including the manufacturer, model, number of units installed, unit serial numbers, address where equipment was installed, contact information (for the customer, contractor, or installer), and distributor invoice number and date.
2. The third-party implementer enters the information into a tracking system and submits monthly reports containing the data to be uploaded into Sales Force.
   The VC will include the midstream projects within the sample of cooling measures that receive M&V throughout the year, to calculate realization rates for net energy and demand savings.

Lighting Efficiency and Small Business Solutions

Within the Lighting Efficiency and Small Business Solutions products, LED lamp incentives will be offered to distributors as the Business LED Instant Rebate. The NTG for this approach will be deemed within the DSM Plan and verified through periodic third-party product evaluations. A fraction of the rebate may be treated as a Vendor Incentive (administration cost) and the remainder as a participant incentive if the fraction of Net Participant costs is greater than the sum of the incremental capital and baseline capital costs, and there is evidence that a portion of the rebate is passed on to product participants. If there is no evidence that a portion of the rebate is passed on to product participants, then the full rebate cost will be captured as an administrative cost. The M&V process for the midstream component of the Lighting Efficiency/Small Business Solutions products is as follows:

1. Participating distributors provide sales reports listing the model, wattage, type, and number of bulbs sold.
2. The distributor enters the information into a tracking system and submits monthly reports to the third-party implementer containing the data and the third-party implementer calculates the demand and energy savings using technical assumptions provided by the Company.
3. The third-party implementer audits the database output by examining and comparing against retailer sales reports. The VC conducts a field verification of 10% of completed projects; and subsequently the third-party implementer adjusts the wattage and number of bulbs if errors are found and provides the final verified savings for all bulbs for year-end.

Public Service compares the net costs paid by product participants to the deemed incremental capital and baseline capital costs to determine the amount of instant rebate passed on to participants as a reduction in product cost. This amount is used in calculating the portion of the presumed participant incentive that is treated as a rebate in the cost-benefit analysis completed for the status report following the product year.

Home Lighting & Recycling

To deliver the Home Lighting & Recycling product, the Company partners with manufacturers and retailers to reduce the retail price of qualifying bulbs and promote them to the retailers' customers. Public Service tracks the manufacturer, model number, quantity, wattage, cost, and type of the bulbs sold through a third-party implementer and pays incentives to the

manufacturer. The M&V process for the Home Lighting component of the product is as follows:

1. Participating retailers provide weekly or monthly sales reports listing the model, wattage, cost, type, and number of bulbs sold.
2. A third-party implementer enters the information into a tracking system and submits monthly reports containing the data and calculation of the demand and energy savings using technical assumptions provided by the Company. Higher bulb costs may be forecasted in the Plan based on estimated costs at the time, observed costs, if available, will be captured throughout the year and used to calculate the actual average incremental capital cost which will be reported in the Annual DSM & BE Status Report. If no data is available, the incremental costs will be deemed based on historical information. The baseline bulb costs will be deemed within the Plan and used within the Annual DSM/BE Status Report.
3. The VC audits the database output by examining and comparing against retailer sales reports. The validation contractor adjusts the wattage and/or number/type of bulbs if errors are found and provides the final verified total savings for all bulbs for year-end.

4. M&V Process for Home Energy Insights Behavioral Products

Behavioral products present unique challenges related to measuring resulting savings. M&V is critical for understanding the savings delivered and fine-tuning the product's effectiveness. The M&V protocol for the HEI group of products is described below.

Until recently, the HEI products tended to have distinct groups of participating customers. As such individual measurement methods would be applied to each product. Where applicable, savings from customers who participated in more than one program or product might be excluded or backed out from another product. For example, for the Online Home Energy Insights (My Energy) Opt-in Product, customers who are also HER treatment customers can be excluded in the My Energy savings. For behavioral products that provide similar types of information and education, there is uncertainty about whether participation in multiple products results in similar savings overall or more savings than participation in one product.

As the HEI suite of behavioral products expands and matures, the Company will initially continue looking at saving from individual product while also validating methods that consider overall energy usage changes from participation across all programs.

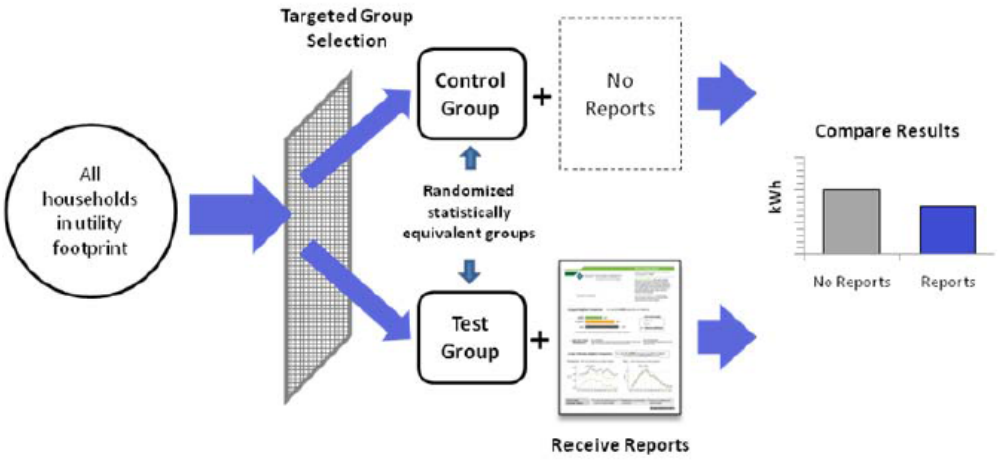
Savings Methods for Individual Home Energy Insights Products (Delivery Channels):

<u>HER</u>

The HER opt-out product provides targeted communication of energy-use comparisons and information to our residential customers, providing specific recommendations and feedback to motivate and teach customers how to reduce their energy consumption. Actual consumption in the form of meter data is used to M&V this product. Meter data for all participants, comparison homes, and control homes are provided to the third-party implementer for continuous analysis and performance reporting. The third-party implementer compares the consumption of participants (Treatment Group) to those of the Control Group to determine the savings resulting from the product. Savings for the print/email product will be measured compared to an appropriately sized Control Group of non-participant customers that are

uninformed by any direct action of this product. In addition to determining the savings resulting from the product, the third-party implementer will track and adjust for participant's incremental participation in other energy efficiency products.

This M&V methodology is recommended by the State and Local Energy Efficiency Action Network ("SEE Action"). The following figure depicts the M&V methodology.



1. Setup Test and Control: Divide targeted population into two statistically equivalent groups.
2. Verify Groups: Verify no historical difference in usage between test and control groups.
3. Deploy Product: Send reports to test group only, no action taken with control group.
4. Measure Impact: Compare average energy use pre- and post-reports for both groups.

M&V Methodology

Moreover, the M&V methodology incorporates recommendations made by the CEE in their evaluation of the Minnesota Residential Energy Feedback pilot. Specifically, the following recommendations were incorporated:

- Opt-out customers are included in total savings. While opt-out customers were previously included in the calculation of savings per household (*i.e.*, in the regression), the aggregation of savings did not include the count of opt-out customers.
- Negative "savings" estimates are included in total savings. Previously, zero savings were reported in months with negative savings estimates. The updated method includes negative "savings" that occur in any month.
- Duplicate records are eliminated. Data preparation steps now remove (if present) duplicate billing records along with records from multiple meters at a customer's home that may have been added during the product. The total number of records removed are noted in a logfile and stored.
- Model is robust to varying monthly imbalances between treatment and control. The regression model below controls for any remaining overall and seasonal differences between treatment and control. This update achieves the intent of the evaluation's

recommendation to take care in adjusting estimates for any residual overall or seasonal imbalance between the treatment and control group.

Online Home Energy Insights (My Energy) Opt-in Product

Residential customers in the print or email product who opt-in to participate in the My Energy tools will remain in the Home Energy Report Treatment Group and their savings will be included in the print/email product savings calculation.

Because login to the My Energy tools is a self-selected, opt-in action and therefore not easily subject to random assignment in a Randomized Controlled Trial, savings for Online Home Energy Insights are performed using quasi-experimental methods.

Measuring savings for customers using the Portal involves several distinct steps in order to identify the savings for the self-selected group of customers who opt-in to use the Portal.

The methodology for measuring savings uses the variation-in-adoption ("VIA") approach recommended by the EM&V of residential behavior-based energy efficiency programs protocol of the The State and Local Energy Efficiency Action Network[74] and the Residential Behavior Evaluation Protocol of the National Renewable Energy Laboratory.[75] Additionally, the estimation implements the recently developed tools and algorithm for estimating difference-in-difference regressions with multiple time periods of Callaway and Sant'Anna.[76]

The VIA approach uses customers who opt into the portal at a later time period as a comparison group for those who opt in during an earlier time period. This helps ameliorate self-selection bias as both treatment and comparison group customers eventually choose to use the portal. Portal users typically use more energy on average than the general population and this is a likely driver of engagement. As a result, it is not advisable to use the general population as a control group. The same process will be used for the kWh and therm analysis.

Savings estimates are computed using the algorithm derived by Callaway and Sant'Anna and involves the implementation of a difference-in-difference estimation for the case with multiple time periods (months) and customers who initiate treatment (opt-in to the portal) at different points in time. Separate analyses are conducted for kWh and therm customers, for the entire group of customers and for the subset of HER customers.

The algorithm estimates a set of group-time average treatment effects ATT(g,t) corresponding to the average treatment effect in month t for the group of customers who first sign-in to the portal in month g. This means that separate treatment effects are estimated by cohorts for each month. For example, the algorithm measures the performance separately for each month for

74 Todd, A., Stuart, E., Schiller, S. and Goldman, C., 2012. Evaluation, measurement, and verification (EM&V) of residential behavior-based energy efficiency programs: Issues and recommendations. Washington, DC: The State and Local Energy Efficiency Action Network (SEE Action).

75 Stewart, J., and Todd, A., 2020. Residential Behavior Evaluation Protocol. The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures, September 2011-August 2020 (No. NREL/SR-7A40-77435). National Renewable Energy Lab.(NREL), Golden, CO (United States).

76 Callaway, B. and Sant'Anna, P.H., 2021. Difference-in-differences with multiple time periods. Journal of Econometrics, 225(2), pp.200-230.

customers grouped by the month in which they first sign in. This results in many treatment effects which are then aggregated for the final results. The difference-in-difference methodology uses past usage patterns to balance the treatment and control groups for each cohort. Fixed effects are used to account for time-invariant differences between customers such as square footage or home age.

Energy savings will have a one-year life, with ongoing treatment and information exposure necessary to continue the full energy-savings benefits. To address this unique situation with treatment-driven behavior programs, Public Service will discount the annual savings so that 1/3 of the total savings measured are claimed each year during a three-year cycle. This is different than the standard conservation product, where a measure gets installed and credit is taken for the multi-year life of that installed measure. The third-party implementer will calculate savings throughout 2017 and 2018 using a comparison of the Treatment Group and the Control Group as savings occur and only if they occur.

Public Service will track rebates by customer and account and will subtract the energy saved through these product participations from the Home Energy Insights results to prevent double counting.

HBA

The HBA product notifies enrolled customers during their billing cycle if their projected bill is more than 30% higher than the same billing period the previous year. The system does bill comparison checks on the sixth and sixteenth day of each billing period and sends email alerts to customers with projected high usage around mid-billing cycle.

Savings for HBAs are deemed based on a large-scale randomized control trial pilot with 50,000 customers in the treatment group (eligible to receive HBAs) and 25,000 customers in the control group (not eligible to receive HBAs). The evaluation used an industry standard fixed-effects difference-in-difference panel model. The pilot found savings of 0.5% for both electricity and natural gas.[77]

My Energy Connection

The My Energy Connection mobile app will provide customers with detailed information about their energy usage by utilizing advanced meters. The first release will provide users with real-time meter data, energy usage, and cost information starting with the ability to access this information from home. The second release of My Energy Connection will focus on providing customers with appliance-specific usage and cost breakdowns, also known as disaggregation insights.

While the app will be available to most customers, not all customers will adopt the app at the same time. Evaluation can leverage these differences in adoption to use quasi-experimental evaluation methods. Depending on rates of adoption, savings can be calculated by 1) establishing a matched comparison group; or 2) using later adopters as a comparison group for earlier adopters.

[77] https://beccconference.org/wp-content/uploads/2019/12/stewart_presentation_reduced.pdf

Method 1: Matched Comparison Group

The matched comparison group method matches customers who use the app ("participating customers" to very similar customers who did not use the app ("matched control customers"). Several methods for identifying close matches exist including Euclidean distance scores based on pre-period energy use and propensity score matching. Propensity score matching calculated the predicted probability of using the app based on customer characteristics and selects the matched comparison group to have similar propensity scores to participating customers. Matching customers based on nearly identical propensity scores serves to balance the distribution of the included customer characteristics among the treatment and matched control populations. An important limitation of either matching method is that treatment customers may still differ from matched control customers along unobserved dimensions (*e.g.*, attitudes toward energy efficiency) which could bias results. Despite this limitation, matching is an accepted method in the DOE SEE Action guidelines and widely used in other disciplines.

Method 2. Variation in Adoption

As described above, variation in adoption uses later participants as the comparison group for earlier participant. This helps ameliorate self-selection bias as both participating customers and comparison group customers eventually choose to use the app. The technical approach to variation in adoption is described under the Online Home Energy Insights (My Energy) Opt-in Product section.

Savings Method Across Products

As participation in HEI products increases with both more customers participating in any product and more customers participating in multiple products, The Company will move toward looking at savings from HEI more holistically using population-level normalized meter energy consumption ("NMEC") methods to calculated savings in aggregate across all HEI participating customers.[78] This method will capture savings in aggregate from HEI participation. This approach will be phased in, with early phases validating NMEC results against traditional, individual program evaluation methods. Mid-phases can leverage matched comparison groups in conjunction with NMEC as participation is ramping up and there are still enough non-participating customers. Later phases, as participation in any HEI product becomes more widespread, will involve developing population-level baselines to control for exogenous factors such as economic trends, rates, changing codes and standards.

Behavioral Demand Response ("BDR")

The Company proposes adding a BDR measure to the Home Energy Insights program starting in 2024. This new measure would send messages to all electric Xcel Energy customers who have opted into communications from the Company and encourage them to reduce energy consumption during peak events called "Energy Action Days".

[78] CPUC. Rulebook for Programs and Projects Based on Normalized Meter Energy Consumption, Version 2.0. January 7, 2020. https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/n/6442463694-nmec-rulebook2-0.pdf

The program will measure impacts from the events using a within-subjects baseline approach. This approach forecasts expected energy use on the event day based on modeling energy use on non-event days with similar weather. Energy use pre, during, and post-event is compared to modeled baseline usage to calculate energy impacts. The Company anticipates leveraging M&V findings from a Minnesota BDR pilot similar to the expected Colorado product to guide further M&V requirements.

5. Pilot Products

EM&V for pilot products can differ from the EM&V for prescriptive and custom products since the pilots are being evaluated for market viability. Therefore, additional testing may be necessary, and, in some cases, specifically designed for a particular pilot. For these reasons, the detailed EM&V Plan for each pilot is included in the pilot's product description, which can be found in the Indirect Products and Services section of the Plan under Product Development.

Section II – Post-Performance Year Product EM&V

The purpose of the post-performance year EM&V is to ensure that all technical assumptions, including the NTG ratios, are accurate and that the product is operating as effectively as possible. Post-performance year activities take place in the years following the performance year and include comprehensive product evaluations, a portfolio-wide technical assumptions evaluation, and calculation of outcomes for the annual status report.

a) Verified Savings Calculation and Reporting

At year-end, net verified generator savings are calculated from gross customer (meter) savings using the approved line losses, measured, or assumed installation and realization rates, and NTG values and reported in the EM&V Results section of each Annual DSM & BE Status Report, according to the following formulas:

Net verified kW savings =
Peak customer kW * Line Loss * Installation Rate * Realization Rate * NTG

Net verified kWh savings =
Customer kWh * Line Loss * Installation Rate * Realization Rate * NTG

Net verified Dth savings =
Gross Dth * Line Loss * Installation Rate * Realization Rate * NTG

Where,

- peak customer kW, customer kWh, and gross Dth are reported from Salesforce and/or provided by the third-party implementers;
- line losses are 6.51% for business products and 7.69% for residential products;
- installation rates are assumed to be 100% for all of the products within the Business, Residential, and Low-Income Programs, and for pilots, with the exception of the Home Lighting & Recycling, School Education Kits, Energy Efficient Showerhead, and Energy Savings Kits products. For each of the exceptions, the third-party implementer measures the installation rate and reports it, along with gross savings, to the Company.

- realization rates are assumed to be 100% for custom products, Low-Income products, and pilots, and are measured and reported by the M&V contractor or the third-party implementer for the prescriptive products; and
- NTG values are as filed in the Technical Reference Manual of the DSM Plan, unless modifications were adopted resulting from a product evaluation, as described below.

Note that:

- Installation and realization rates, as well as NTG values, are applied at the measure and end-use levels within each product.
- Either an installation rate or a realization rate, but not both, are typically applied to calculations of net verified savings.
- Comprehensive products that claim prescriptive or custom savings from other end-uses, will apply the installation rates, realization rates, and NTG ratios specific to each end-use when calculating net verified savings.
- Products that offer studies (such as Business Energy Assessments, Compressed Air Efficiency, or Data Center Efficiency for example) may distinguish study-driven savings from non-study-driven savings and apply different installation rates, realization rates, or NTG values to the various categories of savings, as described in the Technical Reference Manual of the DSM Plan.

b) Product Evaluations

In addition to the performance-year M&V described above, Public Service will contract with at least one independent third-party consultant to complete evaluations for specific products each year. Product evaluations are conducted on a staggered schedule so that all products receive evaluations at least once every eight years with limited exceptions for small or indirect products. The principal objective of the product evaluation is to determine the role of the product in customer decision-making. This includes specific research that assesses customer satisfaction with the DSM product and implementation processes, conducting a thorough review of industry-wide approaches, and/or assessing changes that should be made to NTG ratios or savings baselines based on the evaluator's primary research. When considering the evaluation recommendations, Public Service will follow the guidance from Decision No. C11-0465, which gives Public Service the discretion to make changes to its DSM products that are reasonable, cost-effective, and timely; as well as to reject suggested changes that are flawed.[79]

Factors that are taken into consideration in determining the priority, type, and schedule of product evaluations include, but are not limited to product tenure in Colorado, savings achieved per participant and relative to total goals, product expenditures compared to total budgets, uncertainty and/or risk associated with savings or technical assumptions, duration since a significant product redesign, total number of evaluations in a given year, and availability of other studies regarding the measures. Discussions with portfolio managers, product developers, and technical consultants are used to finalize the priority and schedule of evaluations.

In 2024-2026 the Company plans to continue the practice of separating energy efficiency and demand management evaluations.

[79] Decision No. C11-0465, at 6-7 in Proceeding No. 10A-554EG.

The Company will evaluate fifteen products in the energy efficiency portfolio in 2024-2026.[80] In 2024-2026 the Company proposes a full process and impact evaluation (also known as a comprehensive evaluation) of the Business Energy Assessments, Data Center Efficiency, and Home Lighting and Recycling products in 2024; Business HVAC+R Systems, Lighting Efficiency, and Insulation and Air Sealing products in 2025; Small Business Solutions, Strategic Energy Management, , and School Education Kits products in 2026. The Company will also complete a process-only evaluation of the Business Education and Non-Profit products in 2024, Custom Efficiency and Consumer Education products in 2025, and Evaporative Cooling and Single-Family Weatherization, products in 2026.

In addition to these periodic evaluations, the Company expects to continue evaluation activities for the Codes and Standards Compliance Support components within New Construction product. This evaluation will focus on verification of gross technical savings, compliance rate, and attribution factors as well as providing forward-looking estimates of savings for future plan years as information about building energy code adoption becomes available. and will not include all the same elements as a traditional Comprehensive evaluation due to the unique nature of a code support offering.

In the DR program, as a response to continued growth of the number of DR offerings to meet the new summer and winter DR goals, the Company will continue the holistic portfolio evaluation protocol that will help provide close-to-real-time feedback regarding customer motivations, response to various marketing and control strategies, and customer satisfaction. Due to the nature of the DR program, NTG will not be included in this protocol because events would not be called in the absence of the Company's efforts to reduce demand.

Finally, in response to the Commission's direction to better study impacts of the Company's BE measures, the Company plans to work with a third-party evaluator to construct a market transformation evaluation approach for BE over the course of 2024-2025 to inform the next Strategic Issues filing.

This schedule will be reviewed at the beginning of each year and may be adjusted based on costs, scope, and need.

Section III – EM&V Best Practices

Public Service's ongoing M&V procedures are aligned with utility industry best practices for measuring product results. The Company requires that its contractors follow standard protocols, such as the IPMVP and the Illinois TRM. The following links to some of the common reference materials describe these protocols in more detail:

Illinois SAG TRM:
https://www.ilsag.info/technical-reference-manual/

National Action Plan:
http://www.epa.gov/cleanenergy/energy-programs/suca/resources.html

[80] The Company agreed to conduct four comprehensive product evaluations each year, starting in 2016 under the 2015-16 DSM Plan Settlement Agreement (Proceeding No. 14A-1057EG).

SEE Action EM&V Resource Portal:
https://www4.eere.energy.gov/seeaction/topic-category/evaluation-measurement-and-verification

US Department of Energy Uniform Methods Project
https://www.energy.gov/eere/about-us/ump-home

The International Performance Measurement and Verification Protocol can be found in the Products & Services section of the Efficiency Valuation Organization's website at http://www.evo-world.org.

B. Forecasts, Participants & Budgets

Forecasts and Participants
Not applicable.

Budgets
The robustness of Public Service's EM&V plan is balanced against its costs; we continue to be mindful of the objectives of ensuring accurate savings while keeping expenditures prudent and maintaining the cost-effectiveness of products. The budgets for the various EM&V components are included within this 2024-2026 DSM & BE Plan in the following ways:

- *Rebate validation:* Internal labor is charged as an Administration and Product Delivery cost to individual DSM product budgets.
- *Ongoing M&V:* Most outside contractor costs, including database development, data tracking, and reporting, are charged as an M&V cost to individual DSM product budgets and are not included in the general Measurement & Verification budget under the Indirect Products and Services section of the Plan. Budgets for these activities were forecasted based upon historical experience or followed a more general budgeting plan at between 3 to 5% of the respective DSM products' total budgets.
- *Comprehensive Product Evaluations:* Outside consultant costs are included within the "Product Evaluations" budget under the Indirect Products and Services section of the Plan. These costs were developed based on previous evaluation costs.
- Internal Xcel Energy labor that supports administration and oversight of ongoing M&V and comprehensive product evaluations is charged to "Measurement & Verification" or "Product Evaluation" budgets, respectively, under the Indirect Products and Services section of the Plan.

C. Application Process

Not applicable.

D. Marketing Objectives & Strategies

Not applicable.

E. Product-Specific Policies

EM&V does not have any specific policies.

F. Stakeholder Involvement

EM&V does not have any unique stakeholder involvement.

G. Rebates & Incentives

Not applicable.

H. Evaluation, Measurement, & Verification

As described in section (A) above and in Table 18 below.

Table 18: Measurement and Verification Summary by Product

Product Name	Program Component	M&V Protocol	2024-2026 M&V Plan
Business Electric:			
Business HVAC+R Systems	Prescriptive	General Prescriptive	Verification Contractor selects random sample and performs field inspections of deemed savings factors (*e.g.*, equipment type, size, efficiency, climate zone and building type).
	Upstream/Midstream cooling measures	Unique Prescriptive	Participating distributors will enter sales data into an online application administered by a third-party, listing the make, model, serial number, quantity, installation address and zip code. The third-party administrator will verify customer eligibility and provide periodic sales reports. Verification Contractor selects random sample and performs field inspections of deemed savings (*e.g.*, equipment type, size, efficiency, climate zone and building type).
	Custom	General Custom	Projects <1 GWh savings: Company engineers or outside engineering firm calculate savings for pre-approval, calculations reviewed by higher levels of engineering staff depending on size. Random samples of projects sent to outside engineering firm for verification if Company engineers complete analysis. Account Manager or Business Solutions Center verifies project installation and collects equipment invoices. Projects ≥ 1 GWh savings: Pre & Post Metering verifies savings. (Projects of all sizes may be metered depending on certainty assessment of savings).
Business Energy Assessments (recommissioning component)	Custom	Unique Custom	Customer hires an in-network engineering firm to conduct study of building and to determine energy savings for each measure. The engineering firm will use a methodology that has been pre-approved by Xcel Energy. The Xcel Energy engineering team will randomly review vendor studies to confirm that they continue to conform to mutually accepted methodologies.
Compressed Air Efficiency	Prescriptive	General Prescriptive	Prescriptive rebates available for Variable Frequency Drive Compressors that are less than 150 hp and have no air loss drain valves. In addition to Variable Frequency Drive Compressors, the product has many other prescriptive rebate offerings to confirm dryer flow capacity, mist eliminator flow capacity, added storage tank gallons, and system operating HP. Verification Contractor selects random sample and performs field inspections of deemed savings factors (*e.g.*, size of compressor and number of drains).

Compressed Air Efficiency (cont.)	Custom	General Custom	Projects <1 GWh savings: Company engineers or outside engineering firm calculate savings for pre-approval, calculations reviewed by higher levels of engineering staff depending on size. Random samples of projects sent to outside engineering firm for verification if Company engineers complete analysis. Account Manager or Business Solutions Center verifies project installation and collects equipment invoices. Projects ≥ 1 GWh savings: Pre & Post Metering verifies savings. (Projects of all sizes may be metered depending on certainty assessment of savings).
Custom Efficiency	Custom - Study Driven Credit	Unique Custom	Studies may yield direct energy savings from leak fixes. The study provider will identify the location and size of leaks. The study provider and/or the customer will fix the identified leaks. The customer must verify all leak fixes, as 50% or more of the fixes must be completed to qualify for the study rebate. A realization rate of 100% is applied to the calculated savings from leak fixes.
	Custom	General Custom	Projects <1 GWh savings: Company engineers or outside engineering firm calculate savings for pre-approval, calculations reviewed by higher levels of engineering staff depending on size. Random samples of projects sent to outside engineering firm for verification if Company engineers complete analysis. Account Manager or Business Solutions Center verifies project installation and collects equipment invoices. Projects ≥ 1 GWh savings: Pre & Post Metering verifies savings. (Projects of all sizes may be metered depending on certainty assessment of savings).
Data Center Efficiency	Prescriptive	General Prescriptive	Verification Contractor selects random sample & performs field inspections of deemed savings factors (*e.g.*, equipment type, number of equipment).
	Prescriptive	Unique Prescriptive	For verification of the High Efficiency CRAC units measure installation, the VC will maintain a log of any refusals for site entry for M&V, and subsequently seek out, and document, verbal confirmation of installation from the customer and/or installer.
	Custom	General Custom	Projects <1 GWh savings: Company engineers or outside engineering firm calculate savings for pre-approval, calculations reviewed by higher levels of engineering staff depending on size. Random samples of projects sent to outside engineering firm for verification if Company engineers complete analysis. Account Manager or Business Solutions Center verifies project installation and collects equipment invoices. Projects ≥ 1 GWh savings: Pre & Post Metering verifies savings. (Projects of all sizes may be metered depending on certainty assessment of savings).

Energy Management Systems	Custom	General (EMS) & Unique Custom (EIS)	Projects <1 GWh savings: Company engineers or outside engineering firm calculate savings for pre-approval, calculations reviewed by higher levels of engineering staff depending on size. Random samples of projects sent to outside engineering firm for verification if Company engineers complete analysis. Account Manager or Business Solutions Center verifies project installation and collects equipment invoices. Projects ≥ 1 GWh savings: Pre & Post Metering verifies savings. (Projects of all sizes may be metered depending on certainty assessment of savings).
	Behavioral	Behavioral Custom	The third-party implementer, with review by Xcel Energy engineers, will analyze data from energy information systems in accordance with IPMVP criteria and the Company's custom M&V process, to ensure persistence of the behavioral measure's savings. These savings will be reported annually for the duration of the customer's involvement in the EIS measure.
Lighting Efficiency[1]	Upstream / Midstream	Unique Prescriptive	Participating distributors provide sales reports listing the model, wattage, type, and number of bulbs sold. The third-party implementer enters the information into a tracking system and submits monthly reports containing the data and calculation of the demand and energy savings using technical assumptions provided by The Company. The Verification Contractor (VC) audits the database output by examining and comparing against retailer sales reports. The VC adjusts the wattage and number of bulbs if errors are found and provides the final verified savings for all bulbs for year-end.
	Prescriptive	General Prescriptive	Verification Contractor selects random sample and performs field inspections of deemed savings factors (*e.g.*, number of fixtures, equipment type, building type, existence of air conditioning). Information gathered for a sample of lamps/fixtures and extrapolated to total population.
	Custom	General Custom	Projects <1 GWh savings: Company engineers or outside engineering firm calculate savings for pre-approval, calculations reviewed by higher levels of engineering staff depending on size. Random samples of projects sent to outside engineering firm for verification if Company engineers complete analysis. Account Manager or Business Solutions Center verifies project installation and collects equipment invoices. Projects ≥ 1 GWh savings: Pre & Post Metering verifies savings. (Projects of all sizes may be metered depending on certainty assessment of savings).

Small Business Energy Solutions[1]	Prescriptive	General Prescriptive	Verification Contractor selects random sample & performs field inspections of deemed savings factors (*e.g.*, number of fixtures, equipment type, building type, existence of air conditioning). Information gathered for a sample lamp/fixture.
	Direct Install	Unique Prescriptive	Xcel Energy's product implementer documents equipment installed onsite; no further verification is required.
	Custom	General Custom	Projects <1 GWh savings: Company engineers or outside engineering firm calculate savings for pre-approval, calculations reviewed by higher levels of engineering staff depending on size. Random samples of projects sent to outside engineering firm for verification if Company engineers complete analysis. Account Manager or Business Solutions Center verifies project installation and collects equipment invoices. Projects ≥1 GWh savings: Pre & Post Metering verifies savings. (Projects of all sizes may be metered depending on certainty assessment of savings).
Multi-Family Buildings Efficiency[1]	Custom	General Custom	Projects <1 GWh savings: Company engineers or outside engineering firm calculate savings for pre-approval, calculations reviewed by higher levels of engineering staff depending on size. Random samples of projects sent to outside engineering firm for verification if Company engineers complete analysis. Account Manager or Business Solutions Center verifies project installation and collects equipment invoices. Projects ≥ 1 GWh savings: Pre & Post Metering verifies savings. (Projects of all sizes may be metered depending on certainty assessment of savings).
New Construction[3]	Custom - Energy Efficient Buildings	Unique Custom	Consultant visits site or remotely verifies that specified measures were installed. Projects with individual measure savings ≥ 1 GWh savings: Four weeks of data logging verifies savings.
	Custom - Energy Design Assistance	Unique Custom	Consultant visits site or remotely verifies that specified measures were installed. Equipment and systems are monitored for a two-week timeframe, as appropriate, to evaluate performance variables against modeling assumptions. Projects with individual measure savings ≥ 1 GWh savings: Four weeks of data logging verifies savings. All projects verified with actual results not within 15% of the energy savings identified in the original model will have an as-built model completed for rebate calculations.
Strategic Energy Management	Prescriptive	General Prescriptive	Verification Contractor selects random sample and performs field inspections of deemed savings factors specified for applicable end use product.
	Custom	General Custom	Projects <1 GWh savings: Company engineers or outside engineering firm calculate savings for pre-approval, calculations reviewed by higher levels of engineering staff depending on size. Random samples of projects sent to outside engineering firm for verification if Company engineers complete analysis. Account Manager or Business Solutions Center verifies project installation and collects equipment invoices. Projects ≥1 GWh savings: Pre & Post Metering verifies savings. (Projects of all sizes may be metered depending on certainty assessment of savings).

Self-Direct	Custom	Unique Custom	Customer will calculate savings and Company will verify calculations. Customer will develop and implement M&V plan specific to project. Company will review M&V plan and results. Pre- and post-installation metering and verification will be required for all projects with predicted energy savings greater than 0.25 GWh, unless the Company and customer agree upon another methodology. The Company reserves the right to require data measurement and verification for projects of any size.
Business Gas:			
Business HVAC+R Systems	Prescriptive	General Prescriptive	Verification Contractor selects random sample and performs field inspections of deemed savings factors. For boilers -- size and efficiency. For steam traps -- high or low pressure. For all other -- size and implemented measure.
	Custom	General Custom	Projects <20,000 Dth savings: Company engineers or outside engineering firm calculate savings for pre-approval, calculations reviewed by higher levels of engineering staff depending on size. Random samples of projects sent to outside engineering firm for verification. Account Manager or Business Solutions Center verifies project installation, collects equipment invoices. Projects ≥ 20,000 Dth savings: Pre & Post Metering verifies savings. (Projects of all sizes may be metered depending on certainty assessment of savings).
Business Energy Assessments (recommissioning component)	Custom	Unique Custom and Study-Drive Credit	Customer hires an in-network engineering firm to conduct study of building and to determine energy savings for each measure. The engineering firm will use a methodology that has been pre-approved by Xcel. The Xcel engineering team will randomly review vendor studies to confirm that they continue to conform to mutually accepted methodologies.
Custom Efficiency	Custom	General Custom	Projects <20,000 Dth savings: Company engineers or outside engineering firm calculate savings for pre-approval, calculations reviewed by higher levels of engineering staff depending on size. Random samples of projects sent to outside engineering firm for verification. Account Manager or Business Solutions Center verifies project installation, collects equipment invoices. Projects ≥ 20,000 Dth savings: Pre & Post Metering verifies savings. (Projects of all sizes may be metered depending on certainty assessment of savings).

Energy Management Systems	Custom	General Custom & Unique Custom (EIS)	Projects <20,000 Dth savings: Company engineers or outside engineering firm calculate savings for pre-approval, calculations reviewed by higher levels of engineering staff depending on size. Random samples of projects sent to outside engineering firm for verification. Account Manager or Business Solutions Center verifies project installation, collects equipment invoices. Projects ≥ 20,000 Dth savings: Pre & Post Metering verifies savings. (Projects of all sizes may be metered depending on certainty assessment of savings).
	Behavioral	Behavioral Custom	The third-party implementer, with review by Xcel Energy engineers, will analyze data from energy information systems in accordance with IPMVP criteria and the Company's custom M&V process, to ensure persistence of the behavioral measure's savings. These savings will be reported annually for the duration of the customer's involvement in the EIS measure.
Small Business Energy Solutions[1]	Direct Install	Unique Prescriptive	Xcel Energy's product implementer documents equipment installed onsite; no further verification is required.
	Custom	General Custom	Projects <1 GWh savings: Company engineers or outside engineering firm calculate savings for pre-approval, calculations reviewed by higher levels of engineering staff depending on size. Random samples of projects sent to outside engineering firm for verification if Company engineers complete analysis. Account Manager or Business Solutions Center verifies project installation and collects equipment invoices. Projects ≥1 GWh savings: Pre & Post Metering verifies savings. (Projects of all sizes may be metered depending on certainty assessment of savings).
	Prescriptive	General Prescriptive	Verification Contractor selects random sample & performs field inspections of deemed savings factors (*e.g.*, number of fixtures, equipment type, building type, existence of air conditioning). Information gathered for a sample lamp/fixture.
New Construction[3]	Custom - Energy Efficiency Buildings	Unique Custom	Consultant visits site or remotely verifies that specified measures were installed. Projects with individual measure savings ≥ 20,000 Dth savings: Four weeks of data logging verifies savings.
	Custom - Energy Design Assistance	Unique Custom	Consultant visits site or remotely verifies that specified measures were installed. Equipment and systems are monitored for a two-week timeframe, as appropriate, to evaluate performance variables against modeling assumptions. Projects with individual measure savings ≥ 20,000 Dth savings: Four weeks of data logging verifies savings. All projects verified with actual results not within 15% of the energy savings identified in the original model, will have an as-built model completed for rebate calculations.
Residential Electric:			

Home Energy Insights Residential	Behavioral	Behavioral Prescriptive	Actual consumption in the form of meter data is used to M&V this product. Meter data for all participants, comparison homes, and control homes are provided to the third-party implementer for continuous analysis and performance reporting. The third-party implementer compares the consumption of participants (Treatment Group) to those of the Control Group to determine the savings resulting from the product.
Residential New Home Construction	Prescriptive	Unique Prescriptive	The Program's third-party product implementer's RESNET-Certified HERS raters will perform field visits to all participating homes. As in the prior program design, the implementer will perform pre-drywall inspections to verify the quality of the installation of insulation materials and grade them appropriately. The implementer will verify the envelope integrity and that the requirements for the performance tier are met. After verifying all the components meet program requirements, the implemented then submits the home to Public Service for inclusion in the program.
Home Energy Squad[1]	Prescriptive	Unique Prescriptive	Third-party implementer verifies installation of measures.
Home Lighting & Recycling	Prescriptive	Unique Prescriptive	Third party administrator provides tracking data and manufacturer sales reports for bulbs sold. Verification contractor audits the data and compares to manufacturer sales reports. Verification contractor corrects any errors and calculates energy savings based on Public Service assumptions.
Whole Home Efficiency	Prescriptive	Unique Prescriptive	Third-party product implementer performs a walk-through inspection after the homeowner has performed all their planned energy efficiency improvements. The work conducted by a participating installation contractor will be inspected through this method. Contractors will have first five completed projects inspected followed by a ten percent sample of homes. The product has this permanently built into the product as a requirement to ensure all stated improvements have been made prior to issuing the rebate. The Company will also implement a market research survey with customers to gauge satisfaction with the product, auditors, and installation contractors that were used.
Refrigerator & Freezer Recycling		Unique Prescriptive	Verification contractor conducts phone surveys of random sample of participants to verify removal of refrigerator and that refrigerator was operable at time of removal.

Residential Heating and Cooling			Verification Contractor selects random sample and performs field inspections of deemed savings factors (*e.g.*, efficiency ratings). Verification Contractor selects random sample and performs field inspections of deemed savings factors using a defined process. For central air conditioners and centrally ducted heat pumps, this includes verifying load calc was performed, unit sized properly, and that refrigerant charge, air flow, and duct leakage are within acceptable ranges. For other equipment, this includes verifying that the equipment was installed and matches the equipment listed on the application and invoice. In the case of smart thermostats, phone surveys are conducted to confirm if the device was installed at the recipient's home.
School Education Kits	Prescriptive	Unique Prescriptive	Third-party product implementer conducts surveys to teachers/students to confirm what was installed at students' home.
Residential Gas:			
Energy Efficient Showerheads	Prescriptive	Unique Prescriptive	Verification Contractor selects random sample & performs phone survey of deemed savings factors (*e.g.*, did the customer receive the product and was it installed).
Home Energy Insights Residential	Behavioral	Behavioral Prescriptive	Actual consumption in the form of meter data is used to M&V this product. Meter data for all participants, comparison homes, and control homes are provided to the third-party implementer for continuous analysis and performance reporting. The third-party implementer compares the consumption of participants (Treatment Group) to those of the Control Group to determine the savings resulting from the product.
Residential New Home Construction[3]	Prescriptive	Unique Prescriptive	Third-party implementer manages certified energy raters who consult directly with builders during construction phase and then assign a HERS rating (with blower door testing) at end of construction prior to rebating for product. Home size information, measures installed, and HERS rating are verified by product implementer.
Residential Heating and Cooling	Prescriptive	General Prescriptive	Verification Contractor selects random sample & performs field inspections of deemed savings factors (*e.g.*, manufacturer, model, serial number, type of unit installed).
Home Energy Squad[1]	Prescriptive	Unique Prescriptive	Third-party implementer verifies installation of measures.

Whole Home Efficiency	Prescriptive	Unique Prescriptive	Third-party product implementer performs a walk-through inspection after the homeowner has performed all their planned energy efficiency improvements. The work conducted by a participating installation contractor will be inspected through this method. Contractors will have first five completed projects inspected followed by a ten percent sample of homes. The product has this permanently built into the product as a requirement to ensure all stated improvements have been made prior to issuing the rebate. The Company will also implement a market research survey with customers to gauge satisfaction with the product, auditors, and installation contractors that were used.
Insulation & Air Sealing	Prescriptive	General Prescriptive	Verification Contractor selects random sample & conducts phone or remote verification to confirm measure(s) were installed. VC conducts post blower door test for accuracy of air leakage reduction and confirms that the contractor is certified under BPI, registered under Xcel Energy's product, and licensed in Colorado.
School Education Kits	Prescriptive	Unique Prescriptive	Third-party product implementer conducts mail surveys to teachers/students to confirm what was installed at students' home.
IQ Electric:			
Energy Savings Kits	Prescriptive	Unique Prescriptive	Verification Contractor selects random sample and conducts phone surveys to confirm what was installed at recipient's home.
Multi-Family Weatherization	Prescriptive	Unique Prescriptive	Consultant visits building and completes energy audit. The Company engineer reviews audit report and approves or denies report. Consultant visits site or remotely verifies that approved measures were installed and submits final savings in verification report.
Non-Profit Energy Efficiency	Prescriptive	Unique Prescriptive	Consultant visits building and completes energy audit. The Company engineer reviews audit report and approves or denies report. Consultant visits site or remotely verifies that approved measures were installed and submits final savings in verification report.
Single Family Weatherization[2]	Prescriptive	Unique Prescriptive	Contracted weatherization agency visits home, identifies savings opportunities, and then installs measures. Weatherization agency provides documentation of completed measures to third-party product implementer, who submits information to the Company.
IQ Gas:			
Energy Savings Kits	Prescriptive	Unique Prescriptive	Verification Contractor selects random sample and conducts phone surveys to confirm what was installed at recipient's home.

Multi-Family Weatherization	Prescriptive	Unique Prescriptive	Consultant visits building and completes energy audit. The Company engineer reviews audit report and approves or denies report. Consultant visits site or remotely verifies that approved measures were installed and submits final savings in verification report.
Non-Profit Energy Efficiency	Prescriptive	Unique Prescriptive	Consultant visits building and completes energy audit. The Company engineer reviews audit report and approves or denies report. Consultant visits site or remotely verifies that approved measures were installed and submits final savings in verification report.
Single Family Weatherization[2]	Prescriptive	Unique Prescriptive	Contracted weatherization agency visits home, identifies savings opportunities, and then installs measures. Weatherization agency provides documentation of completed measures to third-party product implementer, who submits information to the Company.

[1] Comprehensive Evaluation will be conducted in 2024-2026.

[2] Process only Evaluation will be conducted in 2024-2026.

[3] Codes and Standards Compliance Support Evaluation will be conducted in 2024-2026.

Market Research

A. Description

The Company conducts market research and analysis to support effective design and implementation of DSM/DR/BE products and services. This enhances data on current and potential customers, market segmentation, and engagement drivers. Additional research is conducted through procurement of third-party consultants who review primary and secondary data. Market research subscriptions that offer energy efficiency and/or marketing resources are also purchased. Research projects are selected and completed, providing strategic information regarding customers, DSM/DR/BE products, and business direction for DSM/DR/BE efforts.

In the new plan, the Company plans to continue procurement of the following market research resources:

- *E Source* - Membership provides the Company with research and advisory services that help advance efficiency programs, improve the customer experience, and use energy more efficiently.
- *Dun & Bradstreet* - The list purchase provides specific firmographic information helpful in effectively identifying potential business customers capable of benefiting from existing and planned DSM/DR programs.
- *Residential Segmentation* - This research provides specific demographic information helpful in effectively identifying potential residential customers capable of benefiting from existing and planned DSM/DR/BE programs.
- *JD Power Subscribed Research Services* - A portion of the JD power subscription costs may be allocated to Market Research depending on the survey specific questions and their relevance to program delivery and development.
- *End Use Study* - Provides valuable information regarding saturation of various home appliances and technologies in residential homes. After completion of the 2022 study, the next fielding will occur in 2024.
- *Product Experience* - The measurement provides insight into customer interactions with participating in various programs. This may include a portion of the costs for the customer engagement management system that enables delivery of this survey.
- *Residential and Business Advertising Tracking*: The data ensures the effectiveness and reach of DSM/DR advertising efforts by asking customers reactions and recall of specific campaigns.
- *Potential Studies* – Studies that include a combination of primary and secondary research to calculate potential for customer adoption. Based on the Commission's direction, this will be focused on increasing understanding of DR BE program opportunities in advance of the next Strategic Issues filing.

The list of research projects will be reviewed at the beginning of each year and may be adjusted to align with current information needs.

B. Forecasts, Participants & Budgets

Forecasts and Participants
This indirect impact product does not have participants or energy savings.

Budgets
The budget reflects annual internal research costs and third-party vendor costs for market research to execute surveys, collect data from research participants, and analyze and interpret data, ensuring representative samples of the study populations, to support research results and findings. Respondents may include peer utility contacts with similar programs, customer participants and non-participants, vendor partners and internal staff involved with the programs of interest. Research is often bid competitively among a list of approved vendors.

C. Application Process

This indirect impact product does not have a rebate / participation application.

D. Marketing Objectives & Strategies

Research is focused to identify opportunities that will maximize existing DSM/DR/BE product impacts and identify new marketing opportunities. Market trends are reviewed to identify market potential for DSM/DR/BE products and gauge customer understanding and satisfaction with product implementation.

E. Product-Specific Policies

This indirect impact product does not have any product-specific policies.

F. Stakeholder Involvement

Trade allies and vendors help enable successful execution of market research with integrity and cost-effectiveness. The Company is currently exploring ways to increase stakeholder engagement in the Potential Studies, including use of separate consultants to lead engagement efforts.

G. Rebates & Incentives

This indirect impact product does not deliver customer rebates or incentives.

Planning & Administration

A. Description

DSM Planning & Administration is an indirect service that manages all energy efficiency-related compliance filings, including this Plan, the annual DSM & BE Status Report, and other regulatory filings. This group performs the benefit-cost analyses of all the energy efficiency and load management products, provides tracking of the energy and demand savings achievements, and collaborates with the Resource Planning group to develop inputs for the resource plans. The DSM Planning and Administration group also provides management and oversight of all evaluation, measurement, and verification planning and internal policy guidance, hosts the quarterly DSM & BE Roundtable meetings and correspondence with the Roundtable members, and works with outside consultants, when needed, to bring additional expertise to our product planning. These functions are needed to ensure a cohesive and high-quality DSM & BE portfolio that meets all legal requirements as well as the expectations of Public Service's customers, regulators, and staff.

This service is administrative in nature and is not open to customer participation. However, because this group operates in all the states where Xcel Energy offers energy efficiency products, the Company can lend consistency and share best practices across all the jurisdictions.

B. Forecasts, Participants & Budgets

Forecasts and Participants

As an indirect service, DSM Planning & Administration does not have savings or participation forecasts.

Budgets

The DSM Planning and Administration budget is made up primarily of internal labor costs required to manage DSM & BE filings, regulatory proceedings, stakeholder meetings, and cost-effectiveness analysis. Employee expenses, consulting and contracting services are a small portion of the total budget. Actual expenditures in recent years were used as a guide for development of the 2024-2026 budgets.

C. Application Process

DSM Planning & Administration is not customer-facing, and therefore, has no associated application.

D. Marketing Objectives & Strategies

The DSM Planning and Administration services are not customer-facing, and therefore, have no associated marketing objectives or strategy.

E. Product-Specific Policies

The DSM Planning and Administration services ensure DSM & BE compliance with internal policies and Commission directives.

F. Stakeholder Involvement

Public Service considers its stakeholders for DSM Planning and Administration to be both the internal groups who manage the DSM &BE products and require DSM & BE data, as well as the external governmental agencies, environmental, and customer groups who express interest in the design of and strategy for the Company's future DSM & BE products. The DSM Planning and Administration group meets with its external stakeholders regularly through the DSM & BE Roundtable, but also meets with parties at other times as needed.

G. Rebates & Incentives

There are no customer rebates associated with this service.

Product Development

A. Description

The Product Development team identifies, assesses, and develops new conservation and load management products and services for potential addition to the DSM & BE portfolio. The product development process begins when customers, regulators, vendors, or energy professionals submit ideas through an Opportunity Identification Form or when Public Service staff (*e.g.*, Product Development team) identifies potential opportunities for new products or measures. The Product Development team works on both energy-efficiency and load-management products.

Product Development also supports commercial, industrial, and mixed-use buildings and neighborhood developments striving to incorporate strategies across multiple distributed energy resources technologies to minimize net energy consumption at the site. These projects may require additional assistance beyond that offered in the current EDA offering, including earlier consulting and energy modeling as well as enhanced monitoring and verification once the project is completed and in operation. The focus of Product Development efforts in these projects is to identify strategies that would enable a streamlined, cost-effective approach to serving these projects through the New Construction product in the future.

Opportunity Identification
The Product Development team will screen, research, evaluate, and prioritize ideas for potential inclusion in the DSM & BE portfolio. New items may be added to the portfolio in the form of a new measure within an existing product, launched as a pilot in need of further testing, or as a stand-alone new product. This work enables Public Service to periodically update its portfolio with promising new energy-saving opportunities for customers. The Company reports on its analysis and next steps for concepts submitted via the Product Development Opportunity Identification Form[81] at quarterly DSM & BE Roundtable Meetings.

Custom Efficiency Analyses
The team will review measures being rebated within the Custom Efficiency product on a periodic basis. As emerging technologies become more commonly rebated as custom measures, the Company will evaluate the potential for transitioning them to prescriptive rebates, if cost-effective.

Emerging Technologies Research
Product Development also conducts research on emerging technologies.[82] Product Development works with other utilities, program administrators and research organizations[83] to identify new technologies that have the potential for consistent and measurable energy savings and are close to commercialization. Promising new technologies are then evaluated through the Opportunity Identification process described above.

[81] Opportunity Identification Form.

[82] First added in the 2009/10 Biennial DSM Plan (Proceeding No. 08A-366EG) as part of the Stipulation and Settlement Agreement, Appendix A, ¶f, pg. 4; which stated: "The Company agrees to increase the budget for research on emerging technologies and new program development."

[83] Examples of research organizations include Western Cooling Efficiency Center ("WCEC"), E Source, Emerging Technologies Coordinating Council ("ETCC"), Consortium for Energy Efficiency ("CEE"), and the American Council for an Energy-Efficient Economy ("ACEEE").

Pilots
Pilot products will continue to contribute to the Company's efforts to innovate and explore new approaches to cost-effectively achieve its energy-efficiency goals. The Company selects measures or products to pilot based on a variety of criteria, including potential energy savings, cost of savings, customer interest, market dynamics, feasibility to be developed and brought to market quickly and at a reasonable cost, potential longevity of the offering, level of market barriers and risk. In addition to researching new product offerings and emerging technologies, Product Development also explores and investigates new energy-efficiency concepts, market transformation opportunities and market approaches as part of our long-term DSM strategy.

The Product Development team will support implementation and evaluation of the following energy efficiency and demand response pilots during 2024-2026:

- Heat Savers Mode - Product Development continues to investigate gas Demand Response and the value of smart thermostats. The second year of the pilot has demonstrated the benefit of shifting gas use during peak times in capacity constrained areas. However, additional aspects of the offering need to be better understood prior to launching a full program.

B. Forecasts, Participants & Budgets

Forecasts and Participants
This is an indirect product and as such, has no estimated energy or participation forecasts.

Budgets
The budget was estimated based on the historical costs and expected costs. Product Development spending can fluctuate significantly from year to year depending on the products in development and the funding needed to research and develop those products. Due to the nature of the emergence of new technologies within the market, it is not always possible to predict steady expenditures from one year to the next.

C. Application Process

This indirect product does not include a customer application process. Ideas for new products or measures can be submitted for consideration to the Company by following the detailed instructions included on the forms listed under 'Product Development Idea Submissions' on the Company's website.[84]

D. Marketing Objectives & Strategies

This indirect product does not have marketing objectives.

[84] Xcel Energy - Colorado Demand Side Management.

E. Product-Specific Policies

Product Development utilizes the following criteria to consider whether a DSM BE technology/approach warrants exploration *via* a pilot:

- Does the market assessment indicate broader deployment is possible? Or are additional learnings needed?
    - Does the preliminary assessment sufficiently answer all technical assumptions?
    - Does sufficient market attractiveness exist for a wide-scale deployment?
- Is additional testing necessary to understand/define the true capabilities of the concept?
    - Has the chosen technology solution been widely deployed elsewhere in a comparable program with comparable learnings?
- Does the enterprise infrastructure support a full deployment or do significant manual processes still exist?
- Do the market, technical and functional requirements meet the needs of all impacted groups (*e.g.*, technical, legal, regulatory, etc.) or are additional learnings needed?

F. Stakeholder Involvement

The Company will rely heavily on the active participation of employees, customers, trade allies and vendors to successfully identify and develop new products with a high level of integrity, timeliness, and cost-effectiveness. Representatives of the energy-efficiency industry and other stakeholder groups are engaged in the development process through such channels as the quarterly DSM & BE Roundtable Meetings and the use of Opportunity Identification Forms found on the Company's DSM Website.

G. Rebates & Incentives

This indirect product does not typically provide customer rebates.

Demand Response Programs

A. Description

Demand Response ("DR") provides utilities with a valuable tool for managing peak demand on the electric system. The utility must maintain adequate generation reserve margins to fulfill its obligation to deliver power at all times, even when unforeseen factors impact generation supply. DR offers a lower cost alternative to meet this need as compared to building or acquiring additional generation capacity. The Company's DR portfolio provides customers with an economic incentive, in the form of rebates or bill credits, in return for their commitment to reduce load when called upon. DR benefits all customers by helping create a more reliable electric system at a lower cost.

Demand response differs from *energy efficiency* in that demand response reduces load only during times of peak demand on the electric system and results in relatively little reduction in overall electric consumption. Energy efficiency, in comparison, provides a permanent reduction in overall electric consumption through equipment replacement, or process or behavior change, only a portion of which may be coincident with system peak demand.

There are three DR program constructs that the Company intends to leverage:

- *Direct Load Control ("DLC")* – The Company directly controls a customer's load, remotely, during periods of high demand creating a dispatchable resource. Saver's Switch is an example of a DLC.
- *Interruptible Tariffs* – Customers agree to reduce consumption at a pre-qualified discount. These products are also dispatchable. There is a fee associated with non-compliance with a control event. The Interruptible Service Credit Option ("ISOC") is an interruptible tariff.
- *Other Demand Response* – Products that would fall into this category include capacity bidding, demand bidding, and other offers, as well as offerings that are non-dispatchable, or those that are directly controlled by customers, such as pricing structures. The AC Rewards, smart thermostat program, is an example.

The Company's DR portfolio includes all three types of demand response; however, the majority of customer load is from DLC and interruptible tariffs.

Products

The Company is deploying, as part of this DSM Plan, nine demand response choices. The originating filing and customer targets for each product are identified in the table below.

Table 19: The Company's Demand Response Program Products

Product	Customers	Filing Source
Critical Peak Pricing	Commercial/Industrial	DSM Plan
Electric Vehicle Critical Peak Pricing	Commercial/Industrial	DSM Plan
ISOC	Commercial/Industrial	Proceeding No. 07S-521E
Peak Partner Rewards	Commercial/Industrial	DSM Plan
Peak Day Partners	Commercial/Industrial	DSM Plan
Small Commercial Building Controls	Small Commercial/Industrial	DSM Plan

Electric Vehicle Optimization	Residential	DSM Plan & Transportation Electrification Plan
Residential Demand Response	Residential	DSM Plan
Residential Battery Demand Response	Residential	DSM Plan

DR products will contribute to both energy and demand savings. Demand savings will count towards total controllable load goals.

The intent of these products is to (1) minimize increased load adjustments until such time as there is an identified resource need and (2) test new approaches so that they could be in place as a need is realized.

B. Forecasts, Participants & Budgets

Forecasts and Participants

DR forecasts are created differently than energy efficiency, as such, the tables below show the incremental and total (incremental plus renewing) summer demand reduction estimates for 2024-2026, dependent on claimed measure life for each product. Table 20 summarizes DSM products that will contribute to demand reduction, as shown in the Plan's Executive Summary.

Table 20a: 2024 Demand Response Load for DSM Products

2024	Electric Budget	Incremental Net Generator kW	Total Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Demand Response Program							
Critical Peak Pricing	$431,257	8,667	36,213	1,552,945	718	$6,590,574	N/A
Electric Vehicle Critical Peak Pricing	$106,308	789	873	0	N/A	$59,780	N/A
Peak Day Partners	$525,337	1,743	23,000	515,586	238	$4,326,777	N/A
Peak Partner Rewards	$1,599,142	22,345	34,317	655,154	592	$12,450,481	N/A
Residential Battery Demand Response	$293,322	433	583	33,113	49	$96,011	1.33
Residential Demand Response	$17,357,312	31,114	328,267	171,459	264	$39,860,229	3.29
Small Commercial Building Controls	$482,259	834	2,008	13,291	20	$251,727	1.44
DR Program Total	**$20,794,937**	**65,925**	**425,261**	**2,941,548**	**1,881**	**$63,635,579**	**4.06**
Planning and Research							
DR Planning & Administration	$290,000	0	0	0	N/A		
DR Program Evaluations	$296,613	0	0	0	N/A		
DR Product Development	$1,498,103	0	0	0	N/A		
DR Planning and Research Total	**$2,084,716**	**0**	**0**	**0**	**N/A**		
Demand Management Approved in Other Proceedings							
Electric Vehicle Optimization	$0	1,639	1,639	0	435	$347,858	N/A
Interruptible Service Option Credit	$560,000	4,833	206,408	0	N/A	N/A	N/A
Demand Management Other Total	**$560,000**	**6,472**	**208,046**	**0**	**435**	**$347,858**	**N/A**
DR PORTFOLIO TOTAL	**$23,439,653**	**72,397**	**633,307**	**2,941,548**	**2,316**	**$61,898,720**	**3.69**

Table 20b: 2025 Demand Response Load for DSM Products

2025	Electric Budget	Incremental Net Generator kW	Total Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Demand Response Program							
Critical Peak Pricing	$437,977	4,081	40,294	1,727,959	762	$7,560,750	N/A
Electric Vehicle Critical Peak Pricing	$107,397	312	1,185	0	N/A	$122,516	N/A
Peak Day Partners	$565,475	2,000	25,000	560,420	247	$4,814,132	N/A
Peak Partner Rewards	$1,749,467	3,995	38,311	731,402	497	$14,206,122	N/A
Residential Battery Demand Response	$327,949	433	1,016	33,113	38	$67,536	1.21
Residential Demand Response	$18,004,442	29,870	335,394	173,616	199	$39,006,108	3.16
Small Commercial Building Controls	$705,555	3,020	5,020	48,135	55	$2,003,452	2.98
DR Program Total	**$21,898,262**	**43,710**	**446,219**	**3,274,646**	**1,797**	**$67,780,616**	**4.08**
Planning and Research							
DR Planning & Administration	$221,200	0	0	0	N/A		
DR Program Evaluations	$341,232	0	0	0	N/A		
DR Product Development	$1,519,246	0	0	0	N/A		
DR Planning and Research Total	**$2,081,678**	**0**	**0**	**0**	**N/A**		
Demand Management Approved in Other Proceedings							
Electric Vehicle Optimization	$0	3,739	3,739	0	1,028	$810,868	N/A
Interruptible Service Option Credit	$560,000	654	207,062	0	N/A	N/A	N/A
Demand Management Other Total	**$560,000**	**4,393**	**210,801**	**0**	**1,028**	**$810,868**	**N/A**
DR PORTFOLIO TOTAL	**$24,539,939**	**48,104**	**657,020**	**3,274,646**	**2,825**	**$66,509,806**	**3.73**

Table 20c: 2026 Demand Response Load for DSM Products

2026	Electric Budget	Incremental Net Generator kW	Total Net Generator kW	Net Generator kWh	Lifetime Emissions Savings (Tons CO2)	mTRC Test Net Benefits (WACC)	Electric mTRC Test Ratio
Demand Response Program							
Critical Peak Pricing	$469,898	5,829	46,123	1,977,936	471	$8,783,998	N/A
Electric Vehicle Critical Peak Pricing	$108,519	312	1,497	0	N/A	$187,706	N/A
Peak Day Partners	$643,251	4,000	29,000	650,087	155	$5,683,017	N/A
Peak Partner Rewards	$1,941,286	4,782	43,093	822,694	340	$16,280,968	N/A
Residential Battery Demand Response	$378,337	520	1,536	39,735	32	$102,870	1.27
Residential Demand Response	$18,385,637	28,625	342,380	175,774	136	$38,365,642	3.08
Small Commercial Building Controls	$536,636	1,350	6,270	21,517	17	$696,997	2.03
DR Program Total	**$22,463,564**	**45,418**	**469,898**	**3,687,744**	**1,151**	**$70,101,197**	**4.14**
Planning and Research							
DR Planning & Administration	$67,436	0	0	0	N/A		
DR Program Evaluations	$352,869	0	0	0	N/A		
DR Product Development	$1,540,873	0	0	0	N/A		
DR Planning and Research Total	**$1,961,178**	**0**	**0**	**0**	**N/A**		
Demand Management Approved in Other Proceedings							
Electric Vehicle Optimization	$0	4,656	4,656	0	1,256	$1,029,634	N/A
Interruptible Service Option Credit	$560,000	981	208,043	0	N/A	N/A	N/A
Demand Management Other Total	**$560,000**	**5,637**	**212,699**	**0**	**1,256**	**$1,029,634**	**N/A**
DR PORTFOLIO TOTAL	**$24,984,742**	**51,055**	**682,598**	**3,687,744**	**2,408**	**$69,169,654**	**3.81**

The Commission-approved demand response goals[85] are cumulative (total controllable load) demonstrating the total peak capacity the Company could make available during a control event (as shown in the Table 21). The Commission-approved demand response goals will be used to inform the Company's next Electric Resource Plan. Table 20 includes both incremental and total kW savings for purposes of transparency; the "Total Net Generator kW" columns reflect the

[85]Decision No. C23-0413 at 73, ¶ 180 (mailed June 22, 2023).

program and portfolio achievement for purposes of comparing to the Commission-approved goals.[86]

Except for the Peak Partners Rewards program, winter goals are either the same as summer or zero for programs targeting summer-only loads. It should be noted that the Peak Partners Rewards program is different because customers may sign up for different amounts of load at different times of year.

Table 21: Demand Response– Total System Controllable Load

	2024	**2025**	**2026**
Summer	633	657	683
Winter	292	306	328

[86] Note that the total capacity of a product in a given year may not equal the sum of that year's incremental capacity plus the prior year's total capacity. This is because incremental capacity for some products includes the effect of equipment replacement or other activity that allows continued customer participation and avoids program attrition, but does not necessarily increase the total controllable capacity of the product.

Budgets

The budget is a small increase from expenditures on existing DR products, however, an overall increase in budget for DR overall due to piloting opportunities. For 2024-2026, DR budgets were developed using the same well-defined process as all other energy efficiency products. Budgets are based on cumulative product load, including costs for incremental growth, and maintaining existing product participation.

C. Application Process

Application processes vary by product. See individual product summaries following this overall for more information.

D. Marketing Objectives & Strategies

For commercial and industrial offerings, outreach and marketing efforts are primarily conducted through internal teams such as the Account Management and Business Solutions Center teams.

For residential offerings, marketing and outreach is primarily conducted through direct contact (*e.g.*, emails, direct mail). In addition, the Company has been working with manufacturers, such as thermostat and battery manufacturers, to further encourage customers to enroll in demand response products.

E. Program-Specific Policies

There are no DR program-specific policies. Individual DR products may have unique policies as noted in each of the product summaries that follow.

F. Stakeholder Involvement

Demand Response efforts will follow the same process for stakeholder engagement as energy efficiency products, within the DSM & BE Roundtable when filed originally within a DSM & BE plan.[87] DR efforts are also discussed with stakeholders during other proceedings such as our Energy Resource Plan. Beyond the DSM & BE Roundtable and various proceedings, product managers individually involve trade allies, manufacturers, and other groups in the development of products.

G. Rebates & Incentives

DR products offer annual or event-oriented incentive payments to participating customers rather than traditional one-time rebate payments. Incentive structures vary by product.

[87]The ISOC product was originally filed outside of the DSM Plan, and therefore will not be included in the DSM Roundtable process.

H. Evaluation, Measurement, & Verification

The impacts from the Company's Demand Response products are analyzed annually. Public Service's load research organization leads an annual research project to evaluate the controllable system load available from our Saver's Switch and ISOC products. This analysis includes all product participants still active in each product. For the Saver's Switch product, the team hires a consultant—that specializes in load research—to conduct the data gathering and most of the analysis on a sample of product participants. For the ISOC product, data is recorded. The results are used to document the extent of load relief achieved during each actual control event occurring within the year. The amount of available total controllable system load is determined by this analysis twice annually in early spring and late summer.

The amount of available total controllable system load is made up from the cumulative historical achievement of incremental participation reported in past Status Reports. This available total controllable system load will differ from the sum of the incremental generator kW achievements reported in past Status Reports due to various reasons, as mentioned above, including but not limited to:

- *Load Loss:* Within DR products there are factors we define as a "load loss pool." This pool includes customers who choose to discontinue participation, as well as those who may adjust their commitment to a lower load reduction.
- *Regulation:* EPA rules, historically, can have an impact on the participation within the commercial and industrial products. Previously, changes to backup generation rules resulted in a significant drop of load from the ISOC product.
- *Savings Estimates:* The Saver's Switch component of the Residential Demand Response product assumes a deemed controllable system load per switch estimate in Status Reports. The actual controllable system load can vary over time. The Company uses data logging on a sample of installed Saver's Switches to identify the available system controllable load per switch. These data loggers record the actual load of the air-conditioning units controlled by the installed switches. This recorded load is used to estimate the available system controllable load at typical system peaking conditions. This estimated available system controllable load can vary over time due to changes in air conditioner efficiencies and residential conservation efforts. Additionally, performance of the switches varies over time due to the disconnection or mechanical failure of switches.

The results of the annual analysis of the impacts from the Company's Demand Response program is combined with a forecast of the future participation in each DR product to produce a forecast of the total controllable system load expected in the future, referred to as the Load Management Forecast. The Company uses this annual analysis, combined with the actual participation in each DR product, to determine the achievement of total system controllable load goals in annual Status Reports.

Pilot products include their own M&V procedures and are discussed in detail within the individual pilot write-ups.

Critical Peak Pricing

A. Description

CPP is a tariff rate that was introduced through Public Service's Phase II rate case.[88] With the approval of the rate by the Colorado Public Utilities Commission, the Company has offered the product as an additional resource for meeting its demand response goals. Price signals can be used to provide an incentive to reduce system costs, including reducing system peak, ultimately reducing costs for all customers. Tariffs focused on the reduction of system peak act much like DR products, and as such should count towards the DR goals.

CPP products attempt to strongly encourage, rather than require, customers to reduce their usage during periods when forecasts indicate the electric grid will experience high system loads as a percentage of available generation capacity. The nomenclature "critical peak" is a reference to such periods. The term "pricing" indicates the Company will charge a high price for usage during these critical periods that will encourage customers to reduce their usage, rather than requiring pre-determined load reductions. During all other hours, customers are assessed lower charges. While primarily focused on summer peaks, this product can be utilized year-round.

The CPP tariff is available to commercial and industrial ("C&I") customers who have existing interval metering. The CPP offering provides an additional choice to customers with an opportunity to reduce their bill by managing their energy usage and contributes to reducing system costs by reducing system peak via the response price signals. This product provides an alternative for customers who cannot or choose not to participate in the Company's other DR products such as ISOC or PPR.

Participating customers will receive day-ahead notification of when "critical peak" periods will occur. CPP events shall be four-hour events occurring between the hours of noon and 8 p.m. A maximum of 15 CPP events can be called during a calendar year.

To better manage their energy usage during CPP events, participants will be provided with access to their electric load profile data in near real time. Access to this data will allow participants to monitor their performance during events and provide insight into their energy use throughout the year.

The CPP tariff is designed to be "revenue neutral" for the class average customer. That means a customer with the average load profile within a given rate class would pay the same amount for electricity on an annual basis whether they were on the standard rate or the CPP rate if they do not modify their consumption. This design provides a strong incentive for reducing usage with little inherent risk of an overall increase in electric bills.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The CPP tariff is targeted to larger C&I customers with the sophistication and ability to manage and curtail their energy consumption. Customers will primarily be recruited by the Company's

[88]Proceeding No. 16AL-0048E.

Account Management and BSC teams. Market segments which may be interested in this product include:

- *Manufacturing* – ability to curtail a process line or production shift during an event
- *Office (commercial, institutional, etc.)* – ability to pre-cool, adjust HVAC settings and shed discretionary loads
- *Water/wastewater treatment* – ability to shift process times

For the 2024-2026 DSM & BE Plan, the Company anticipates incremental demand reduction of 24 MW.

Budgets

All administrative and implementation costs are included in the annual budget. Unlike other DSM products there is no monetary incentive associated with this product. Product costs are attributed to the following areas:

Administration – This category covers costs associated with day-to-day operations including managing the product, executing marketing strategy, customer recruiting and enrollments, and support from internal teams such as Account Management and Business Solutions Center.

Equipment & Installation – This category reflects the cost to purchase and install monitoring equipment at each participant's facility. Most of these expenditures are allocated to new participants and realized by the product during each customer's first year of participation. Future expenditures will reflect costs of growing the product incrementally and any ongoing equipment maintenance for current participants.

Advertising & Promotion – This category is for marketing campaigns and associated collateral. The CPP product will require the need for ongoing customer support and communication to ensure the product delivers reliable results year over year.

C. Application Process

Account Management will act as the primary channel for delivering this product to market. Account Managers will discuss the CPP tariff option with customers. Those customers wishing to participate will request to be placed on the new tariff. After verifying eligibility with the Product Manager, the Account Manager will initiate the tariff change for the customer.

Once a customer has elected to be on the CPP tariff, monitoring equipment will be installed to provide the participant with near real time access to their load profile data. Though each participant's configuration may vary depending on their unique circumstance, in general this equipment will consist of a "pulse" device to transmit data pulse outputs from the customer's revenue meter and a data logger to record and translate the pulse outputs and communicate this data back to the Company's Demand Response Management System ("DRMS"). This process is estimated to take up to 60 days.

D. Marketing Objectives & Strategies

A critical part of the CPP product's success will be the Company's ability to locate potentially eligible customers and assist them with participating in the product. A qualification of this product is the existence of interval metering. This customer base is made up primarily of "managed accounts." Potential customers will be contacted by their Account Manager to discuss the product. The objective of the meeting is to introduce the customer to the product, discuss tariff requirements, and assist the customer in identifying controllable loads which could be shed during a critical peak event.

Marketing and communication materials will communicate the features and benefits of the product. These will include a rate evaluation tool which Account Managers can use to help customers evaluate whether the CPP rate offers them potential savings opportunities.

A key asset enabling this product will be the Company's DRMS. This system provides the platform from which all its demand response products are managed. In addition to managing events and providing customer notification the system will provide product participants with near real time access to their load profile data. Having this data will allow participants to manage their energy use during events to help them maximize their savings.

The CPP product will require the need for ongoing customer support and communication to ensure the product delivers reliable results year over year. Therefore, marketing is a continuous process, not a single event, which includes initial discussion to recruit participants, then ongoing engagement with participants to ensure they are aware of and can continue to evaluate the benefits of the product to retain these customers.

E. Product-Specific Policies

All product-specific policies are provided in full detail within the CPP Service (Schedules SG-CPP, PG-CPP, and TG-CPP) electric rate tariffs. Note that the tariffs may be updated annually and mid-cycle changes to CPP may not be reflected within this Plan.

Qualification:
CPP is available to all Colorado business customers receiving electric service under Schedule SG, PG, or TG with the following qualifiers:

- Customers must have existing interval metering
- Customer's load factor for the previous 12 months is 30% or greater.
    - Load factor ("LF") is calculated as the customer's total annual usage in kWh divided by the product of the customer's annual peak demand in kW times 8,760. ($LF = kWh_{annual}/(kW_{peak} \text{ X } 8{,}760)$

Contract Term:
There are no contracts associated with this product other than the associated tariff. A minimum period of one-year participation is stipulated within the tariff. The customer may elect to leave the tariff after 12 months and revert to their original rate plan.

Events:
CPP events are triggered whenever forecasts indicate the electric grid will experience high system loads as a percentage of available generation capacity. Based on historical system peaking conditions, events are most likely to be called during the summer months of June through September, but events may occur in any month throughout the year.

Events may be called between the hours of noon and 8:00 p.m. MT. Events shall be four hours in duration within this time period. Customers will be subject to no more than one event in any 24-hour period. No individual customer will experience more than 15 events per calendar year, for a total of 60 critical peak hours per year.

Load Reductions:
Load reduction will be determined by dividing the total energy reduced during the event period as measured in kWh by the number of hours in the event. Energy reduction will be calculated by subtracting the customer's actual usage during an event from the customer's baseline consumption for the same time period. The aggregate of participant's load reductions during critical peak events will be used to determine the amount of Demand Response provided by the product. Initially this amount has been estimated at 20% of the participant's peak demand based on the Company's investigation of similar programs from other utilities. As results from actual events become available the DR estimates can be adjusted to align with actual expected performance.

Baseline Consumption:
For purposes of determining a participant's load reduction, the customer's load during an event will be compared to the customer's baseline load. The baseline methodology being proposed for this product is an adaptation of baseline calculations the Company has used in past products. Public Service updated its historical approaches by reviewing "Measurement and Verification for Demand Response" (2013). This document, commissioned by the National Action Plan on Demand Response Measurement and Verification Working Group, focuses on providing "best DR M&V practices in various market and program contexts." This report provided valuable context on different baseline approaches, and several recommendations contained within the report have been incorporated into the baseline.

Specifically, for this product, the baseline usage for any 15-minute interval during an event will be calculated as the average of the measured demand during the same interval of the customer's five (5) highest energy consumption days within the last ten (10) non-holiday, non-weekend, non-event days.

An event day correction will be made to each 15-minute interval during the event to reflect the impact of weather or other operational changes which could cause substantive differences between the event day and the baseline calculation. This event day correction will be the average 15-minute kW difference between the baseline calculation and the participant's actual load during the hour prior to event notification.

As customer baselines are inherently unobservable, one cannot measure usage which never took place, a poor baseline methodology can lead a systematic bias. To help mitigate this problem, Public Service will regularly evaluate baseline calculations. This can be done by selecting sample participants, calculating their baseline consumption for a simulated event day, and evaluating the difference between the calculated baseline and actual loads. Should these simulations show significant bias that is leading to inaccurate baseline assumptions, then Public Service will develop and recommend changes to the baseline methodology. It is proposed that such an evaluation be

done annually prior to the summer event season. Should any changes be warranted, updates to the product would be made through 60-day notice.

Incentives:
Customers do not receive a monetary incentive for participating in the CPP product, however the "incentive" to participants is the opportunity to save money by reducing usage during high priced critical peak events. Further, participants will realize savings from the CPP tariff's reduced demand charges. Participants will also receive the benefit of having access to their electric load profile data in near real time. Access to this data will not only allow participants to monitor their performance during events, but also provide insight into their energy use throughout the year. Data will be provided in near real time with updates occurring at least every fifteen minutes through a customer portal feature of the DRMS.

Notification:
Participating customers will receive advance notice of events. Notifications will be delivered a minimum of 22 hours prior to an event and are typically sent during normal business hours between 8:00 a.m. and 5:00 p.m. MT. Notifications will be sent to the customer's designated contact(s) via e-mail, SMS text, voice message, or combination thereof as specified by the customer. Customers are responsible for ensuring contact information is kept current via the DRMS or by notifying their Account Manager or the Product Manager if any changes are necessary.

F. Stakeholder Involvement

Colorado business customers have played a major role in the on-going dynamics of this product. Additionally, key internal stakeholders such as the Account Management team have provided consistent feedback on product performance and customer satisfaction that continuously influences product design and operations. The Company continues to meet frequently and interact with these business customers and internal stakeholders to encourage their input.

G. Rebates & Incentives

There are no monetary rebates or incentives associated with this product comparable to other DSM products in the portfolio. The CPP participant's incentive is avoiding high priced energy charges during critical peak periods. These charges are established through the CPP tariffs put forward by the Company as part of its Phase II rate case. During critical peak periods participating customers will be charged the following based on their respective rate class:

SG-CPP	$1.44/kWh
PG-CPP	$1.40/kWh
TG-CPP	$1.35/kWh

These rates were established to provide a strong incentive for customers to reduce their usage during these critical periods. Additionally, the Company believes customers must see the opportunity to make a substantial impact on their annual electric bill to entice their participation. As CPP events are limited to 60 hours per year the effective price per kWh was set quite high to present an opportunity for substantial bill savings. At these price points, with an estimated usage reduction of 20% during peak periods, annual bill savings of between 5%-10% could be obtained.

Furthermore, participants face limited risk of increased electric bills as compared to the standard tariff as the CPP rates are designed to be revenue neutral on an annual basis.

H. Evaluation, Measurement, & Verification Plan

The Company will collect interval data from each participant in the CPP product from monitoring equipment installed as part of product enrollment and/or interval data metering installed as part of their regular electric service. This data will be stored and analyzed within the DRMS. Product performance for each event will be calculated by subtracting the actual aggregated usage of all customers from the aggregated baseline usage during the event window. This calculation, both on the portfolio level and for individual customers, will be automated through the functionality of the Company's DRMS. Performance data will be available to individual participants through the customer portal feature of the DRMS. Customers can view their usage at any time using their unique username and password to log into the system. The amount of demand reduction supplied for a given event is calculated by subtracting the actual aggregated usage of all customers from the aggregated baseline usage during the event window.

Electric Vehicle Optimization - Static Charging

The Electric Vehicle Optimization programs started in Demand Side Management during 2021. The recent Transportation Electrification Plan or "TEP" (Proceeding No. 23A-0242E) proposes a transfer of these EV Optimization programs to the TEP. The following verbiage represents the Demand Side Management's intentions regarding Electric Vehicle Optimization whereby the details are meant to complement the TEP. The Electric Vehicle Optimization budget will be managed under the TEP, while the program savings will fall under the DSM plan.

A. Description

Static Optimization, marketed as "Optimize Your Charge" to customers, is an offering that seeks to manage the grid impacts of electric vehicles ("EVs") by working with customers to schedule their daily EV charging based on the customer's selection of a preferred schedule that ensures charging occurs outside the Company's system peak.

Static Optimization includes several core features:

- *Schedule selection*: During enrollment, the customer will choose their preferred charging schedule. The Company offers three 9-hour charging schedule options to customers; 9:00 p.m. to 6:00 a.m., 12:30 a.m. to 9:30 a.m., and 6:00 a.m. to 3:00 p.m.

- *Opt-out*: Customers will be able to override their chosen charging schedule with no restrictions.

- *Rebate*: In exchange for participating and meeting a 25% performance minimum, the customer will receive $50 bill credit.

- *Behavioral reinforcements*: Since the offering allows the customer to override without penalty and the customer can also re-set their schedule at any time, the Company will utilize behavioral reinforcements to keep customers engaged and re-engage customers that are consistently overriding or that have changed their schedule. Using data it receives from selected vendors, the Company will be able to track customer participation, and it will use this information to inform its behavioral strategy.

To set the charging schedule, the Company will utilize communication and educational materials that direct the customer to set their schedule either within their vehicle (or vehicle mobile app) or through their charging station (or charging station mobile app) as relevant for the customer. For participating customers that also choose to participate in products where the Company installs, owns, and maintains a charging station at the customer's home or premise, the Company will work with its chosen installation partners to program the charging station to the customer's selected charging schedule at the time the charging station is installed.

The Company used a competitive process to select vendors to provide charging data for participating customers. Current vendors include two EV charger Original Equipment Manufacturers ("OEMs") and a third-party vendor able to access charging data through Application Programming Interfaces ("APIs") with automakers.

By establishing a charging schedule for Static Optimization participants, the Company will reduce on-peak charging, reduce operating costs by increasing charging during lower cost hours, and will reduce local distribution problems that can be caused by the coincidence of charging start times.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The Company is targeting residential EV drivers that charge at their home location. In addition, the Company is targeting commercial customers that have light-duty fleets that operate in a similar way to residential customers and that utilize the same vehicle and charging station equipment manufacturers.

Budgets

The budget includes costs for vendors, rebates, administration, and EM&V through the end of 2026. Marketing is being performed by our third-party vendor, as well as campaigns proposed under the TEP.

C. Application Process

Customers that seek to participate in Static Optimization will enroll through the Company's website where they will be able to view product details and submit an application that includes fields such as name, address, email, and information necessary for the vendor to identify and enroll their vehicle or charging station as a product participant. The customer will also agree to product terms and conditions during this process.

D. Marketing Objectives & Strategies

The Company leverages strategies proposed in its TEP to provide residential customers with information about EVs and EV-related offerings. These strategies include digital placements such as search engine marketing, banners, and social media posts to direct car buyers and EV drivers.[89] The website will consist of product information as well as an EV Advisor tool to help customers decide whether and how to participate in the Company's Optimization product.

E. Product-Specific Policies

A customer is eligible to participate in Optimization if they meet the following requirements:

- Own or lease an EV;
- Have an active Xcel Energy account that receives electric service;
- Be a residential customer and charge their vehicle at their home address in Xcel Energy Colorado service territory;
- Have a charging location that has access to Wi-Fi if customer is relying on the use of their networked charging station for participation in Optimization;
- Not already enrolled in conflicting EV Optimization offering from Xcel Energy.

[89] https://ev.xcelenergy.com/.

F. Stakeholder Involvement

The Company has updated both internal and external stakeholders on the pilot through on-going DSM Roundtables and in regularly scheduled EV stakeholder meetings related to the TEP filing.

G. Rebates & Incentives

Optimize Your Charge provides a $50 bill credit to all customers that meet the minimum performance criteria of 25% EV charging time conducted within their chosen Optimize Your Charge charging schedule. Bill credits are paid to eligible customers on an annual basis.

Customers are emailed performance information updates on a quarterly basis, and are given the opportunity to improve, or reach out to correct technical issues with their charging data.

H. Evaluation, Measurement, & Verification

For Static Optimization, the Company has partnered with a third-party evaluator to provide analysis of customer charging data. Data for the Static Optimization analysis came from the participating vendors.

Customer charging data has been within the expected range, with customers successfully moving their EV charging to off-peak hours.

Electric Vehicle Optimization - Dynamic Charging

The Electric Vehicle Optimization programs started in Demand Side Management during 2021. The recent Transportation Electrification Plan or "TEP" (Proceeding No. 23A-0242E) proposes a transfer of these EV Optimization programs to the TEP. The following verbiage represents the Demand Side Management's intentions regarding Electric Vehicle Optimization whereby the details are meant to complement the TEP. The Electric Vehicle Optimization budget will be managed under the TEP, while the program savings will fall under the DSM plan.

A. Description

Dynamic Charging, marketed as "Charging Perks" to customers, applies active managed charging which relies on communication between utilities or aggregators and EVs[90] to dynamically optimize EV load based on forecasts or real time grid conditions. Charging Perks executes a Dynamic Optimization strategy that evaluates how the Company can leverage the flexibility of EV charging. The Dynamic Optimization approach works with automakers and/or vendor partners (*e.g.*,WeaveGrid) to coordinate a customer's daily EV charging schedule based on key variables such as day-ahead forecasts of power production costs, day-ahead forecast of renewable generation, day-ahead forecasts of weather, vehicle state of charge, and customer driving preferences.[91] A major goal of Charging Perks is to match customer EV charging to periods when electrical costs are low and/or renewables are plentiful
through dynamic scheduling adjustments.

The impact of electrical rates shows that tariffs can be effective at shifting EV charging outside of system peaks, but more active control via smart charging capabilities may further improve the customer experience and provide greater precision to accomplish other objectives like integrating more renewable energy.

EVs are poised to become a significant source of electrical demand over the coming decades across Xcel Energy's service territories. These vehicles are new electrical loads that never existed before in most residential homes and commercial businesses which typically consumed electricity for common living or business reasons such as interior lighting, air conditioning, refrigeration, etc. The American market continues introducing electrical vehicles to consumers, and people are adopting EVs as a new load to their electrical obligations.

The number of EVs that will be on the American roads in the future is dependent on several factors like government policies, consumer preferences, technological advancements, market dynamics, etc. For example, a Biden Executive Order is targeting 50% of new vehicles sales to be ZEV (Zero Emission Vehicles) which includes BEV, PHEV, and fuel-cells.[92] There are several resources for research on the adoption rates of EVs across the United States. Entities like EPRI, Bloomberg NEF, Bloomberg Intelligence, Consulting Agencies, and even other utilities all predict increased

[90] Electric vehicles refer to both battery electric vehicles ("BEV") and plug-in hybrid electric vehicles ("PHEV").
[91] Charging Perks customers designate a specific time by which they want their EV charged. For example, a customer may want their EV charged by 7:00 a.m.
[92] FACT SHEET: President Biden Announces Steps to Drive American Leadership Forward on Clean Cars and Trucks | The White House.

EV numbers in future years. According to the Edison Electric Institute ("EEI"), there will be more than 26MM EVs on U.S. roads in 2030.[93]

As EV adoption continues penetrating the transportation sector, drivers are likely to charge their EV as needed, resulting in random charging schedules that may also have negative impacts to the grid. These EVs could increase summer peak demand in Colorado, and the uncoordinated charging could require substantial infrastructure investment in the electric system to compensate for this variable demand. EVs represent demand growth, but they also represent strain at the grid edge on distribution nodes when the vehicles charge in uncontrolled ways. The effects of EV charging will be felt locally on the distribution system, especially under a clustering scenario where a neighborhood with several EVs might stress a feeder when all vehicles charge at the same time. Residential EV charging may challenge the capacity of the distribution system and thereby require upgrades to transformers and conductors, but distribution costs could be mitigated thanks to dynamic charging which actively charges EVs in a coordinated manner at the most conducive times for the grid. An early analysis conducted using data from Sacramento Municipal Utility District ("SMUD") found local distribution costs ranged from $34 to $2,000 per EV, escalated as the power of the charging solution used by homeowners increased, and could be nearly eliminated with a combination of smart charging and time-varying rates.[94]

Active charging can include benefits such as *Load Shifting*. Distribution impacts from EV charging could be countered by leveraging dynamic EV charging as a strategic asset. As the grid incorporates more renewable energy and adds more distributed intelligence, utilities could harness the flexibility of active EV charging.

First, dynamic optimization can shift EV charging demand outside system peaks to provide capacity savings. Second, dynamic optimization can shift charging into the hours with the lowest electricity production costs. Third, dynamic optimization can encourage charging at certain hours to reduce wind and/or solar power curtailments. The combination of these three applications will continue demonstrating how smart charging can mitigate on-peak demand from EV load. Charging Perks will also pave the way for future opportunities to leverage the flexible EV load to operate the system of the future.

The innovative approach of Dynamic Optimization has proven successful during the pilot of 600 EVs that was expanded to 1,000 EVs. By working with the automobile original equipment manufacturers ("OEMs") and vendor partners, the Company communicated demand management instructions to each OEM and vendor partner, who then communicated directly to the EVs charging at home. The Charging Perks pilot has been successful at: shifting load to off-peak hours, encouraging charging during hours with low production cost, avoiding the need for additional capacity, helping marginal CO2 emissions savings, and avoiding renewable curtailments.

[93] EEI Projects 26 Million Electric Vehicles Will Be on US Roads in 2030. |

[94] Berkheimer, J., Tang, J., Boyce, B., and Aswani, D., "Electric Grid Integration Costs for Plug-In Electric Vehicles," SAE Int. J. Alt. Power. 3(1):2014, doi:10.4271/2014-01-0344.

Plans

The Company has requested Commission approval in TEP proceeding No. 23A-0242E to make Charging Perks a permanent option for EV customers, remove the 1000 EV participation cap, and transfer the program from the DSM portfolio into the TEP portfolio. DSM submitted a 60-day notice to the Commission with a deadline for comments by early October 2023. The Charging Perks pilot reached the current cap of 1,000 participants, so lifting this cap via 60-day notice would allow the Company to add additional Charging Perks participants. The comment period closed for the EV Optimization 60-day notice without any comments, so DSM will operate Charging Perks without a participation cap.

B. Forecasts, Participants & Budgets

Forecasts and Participants

The Company is targeting residential EV drivers who charge their vehicles at home. Charging Perks launched in 2021 with an initial cap of only 600 participants because the Company had limited IT bandwidth to manage the pilot operations. The primary challenges with the Charging Perks pilot were processing customer enrollments. There were several manual procedures in the beginning, but the Company has since integrated new IT resources such as Visual Basic for Application ("VBA") which helped expedite some manual processes. This VBA coding increased efficiency and led the company to expand the cap from 600 to 1,000 participants in the 2023 DSM/BE plan. The Company has since integrated Python code to remove most of the manual procedures and therefore accelerate operations. Due to high interest from EV owners, new models of EV's populating the market, and continued engagement from stakeholders - the Company plans to remove participant caps. The automation benefits from the VBA and Python codes save the Company several workhours and optimizes the operational efficiency of Charging Perks. With these improvements, the Company is well positioned to handle the growth of the program.

Budgets

The budget includes costs for vendors, financial incentives, administration, and M&V through the end of 2026. Marketing for Dynamic Optimization will be performed by the automakers and vendor partners.

C. Application Process

Customers who are interested in applying for Dynamic Optimization are directed to apply through the Company's Charging Perks website, which provides hyperlinks to online applications based on the EV make.[95]

As part of the enrollment process, the customer will provide common enrollment information (name, address, email, make, model, etc.) and agree to the Company's terms and conditions. The automakers or vendor partner will securely share enrollment information with the Company through DAT files, encrypted files, csv files, and/or sFTP[96] sites. The Company will review the Customer's eligibility for the program and then inform the automaker or vendor partner about the customer's enrollment status.

[95] Charging Perks | Xcel EV Shopping Advisor (xcelenergy.com).

[96] Secure File Transfer Protocol that uses secure shell encryption to provide security for sharing files.

D. Marketing Objectives & Strategies

The Company will leverage strategies proposed in its TEP to provide residential customers with information about EVs and related offerings. These strategies include digital placements such as search engine marketing, online banners, and social media posts to guide EV buyers and drivers to Xcel Energy's EV websites. The websites will consist of product information and program descriptions as well as EV Advisor tools to help customers decide whether to participate in the Company's EV programs.

Marketing for Dynamic Optimization will be performed by the automakers and partners. The participating automakers and vendor partners for Charging Perks will market directly to their EV drivers in the Company's Colorado service territory.

E. Product-Specific Policies

A customer is eligible to participate in Charging Perks if they meet the following requirements:

- Owns or leases an eligible EV with on-board telematics that communicates with the OEMs;
- Owns or leases an EV with on-board telematics that communicates with vendor partners;
- Has an active Xcel Energy account for electric service;
- Is a residential customer inside the Company's Colorado service territory;
- Charges their EV at their home address in Xcel Energy Colorado service territory;
- Has a charging location with access to Wi-Fi;
- Not already enrolled in a conflicting EV Optimization offering from Xcel Energy.

F. Stakeholder Involvement

For Dynamic Optimization, the Company conducted a significant amount of stakeholder engagement prior to the filing of the pilot as a 2019-2020 DSM Plan Modification. Additionally, the Company has updated stakeholders about the pilot through on-going DSM Roundtables and in EV stakeholder meetings to gather stakeholder feedback based on their views of managed changing.

G. Rebates & Incentives

Dynamic Optimization offered different incentive levels to customers based on their EVSE.[97] Charging Perks initially provided a $100 upfront incentive for enrollment coupled with an annual incentive between $50-100 depending on the customer's charging rate (kW). The incentives are designed to attract participation and retain customers, not to reflect the compensation level or structure for any future offering. The Company is proposing to reduce customer incentives. Although the Company believes that managed charging is an important strategy to proactively mitigate the grid impacts of vehicle electrification, the current incentives exceed current grid benefits.

[97] Electric Vehicle Supply Equipment which is an EV charger.

An analysis of benefits associated with our current managed charging programs was prepared as part of M&V activities for the pilot phase of Dynamic Optimization. This analysis attempted to value the annual grid benefits achieved from active control managed charging, both by shifting load to off-peak times and greater utilization of increased renewable generation. The preliminary findings based on analysis of 2022 data indicates that Charging Perks delivers less than $25 of benefit per EV. This amount does not take into consideration the potential future benefits that may be realized when active control charge management evolves to control assets to mitigate localized distribution constraints. Nevertheless, the grid benefits of managed charging may increase over time as methodologies to quantify locational, regional, geo-targeted values are developed. As the Charging Perks program evolves, the Company will continue to analyze the benefits and costs. The Company will also seek to modify incentive amounts as appropriate.

The new table below summarizes the planned incentives for Charging Perks customers from 2024-2026. Incentives will no longer be in the form of gift cards; instead, the incentives will be in the form of customer bill credits.

New Structure			
Offering	**Customer Type**	**Initial Incentive**	**Annual Reward**
Dynamic Optimization	**Level 1** Level 1 chargers use a standard 120-volt plug and provide approximately 4 miles of range per hour of charging.	$50 Bill credit	$50 Bill credit
Dynamic Optimization	**Level 2** Level 2 chargers require 208/240-volt electrical service and typically provide approximately 20 to 60 miles of range per hour of charging.	$50 Bill credit	$50 Bill credit

H. Evaluation, Measurement, & Verification

The Company plans to continue evaluating Dynamic Optimization into the future and build upon previous learnings highlighted in the TEP[98]. Several calculations that were originally outsourced to third parties from 2021-2023 will now be conducted internally by the Data and Analytics team. As Dynamic Optimization transitions to a full-scale offering the EM&V functions will transition to the corresponding portfolio-level approach. When appropriate, the Company's EM&V plan may include research objectives related to Dynamic Optimization such as:

- Assessment of the EV charging counterfactuals—Use of scenario analysis, plug-in times, and baseline days to assess how EVs are charged outside of optimized schedules;
- Evaluation of smart charging performance—Use of charging data to evaluate avoided capacity, CO2 emissions savings, operational cost savings, and reduced renewable energy curtailments.

Data used in the analyses comes from telematics data that is logged and communicated from participant vehicles to the automaker, and then shared with Xcel Energy. The specific information

[98] Hearing Exhibit 106, Attachment CAG-1_ Guidehouse CP Analysis_Memo.pdf (xcelenergy.com).

in M&V reports will be governed by data sharing rules set by the Public Utility Commission, policies of the participating OEMs, and the contract terms agreed to between the Company and the OEMs or vendor partners.

Interruptible Service Option Credit

A. Description

The ISOC product offers significant savings opportunities for Public Service's business customers who can reduce their electric demand when notified. In return for participating, customers receive a monthly credit based on the notification option and total interruption hours they select.

During periods of peak demand, such as hot summer days, the system may require more power than is normally available. By participating in this product, ISOC customers help reduce the amount of electricity needed, which helps Public Service meet electric system requirements at critical times.

The product is a tariff rate approved by the Colorado Public Utilities Commission,[99] and is available to commercial customers in Public Service's electric service territory. To qualify, customers must have an interruptible demand of at least 300 kW during the months of June, July, August, and September. In addition, the customer must have a Contract Interruptible Load ("CIL") of 300 kW or more.

The customer's contracted interruptible load is the median of their maximum daily one-hour integrated demands, which occurred between noon and 8 p.m. on Monday through Friday (excluding holidays); from June 1 through September 30 of the previous year. In addition, their interruptible demand is the maximum daily integrated demand used during the month that occurred each day between noon and 8 p.m., less any firm demand. Customers must install a phone line that is connected to their meter. This will allow Public Service to provide near real-time usage information.

The participating customer signs a contract that includes their selected firm demand, the hours of interruption per year, and other available options. Customers can use electricity as usual until Public Service notifies them of a control period. The Company will give advance notice before requiring the customer to curtail electricity use. Then, during the interruption period, customers cut their electricity use down to the firm demand chosen in their product agreement.

Customers choose the amount of interruption appropriate for their facility. The credit they receive is tied to the capacity offered to the Company and number of hours they contract to be interrupted each year.

Interruption periods can occur at any time of year and are triggered as a result of capacity, contingency and/or economic constraints. Economic interruptions are the only interruptions that offer the customer a buy-through option. All interruptions (events) last a minimum of four hours unless the customer has chosen to waive the four-hour minimum interruption timeframe. If customers do not meet their agreed-upon load reduction, they will be charged penalties.

B. Forecasts, Participants & Budgets

[99]Proceeding No. 07S-521E.

ISOC is available to all customers that qualify for the Schedule ISOC tariff. The annual credit amounts are primarily influenced by the amount of controllable load made available by participants along with participant-selected options such as annual control hours and firm demand nominations.

As of August 2023, there are 68 Public Service customers participating in the ISOC product, with 67 customers participating via Part B and 1 customer participating via Part C of the tariff. All ISOC customers are now considered Within 10 Minute Notice participants as the one-hour notice option was eliminated in 2019.

ISOC budget items include labor, equipment, and the development of marketing materials, such as customer ISOC DRMS Training Guide (described in Section D below), as well as an annual training for customers and Account Managers to share updates on any enhancements or revisions to the product.

C. Application Process

Public Service Account Managers play a vital role in communicating the benefits of this product to potential customers. They spend a great deal of time with the customer throughout the application process to ensure that the customer meets all the requirements of the product, and that all product information is understood. When customers decide to join the product, they will work with their Account Manager to determine the following:

Qualification:
ISOC is available to all customers that qualify for the tariff rate. Prior to completing a contract, the customer must have a minimum of 300 kW of Interruptible Demand in each of the summer months of June, July, August, and September. Additionally, the customer's CIL for Planning Reserves must be greater than 300 kW. The Interruptible Demand and CIL figures may be reduced by any Contract Firm Demand the customer chooses. A minimum is required for summer months; however, events can be called at any time of the year if needed.

Within 10 Minute Notice contract term (Part C customers):
The initial contract term for customers joining the product after January 1, 2019, shall be five years, with an 18-month termination notice requirement. Early termination penalties will be equal to 18 months of credits.

> Trial Period Provision: There is a first-year trial period provision provided in the tariff (*for example:* If the customer signs-up for ISOC in April, the trial period will run from April through December of that year). If the customer chooses to cancel their agreement in the first year, they can do so by returning all credits paid. Subsequently, the Company will return any capacity/contingency penalties and cancel the contract. This provision is only available to participants during the year in which the contract is signed.

Grandfathered Within 10 Minute Notice contract term (Part B customers):
Those customers enrolled by December 31, 2018, that commit the same kW load shed commitment for a period of ten years will receive a grandfathered credit rate, but no additional application process is necessary. If grandfathered customers wish to leave the product, they will be required to provide the Company three years' notice. If these customers wish to leave the product prior to the termination of their ten-year commitment, they will be subject to an early termination penalty that amounts to 36 months of credits.

Contract Authorization:
Once it is determined that the customer will qualify for the ISOC product, an Interruptible Service Option Agreement will be executed. The Agreement must be approved by the customer and by an authorized representative of Public Service prior to May 31 for the customer to receive credits in that year.

D. Marketing Objectives & Strategies

A critical part of the ISOC product's success is the Company's ability to locate potentially eligible customers, assist them in becoming a part of the product, and provide service according to the tariff. That process begins by running a query on the customer information system to locate business customers in the electric service territory that meet eligibility requirements for the ISOC product.

Potential customers that meet product eligibility requirements are contacted by an Account Manager, and a meeting is scheduled with interested businesses. The objective of the meeting is to introduce the customer to the various ISOC product options and discuss product requirements and responsibilities.

In addition to this customer prospecting process, marketing and communication materials are created, and these materials are used to communicate the features and benefits of the product. These marketing materials include:

- The ISOC DRMS Training Guide – Provided to customers as a valuable reference to navigating the DRMS.
- ISOC Info Sheet – Summarizes the product's features and benefits, helps potential customers determine their qualification status, and outlines various control options and assists customers in understanding the savings they could realize by participating.
- ISOC Website – Extensive information is also included on the Xcel Energy website for current and potential customers.[100] The website is reviewed on a consistent basis to ensure the information is current.

Account Managers conduct outreach to potential customers utilizing the marketing and communications materials referenced above. The Account Managers play a crucial role by interacting with customers on a regular basis to ensure customer satisfaction.

A group of internal employees including analysts, Account Managers, product developers, marketers, technicians, and product managers are also continually working to track the progress of the product to meet the product forecasts and objectives. This measurement process consists of monitoring several indicators, including the number of customers participating, interruption data, MW available for control, and credit dollars.

Much of the effort for future ISOC marketing initiatives will involve working to target qualified customers and increase the level of communications to current and potential customers.

For a product of this nature, it is not only important to promote the product up-front, but customers also need ongoing support and communication. It should also be noted that we view marketing as

[100] https://co.my.xcelenergy.com/s/business/rate-plans/interruptible-service-option.

a continuous process, not a single event, which includes initial discussion to recruit participants, then ongoing communication to ensure customers know and can continue to evaluate the benefits of the product to retain these customers, and ongoing communication/education about how the product works.

This effort includes pre-season communication and training, as well as during and post-control event communications and support. Marketing staff work to understand the various stages of any customer's interpretation of the product and provide materials and support necessary to ensure consistent and positive customer experience.

Marketing encompasses both solicitation communications and education, and on-going product communication, including training to retain participant customers in support of achieving the capacity deferral benefit potential of the product, as captured in the Company's ISOC forecast.

E. Product-Specific Policies

As of January 1, 2019, all new contracts for service under this schedule shall be for an initial five-year term. New customers enrolling after January 1, 2019, must provide the Company an eighteen-month advance notice in writing to cancel service under this schedule.

Any time during the first year of service under the contract a customer may opt to cancel by returning all monthly credits received to date. No additional payment will be assessed.

Any customer who cancels service without complying with the Service Period requirements under this schedule shall be required to pay Public Service, as a penalty, an amount equal to the product of 110% times the customer's CIL times the customer's Monthly Credit Rate for each of the remaining months of the unexpired contract term.

In addition, the customer shall reimburse Public Service for the direct cost incurred for equipment to measure the customer's interruptible demand and to interrupt the customer.

F. Stakeholder Involvement

Colorado business customers have played a major role in the on-going dynamics of this product. The Company continues to meet frequently and interact with these business customers to encourage their input.

G. Rebates & Incentives

The monthly kW credit paid to customers as part of the ISOC product is calculated by multiplying the Monthly Credit Rate by the lesser of the customer's CIL or the actual Interruptible Demand during the billing month. The credits are a monthly credit to the customer's energy bill.

The Monthly Credit Rate is revised effective January 1 each year and shall remain in effect for the calendar year. The Monthly Credit Rate will vary by season. The summer season runs from June 1 through September 30, and the winter season is October 1 through May 31.

The number of hours in the year that each customer elects as interruptible is set in the ISOC Agreement. The options include 40 hours, 80 hours, or 160 hours.

H. Evaluation, Measurement, & Verification

The Company will collect interval data from each participant in the ISOC Product from monitoring equipment installed as part of product enrollment and/or interval data metering installed as part of their regular electric service. This data will be stored and analyzed within the DRMS. Performance data will be available to individual participants through the customer portal feature of the DRMS. Customers can view their usage at any time using their unique username and password to log into the system.

Peak Day Partners

A. Description

PDP is a Demand Response offering that affords the Company's commercial and industrial customers an incentive through a bid-offer process, in exchange for reducing their peak load during periods when demand is high. The purpose is to provide the Company with an additional power purchase resource to manage system requirements more efficiently during exceptional periods, as well as provide customers the option of receiving pricing associated with energy supply markets during such periods.

The Company will send offers to participating customers for a specific load reduction amount at a given price and a specific date and time. Customers will have the option to accept or decline the offer or provide a counteroffer. If accepted, the customer will be responsible for manually meeting this accepted demand reduction during the specified hours. Participation is voluntary and there is no penalty for event non-participation or withdrawal from the product. PDP is expected to be primarily utilized on hot summer days when the Company's load is expected to reach near-peak capacity. Control events could also be issued during winter peaking events. Customers will sign an Enabling Agreement to participate in the bidding process for Peak Day Partners.

PDP is designed to price capacity at or below forecasted market costs, start-up costs, and spinning reserve costs. This means that purely on a capacity basis, it should yield positive net benefits.

B. Forecasts, Participants & Budgets

Forecasts and Participants

PDP is available to all the Company's commercial and industrial customers who can commit to reducing their peak electric load during peaking events. Historically, PDP participants can provide 3 MW of load relief or above. For the 2024-2026 DSM & BE Plan, the Company anticipates incremental demand reduction of five MW.

Budgets

The primary costs in operating Peak Day Partners are attributed to two primary categories: Marketing & Administration and Participant Incentives:

Marketing & Administration – Administration costs cover several different activities as detailed below.

- Administration - This category covers costs associated with day-to-day operations including managing the product, executing marketing strategy, customer recruiting and enrollments, and support from internal teams such as Account Management.

- Equipment & Installation - This category reflects the cost to purchase and install monitoring equipment at each participant's facility. The expenditure is expected to be greatest in the early years as the participant base is built. Future expenditures will reflect costs of growing the product incrementally and any ongoing equipment maintenance for current participants.

- Advertising & Promotion - This category is for marketing campaigns and associated collateral.

Participant Incentives – Participant incentives account for a significant portion of the budget and will be based on the actual load reduction participating customers supply within each event bid-offer that was accepted and performance met.

C. Application Process

PDP will leverage the Company's Account Management team as the primary channel for delivering this offering to market. These account managers have established relationships through ongoing communication over time. This direct marketing channel will enable the Company to lay out the product in a personalized manner to interested customers in efforts to capitalize on conversion. After verifying available capacity from interested customers with the product manager, the account manager will guide the customer through the following application details:

Qualification:
PDP is available to all commercial and industrial customers who can agree to reduce usage during weekdays, typically in the afternoon hours. The Company may send PDP offers to participants year-round, however the majority of events have been historically called during the summer months from June through September.

The Company prefers that participants be capable of providing at least 500 kW of peak demand reduction at each site for which load reduction is offered. However, the Company may accept applications including sites providing less than 500 kW of peak demand reduction in the interest of meeting its peak load reduction forecasts. Metering considerations will impact the application process, with priority given to participants with existing Interval Data Recorders ("IDRs"). All included project sites must be non-residential customers of Xcel Energy taking service at Primary, Secondary or Transmission Voltage, and/or be a non-profit customer or government entity, including educational institutions.

Contract Authorization:
Once it is determined that the customer will qualify for Peak Day Partners, the Enabling Agreement will be executed.

Enabling Agreement Term:
The Enabling Agreement will be effective until cancelled by written notice from the customer or the Company. If the customer chooses to cancel their Enabling Agreement they may do so without penalty.

D. Marketing Objectives & Strategies

PDP will be promoted to existing commercial and industrial customers primarily through Public Service Account Management team. Since eligible customers are typically large operational facilities, leveraging the continued communication, existing relationships and operational knowledge of the customers' various facilities will enable the focused marketing on interested customers.

Potential customers will be contacted by an account manager to meet and discuss the product. The objective of the meeting is to introduce the customer to the PDP product, discuss requirements and responsibilities, and assist the customer in identifying controllable loads which could be shed during an interruption.

PDP requires the need for ongoing customer support and communication to ensure it delivers reliable results year over year. Therefore, marketing is a continuous process, (not a single event)which includes an initial discussion to recruit participants, then ongoing communication to ensure customers know and can continue to evaluate the benefits of participation in order to retain these customers, and ongoing communication/education about how the product works.

Additional marketing materials may include but are not limited to a guide summarizing key features and benefits and a PDP website accessible on the Company's website to provide more extensive information.

E. Product-Specific Policies

Qualification:
PDP is available to the Company's commercial and industrial customers who are not currently under ISOC or PPR contract. However, if the customer has multiple premises, the premises that are not currently under ISOC or PPR contracts are eligible to participate in PDP. Participants agree to be contacted with opportunities to reduce their load when market conditions signal a need, typically during the summer months, June through September, during high peak afternoons, but is an available resource year-round if needed.

Events:
Demand response event periods are triggered as a result of capacity, contingency and/or economic constraints upon the electrical system. Based on historical system peaking conditions, events are most likely to be called on weekdays during the summer months of June through September, but events may occur in any month throughout the year.

Events will be no less than one hour in duration and no more than six hours in duration. There is no limit as to how many events can be called during a given year.

Enabling Agreement:
Term - All Enabling Agreements for service under this schedule shall not have a minimum participation commitment. Customers can withdraw from PDP at any time by providing the Company with a written request to un-enroll.

Load Reduction Obligation – Each participating customer will be responsible for reducing their facilities load during an event by an amount equal to or greater than that designated within each given bid-offer.

Load reduction during an event will be determined by subtracting the participant's actual demand during an event from the participant's baseline demand for the same time. The customers minimum hourly load reduction must be no less than the load stipulated within the participant's bid-offer.

Baseline – A participant's load reduction will be determined by comparing the customer's load during an event to the customer's baseline load. A description of the baseline methodology is provided later in this document.

Penalties - If a participant declines to participate in an event through the bid-offer, there will be no penalty. However, if a participant does not meet their hourly contractual obligation in the agreed upon bid-offer, they will not receive their specific, hourly performance incentive.

Incentives:
The customer will receive a financial incentive for the capacity they supply within each event bid-offer that was accepted and performance met. This incentive is designed to give customers the flexibility to participate in an event or not.

Notification:
Participating customers will receive advance notice of events. Notifications will be delivered likely a minimum of 24 hours prior to an event. However, in some cases event notifications may come with less than 24 hours' notice and will include:

- Purchase price for energy load reduction
- Event start time
- Duration of event
- Event end time

Notifications with bid-offers will be sent to the participants which will be responsible for responding to offers. Customers are responsible for ensuring contact information is kept current and notifying their account manager or the product manager if any changes are necessary.

Baselines:
A participant's load reduction will be determined by comparing the customer's load during an event to the customer's baseline load. The baseline methodology proposed for this product is an adaptation of baseline calculations the Company has used in past products. The Company updated its historical approaches by reviewing "Measurement and Verification for Demand Response" (2013). This document, commissioned by the National Action Plan on Demand Response Measurement and Verification Working Group, focuses on providing "best DR M&V practices in various market and product contexts." This report provided valuable context on different baseline approaches, and several recommendations contained within the report have been incorporated into the baseline.

As customer baselines are inherently unobservable, one cannot measure usage which never took place. A poor baseline methodology can lead to systematic bias. To help mitigate this problem, the Company will regularly evaluate baseline calculations. This can be done by selecting sample participants, calculating their baseline consumption for a simulated event day, and evaluating the difference between the calculated baseline and actual loads. Should these simulations show significant bias that is leading to inaccurate baseline assumptions, then the Company will develop and recommend changes to the baseline methodology. Such an evaluation shall be done annually prior to the summer event season.

F. Stakeholder Involvement

Colorado business customers have played a major role in the on-going dynamics of this product. Additionally, key internal stakeholders such as the Account Management team have provided consistent feedback on product performance and customer satisfaction that continuously influences product design and operations. The Company continues to meet frequently and interact with these business customers and internal stakeholders to encourage their input.

G. Rebates & Incentives

The Company will establish an offer for participant energy at or below forecasted market costs, start-up costs, and spinning reserve costs. Offer incentives will vary by event. Customer incentives will vary for each event and each participant and will be determined for each hour of the event. If the agreed-upon load reduction is not met during the specified hour, customers will not receive an incentive payment for that particular hour.

H. Evaluation, Measurement, & Verification

The Company will collect baseline interval data from each participant in PDP from monitoring equipment installed as part of enrollment and/or interval data metering installed as part of their regular electric service.

Peak Partner Rewards

A. Description

PPR product is a Demand Response product designed to provide Public Service's business customers an incentive for agreeing to reduce their electrical loads when the electric grid experiences peak demand periods. While primarily focused on summer peaks, this product can be utilized year-round. The product was originally designed to be a flexible alternative option for customers not currently eligible for or unable to participate in the ISOC product. Customer incentives are outlined within the Peak Partner Rewards Program Schedule PPRP tariff which may be updated annually, allowing the Company to balance product cost effectiveness and customer participation.

Participating customers will sign a contract agreeing to reduce load at their facility during peak demand periods. This load reduction will be determined by the customer based on their ability to manage operations within their facility but must be at least 25 kW during summer months. Customers will receive a monthly credit (reservation incentive) based on this committed load reduction. When peak period events are dispatched, customers will receive an additional incentive based on their total load reduction, measured in kWh, during the event (performance incentive). Customers who participate in the product will receive an additional benefit of having access to their electric load profile data in near real time. Access to this data will not only allow participants to ensure they are complying with their contractual obligations, but also provide insight into their energy use throughout the year.

Peak period events are triggered as a result of capacity, contingency and/or economic constraints upon the electrical system. All interruptions will last a minimum of one hour, up to a maximum of four hours. Participating customers will receive at least one-hour notice prior to an event. If customers do not meet the agreed upon load reduction during an event, they will not receive their performance incentive for that event and may be removed from the product.

PPR is designed to price capacity at or below the cost of avoided capacity as defined within the 2024-2026 DSM & BE Plan Cost Benefit assumptions. This means that purely on a capacity basis, the product should yield positive net benefits.

B. Forecasts, Participants & Budgets

<u>Forecasts and Participants</u>
PPR is available to all commercial customers who can commit to reducing their electric load by a minimum of 25 kW during summer months and receive electric service under the Company's General Service Rate Schedules SG, PG or TG. Marketing of the product covers a diverse spectrum of commercial and industrial customers, ranging in size from greater than one MW to less than 100 kW. PPR is not available to commercial customers that are currently under an ISOC, CPP tariff, or on a Standby Tariff.

For the 2024-2026 DSM & BE Plan, the Company anticipates an incremental demand reduction of 31 MW.

Budgets

Product costs are attributed to two primary categories: Marketing & Administration, and Participant Incentives.

Marketing & Administration – Administration costs cover several different activities as detailed below.

- *Administration* – This category covers costs associated with day-to day operations; including managing the product, executing marketing strategy, customer recruiting and enrollments, and support from internal teams such as Account Management and Business Solutions Center.
- *Equipment & Installation* – This category reflects the cost to purchase and install monitoring equipment at each participant's facility. Most of these expenditures are allocated to new participants and realized by PPR during each customer's first year of participation. Future expenditures will reflect costs of growing the product incrementally and any ongoing equipment maintenance for current participants.
- *Advertising & Promotion* – This category is for marketing campaigns and associated collateral.

Participant Incentives – Participant incentives account for most of the product budget and include both a reservation incentive for contracted load reduction and a performance incentive for actual load reduction during event days.

C. Application Process

PPR is offered to business customers of all sizes. Therefore, product marketing will be delivered through several channels: Account Managers for larger C&I customers (Managed Accounts) and the BSC for non-managed customers. Through these channels, customers interested in the product will be guided through the following application details:

Qualification:

PPR is available to all business customers who receive electric service under the Company's General Service Rate Schedules SG, PG or TG and can agree to reduce usage during the summer months, June through September, between the hours of 12:00 p.m. and 8:00 p.m. (events are 4 hours or less in duration) by a minimum of 25 kW. The product can also be used at peak times throughout the year as needed.

Contract Term:

The initial contract term shall be 24 months followed by an annual term that is automatically renewed each year. A sixty-day written notice is required from the customer to cancel their participation. If the customer chooses to cancel their agreement in the first year, a one (1) time fee of five hundred dollars ($500) will be assessed to cover costs associated with decommissioning hardware supplied to the customer for this product. This provision is only available to participants during the year in which the contract is signed.

Contract Authorization:

Once it is determined that the customer will qualify for PPR, a PPR Product Agreement will be executed.

D. Marketing Objectives & Strategy

A critical part of the PPR product's success is the Company's ability to locate potentially eligible customers, assist them in becoming a part of the product, and provide service according to the tariff.

Potential customers are contacted by an Account Manager to discuss the product. The meeting objective is to introduce the customer to the product, discuss product requirements and responsibilities, and assist the customer in identifying controllable loads which could be shed during an interruption event.

Marketing materials include a product guide summarizing key features and benefits and a PPR website accessible on the Company's website to provide more extensive product information.

A key asset enabling this product is the Company's DRMS. This system provides the platform from which all the Company's demand response products are managed. In addition to managing events and providing customer notification, the system provides product participants with near real time access to their load profile data. Having this data allows participants to manage their energy use during events to ensure they comply with their contractual requirements as well as maximize their potential incentive.

The PPR product requires the need for ongoing customer support and communication to ensure the product delivers reliable results year over year. Therefore, marketing is a continuous process(not a single event), which includes initial discussion to recruit participants, followed by ongoing communication to ensure customers know and can continue to evaluate the benefits of the product to retain these customers, and ongoing communication/education about how the product works.

E. Product-Specific Policies

All product-specific policies are provided in full detail within the PPR Product, Schedule PPRP, electric rate tariff. Note that the tariff may be updated annually and mid-cycle changes to PPR may not be reflected within this Plan.

Qualification:
PPR is available to Public Service's firm rate Commercial and Industrial customers who receive electric service under the Company's General Service Rate Schedules SG, PG or TG, are not currently under an existing ISOC, CPP tariff, or on a Standby Tariff. Participants must agree to reduce usage by a minimum of 25 kW during the summer months, June through September, between the hours of 12:00 p.m. and 8:00 p.m. Events are four hours or less in duration. Although no minimum or maximum customer size is required, the product is focused on providing an option to customers with smaller loads who do not qualify for the ISOC tariff.

***Events*:**
Demand response event periods are triggered as a result of capacity, contingency and/or economic constraints upon the electrical system. Based on historical system peaking conditions, events are most likely to be called during the summer months of June through September, but events may occur in any month throughout the year.

Events will be no less than one hour in duration and no more than four hours in duration. Customers will be subject to no more than one event in any 24-hour period. No more than 15 events would be called for any one customer during a given year (60 total event hours annually).

In addition to events called for a specific need, each customer may be subject to up to two test events each calendar year. The purpose of test events is to ensure participants can deliver the committed load reductions. Participants will receive the same performance incentive for test events as for actual events.

Should a capacity or contingency situation arise outside of the prescribed hours of 12:00 p.m. to 8:00 p.m., product participants may be notified and asked to curtail load on a "best effort" basis. The customer will be under no obligation to reduce load, but those able to participate will be compensated for energy reductions at the tariffed incentive level.

Contracts:

Term – All contracts for service under this schedule shall be for an initial two-year term, with automatic one-year renewal terms. A customer must provide Public Service a sixty-day advance notice in writing to cancel.

Load Reduction Obligation – Each participating customer will be responsible for reducing their facility's load during an event by an amount equal to or greater than that designated within their contract. Participants will designate their load reduction obligations, in terms of kW, by calendar month. The kW commitment can vary each month, however during the summer months of June through September the participant's commitment cannot be less than 25 kW. The monthly kW commitment may be zero kW outside of the summer months.

Load reduction during an event will be determined by taking the total energy reduction during the event period as measured in kWh and dividing by the number of hours in the event. Energy reduction will be calculated by subtracting the participant's actual usage during an event from the participant's baseline consumption for the same time. The customers minimum hourly load reduction must be no less than the kW stipulated within the participant's contract.

Baseline – For purposes of determining a participant's load reduction, the customer's load during an event will be compared to the customer's baseline load. A description of the baseline methodology is provided later in this document.

Penalties – If a participant does not meet or exceed their contractual obligation during a PPR event, they will not receive payment of their performance incentive. If a participant fails to meet their contractual obligation during two PPR events within the same calendar year, they will be dropped from the product. Should a participant elect to leave the product during their initial two-year contract term, a one-time fee of $500 will be assessed to cover costs associated with decommissioning hardware supplied to the participant for this product.

Incentives:

Customers will receive three distinct incentives for their participation:

Reservation Incentive – The customer will receive a credit on their monthly bill for the capacity they have agreed to supply within their contract. This incentive is designed to keep customers

committed to the product over the long term. The Reservation Incentive credit rate is $2.00 per kW of committed load reduction, and subject to change annually.

Performance Incentive – Participants will receive an additional incentive based on actual performance during events if they meet or exceed their committed load reduction. This is designed to help ensure customers meet their obligation during actual events. The incentive is based on a participant's total energy reduction during the event period. The Performance Incentive credit rate is $0.70 per kWh reduced during a PPR event. This rate shall be subject to change annually.

Load Profile Data Access – Customers who participate in the product will receive an additional benefit of having access to their electric load profile data in near real time. Access to this data will not only allow participants to ensure they are complying with their contractual obligations, but also provide insight into their energy use throughout the year. Data will be provided in near real time with updates occurring at least every fifteen minutes through a customer portal feature of the DRMS. Performance data will be available to individual participants through the customer portal feature of the DRMS. Customers can view their usage at any time using their unique username and password to log into the system.

Notification:
Participating customers will receive advance notice of PPR events. Notifications will be delivered a minimum of one hour prior to an event and will include the event start time, duration of event, and event end time. Notifications will be sent to the participating customer's designated contact(s) via e-mail, SMS text, voice message, or combination thereof as specified by the customer. Customers are responsible for ensuring contact information is kept current via the DRMS or by notifying their Account Manager or the Product Manager if any changes are necessary.

Baselines:
For purposes of determining a participant's load reduction, the customer's load during an event will be compared to the customer's baseline load. The baseline methodology being proposed for this product is an adaptation of baseline calculations the Company has used in past products. Public Service updated its historical approaches by reviewing "Measurement and Verification for Demand Response" (2013).[101] This document, commissioned by the National Action Plan on Demand Response Measurement and Verification Working Group, focuses on providing "best DR M&V practices in various market and product contexts." This report provided valuable context on different baseline approaches, and several recommendations contained within the report have been incorporated into the baseline.

Specifically, for this product, the baseline usage for any 15-minute interval during an event will be calculated as the average of the measured demand during the same interval of the customer's five highest energy consumption days within the last 10 non-holiday, non-weekend, non-event days.

An event day correction will be made to each 15-minute interval during the event to reflect the impact of weather or other operational changes which could cause substantive differences between the event day and the baseline calculation. This event day correction will be the average 15-minute kW difference between the baseline calculation and the participant's actual load during the hour prior to event notification.

[101] https://www.ferc.gov/industries/electric/indus-act/demand-response/dr-potential/napdr-mv.pdf.

As customer baselines are inherently unobservable, one cannot measure usage which never took place, a poor baseline methodology can lead a systematic bias. To help mitigate this problem, Public Service will regularly evaluate baseline calculations. This can be done by selecting sample participants, calculating their baseline consumption for a simulated event day, and evaluating the difference between the calculated baseline and actual loads. Should these simulations show significant bias that is leading to inaccurate baseline assumptions, then Public Service will develop and recommend changes to the baseline methodology. Such an evaluation will be done annually prior to the summer event season and should any changes be warranted updates to the product would be made through 60-Day Notice.

F. Stakeholder Involvement

Colorado business customers have played a major role in the on-going dynamics of this product. Additionally, key internal stakeholders such as the Account Management team have provided consistent feedback on product performance and customer satisfaction that continuously influences product design and operations. The Company continues to meet frequently and interact with these business customers and internal stakeholders to encourage their input.

G. Rebates & Incentives

The PPR product was designed to price capacity at or below the avoided costs used within this 2024-2026 DSM & BE Plan. This results in a product that, on a capacity basis, always yields positive net benefits. Incentive values are to be identified within the PPR tariff which will be filed separately.

Reservation Incentive – The Reservation Incentive is a monthly kW credit calculated by multiplying a capacity payment by the participant's contractual summer load reduction obligation.

Performance Incentive – The performance incentive is calculated by multiplying an energy payment by the participants total energy reduction during the event period. The energy payment does not necessarily reflect the anticipated marginal cost of energy during event periods. Its value is established to provide participants a compelling incentive to perform during demand response events.

H. Evaluation, Measurement, & Verification Plan

The Company will collect interval data from each participant in the PPR Product from monitoring equipment installed either as part of product enrollment and/or interval data metering as part of their regular electric service. This data will be stored and presented within the DRMS. Product performance for each event will be calculated by subtracting the actual aggregated usage of all customers from the aggregated baseline usage during the event window. The amount of demand reduction supplied for a given event is calculated by subtracting the actual aggregated usage of all customers from the aggregated baseline usage during the event window.

Renewable Battery Connect

A. Description

The previous Residential Battery Demand Response Pilot (marketed as "Battery Connect" to customers) launched in February 2021 and operated for one and a half years. The Battery Connect pilot successfully evaluated various energy storage concepts related to residential battery use. Renewable Battery Connect represents the next version of this product and was originally filed in the 2022-25 Renewable Energy Plan[102] approved by the Colorado Public Utilities Commission in September 2022. The primary product design changes from the pilot are the increased upfront incentive amount and the requirement for the battery to be 100% charged by an on-site solar system which enables the battery to qualify as a renewable energy resource.

Renewable Battery Connect will continue to assess the availability of batteries for demand response and demand management applications. In addition, the product will evaluate optimal dispatch strategies to reduce grid usage over the entire day and during peak periods in the afternoon, and how those strategies may change based on the season, customer segments, or battery vendors. The Company's assessment of availability and performance is critical in determining expected performance of the technology, program design, and assessing the level of compensation to be offered to future customers for participation.

Customers can choose to operate their battery in ways that provide benefits solely to the battery customer (*e.g.*, back-up power), to the grid, or both as long as the battery is charged by an on-site solar system. Renewable Battery Connect will explore customer interest in allocating a portion of their battery to support the grid.

Participant batteries are used to test how a battery performs as a demand management resource. Leveraging a participant's battery during control events reduces energy use, which in turn reduces demand and helps stabilize the electric grid when it is stressed. Renewable Battery Connect events will discharge participant batteries for up to a three-hour duration. The product's dispatching strategies will operate the batteries so that capacity benefits are provided year-round without impacting customer comfort.

The charging and discharging of batteries in Renewable Battery Connect will continue to explore the research questions of the Battery Connect pilot with additional use cases to expand learning opportunities. Desired evaluation outcomes through 2026 may include identifying various dispatch strategies that optimize kW impacts and calculating the financial value for available battery capacity ($/kWh).

To evaluate these research questions, the product leverages a simple incentive structure. For customers that install a new qualifying solar-charged battery and enroll in Renewable Battery Connect, Xcel Energy will automatically manage their solar-charged battery during periods of peak demand up to 60 times per year and use up to 60% of the battery capacity. Participants receive an upfront incentive of $500 per kW of the storage charge rate, and an annual $100 participation incentive per premise for a term of five years. Income qualified customers and

[102] Proceeding No. 21A-0625EG

customers in disproportionately impacted communities are eligible for additional upfront incentives.

The Company plans to utilize approximately half of the Renewable Battery Connect events to provide peak-load reduction during the summer months. The remainder of events will target non-summer months to evaluate non-summer performance and solar time shifting.

The Company has extended agreements using the virtual power plant or "VPP" software of its selected vendors[103]. The product will continue to allow the Company to gain familiarity with the use of VPP software and the capabilities the software offers in terms of management of batteries and data collection and analysis.

B. Targets, Participants & Budgets

Targets and Participants

The Company is seeking up to 10 MW of total storage capacity for the product by the end of 2025. Based on typical residential battery capacities, this equates to approximately 1,850 batteries. This amount of participation was determined in the 2022-25 Renewable Energy Plan, and the Company believes there is no reason to adjust this number.

Budgets

New customer enrollments and administration of the Company's interconnection portal including all participant incentive payments, are managed by the Renewables and Choice Programs team, and paid for by the RESA (Renewable Energy Standard Adjustment). Operational costs of this product are included in the annual budget and attributed to the following areas:

Administration – This category covers costs associated with managing day-to-day operations of the product, executing the battery dispatch strategy and management of the vendor relationships.

Vendor VPP Agreements – This category covers costs associated with the VPP agreements that outline the deliverables of the VPP software.

EM&V (evaluation, monitoring, and verification) - Data collection and analysis of battery performance before/during/after load control events in addition to evaluation of the research questions for this product.

C. Application Process

Customers are instructed to work with their solar battery provider to apply in the Company's interconnection portal for Renewable Battery Connect. The product requires the battery to be new equipment and approved for operation through the interconnection process. The portal automatically performs a rate validation to check that the Customer is a residential or small commercial electric customer in Colorado, and sends a Renewable Battery Connect Agreement

[103]Through an RFP process conducted in 2019, the Company selected two vendors for the Battery Connect pilot. The Company has extended both vendor contracts to support Renewable Battery Connect for 18-months with options to extend at additional 6-month increments.

and an Interconnection Agreement for electronic signature. Once the interconnection application is complete, the Customers are notified of permission to operate and receives the upfront incentive payment within sixty days. Each battery is verified within the vendor's VPP and placed in a Renewable Battery Connect demand response group that is ready for dispatch.

D. Marketing Objectives & Strategies

The Company hosted information sessions for solar battery installers to describe the product and how to enroll customers. Resources for customers and installers are available on the Company's website including information sheets, presentations, and frequently asked questions. Installers may do their own direct marketing to customers that choose to install eligible battery equipment.

In addition, the VPP vendors either directly and/or through their channel partners discuss Renewable Battery Connect with customers that show interest in purchasing a battery. As part of this outreach, VPP vendors perform training courses which the Company has co-presented to relevant sales personnel to generate awareness of the product and the benefits it offers customers.

E. Product-Specific Policies

Batteries: Participation is open to customers that plan to install a new battery offered by one of the vendors that is paired with onsite solar, where the battery can be paired with an existing or new solar system.

Interconnection Agreement: Each participant must have an interconnection agreement with Public Service that allows their system to operate in parallel with the grid. These interconnection agreements will dictate how the Company utilizes each customer's battery in regard to 100% renewable export or non-export of energy to the grid. For example, some agreements only permit a customer to use their battery to offset onsite electricity demand. For these customers, the Company works with participating technology vendors to ensure a customer's participation in the program does not violate the interconnection standard they have chosen to operate within.

Renewable Battery Connect Agreement: Each participant must have a Renewable Battery Connect Agreement with Public Service that contains the terms and conditions of the product that include the upfront incentive payment and automatic participation in demand response events called by the Company.

System Size: There is a wide range of battery sizes in the market today that range from one kW up to tens of kW of storage charge rate. For this product, the Company is limiting participation to the equipment offered by the vendors. Multiple batteries may be installed at a single premise under this product. There is no battery size limitation, however, the one-time upfront incentive cannot exceed 50% (or 75% for IQ/DIC) of the retail cost of the batteries excluding labor, tax, or any other state or federal incentives.

Early Termination: Contrary to the pilot, there is no early termination fee to discourage customers from accepting an upfront rebate and unenrolling. This decision was made to remove any barriers to participation. In the pilot, the early termination fee was prorated based on the amount of time the customer had participated. If a customer chooses to leave after one year of participation, there was no early termination fee.

F. Stakeholder Involvement

The Company conducted a significant amount of stakeholder engagement prior to the filing of Renewable Battery Connect in the 2022-25 Renewable Energy Plan (Proceeding No. 21A-0625EG), which is detailed in that plan testimony. Furthermore, given the Company's request for approval of a DRMS in Proceeding No. 22A-0189E which would be used to support future expansion of the offering (including a pay-for-performance product), the Company has been conducting extensive stakeholder engagement with Parties to the 2022-25 Renewable Energy Plan and its inaugural Distribution System Plan (Proceeding No. 22A-0189E).

The Company held an initial stakeholder meeting in May of 2023 to discuss the DRMS use cases to support Renewable Battery Connect and begin initial conversations around pay-for-performance. This meeting was conducted by the Company before onboarding Gridworks as the Distribution System Planning Technical Working Group facilitator. A second stakeholder engagement session facilitated by Gridworks occurred on August 23rd which discussed the pay-for-performance use case in more detail. This meeting included presentations by both the Company and the Solar Energy Industries Association ("SEIA"). On August 25th, 2023, the Company filed its Phase II Distribution System Planning Report which provided additional detail on the relationship and evolution of Renewable Battery Connect and DRMS.

G. Rebates & Incentives

Renewable Battery Connect offers an upfront incentive per qualifying battery of $500 per kW of the storage charge rate capped at 50% of the retail battery cost, excluding any tax and installation costs. Participants who qualify as IQ or located in a DIC receive an increased incentive of $800 per kW of the storage charge rate capped at 75% of the retail battery cost. In addition, there is a $100 annual payment per premise for the program term of five years.

The incentives are designed to attract participation by supporting the purchase of the batteries and do not necessarily reflect the compensation level or structure for any future product.

The incentive payments for this product are paid from the RESA fund managed by the Renewable and Choice organization at the Company.

H. Evaluation, Measurement, & Verification

The Company's EM&V plan focuses on conducting additional analysis that would serve to increase the demand response capacity of the Xcel Energy Colorado's demand management portfolio by focusing on the following:

- Dispatch strategies – Identifying various dispatch strategies that optimize kW impacts.
- Battery capacity value – Calculate the financial value for each battery ($/kWh).
- Assessment of the battery baseline—Perform data collection, validation, and impact analysis to estimate baselines and impacts.
- Event Dashboards – Produce dashboards that display key metrics for each event day.

- Customer Surveys – Conduct customer survey after the end of the 2024 summer event season.
- Potential forecasting tool – Produce a forecasting tool to predict load reductions associated with battery curtailment during a combination of operating conditions.

Data used in the analyses comes from on-site monitoring of solar, battery, and energy use that the participating vendors collect and is analyzed by the Company's EM&V provider.

Residential Demand Response

A. Description

The Company's Residential Demand Response product contains three offerings:

- Saver's Switch
- AC Rewards
- Smart Water Heaters (water heater demand management)

The products seek to reduce system load by curtailing central air conditioners and electric heat pump water heaters and are generally utilized on hot summer days when Public Service's load is expected to reach near-peak capacity.

Saver's Switch®
Saver's Switch offers residential participants a $40 annual bill credit as an incentive for allowing the Company to control operation of their central air conditioners. Since the launch of Saver's Switch in 2000, Public Service has declared an average of six control events per year. When a customer enrolls, a switch device is installed near the AC unit that can interrupt the operations of the compressor.

When activated, a control signal is sent to interrupt the customer's central air conditioning load during peak periods, typically between the hours of 2:00 p.m. and 7:00 p.m. on weekdays. During a control event, the AC unit is cycled off in 15–20-minute increments to reduce load on the grid. Currently, there are about 180,000 customers enrolled.

Control events, normally last for about four hours on a control day and take place in the late afternoon or early evening. With the expanding participant population, Public Service has created subgroups of participants to enable the activation of less than the entire population at a time. This gives the Company flexibility to better manage peak demands on the system.

Saver's Switch was launched in Colorado in 2000. The switches utilized are deemed to have a 15-year life. As there is very little attrition from Saver's Switch (outside of cannibalization from AC Rewards), the switch population is beginning to include a sizeable portion of devices that are beyond their 15-year life. In the 2021/2022 biennial, the company began to initiate maintenance replacements of switches older than 15 years and plans to continue this replacement cycle. These maintenance replacements will be tracked separately but counted in the same manner as new installations for the achievements in the DSM plan.

AC Rewards
Following a pilot in 2015 and 2016, Public Service launched the AC Rewards offering in July 2017. Like Saver's Switch, AC Rewards seeks to reduce AC load at peak times, but the methodology is different, AC Rewards is activated using a temperature offset strategy.

Customers can join AC Rewards by installing and enrolling a Wi-Fi enabled thermostat. Currently, certain devices from ecobee, Nest, Honeywell, and Emerson are eligible for enrollment. There are two channels for customers to join:

- Bring Your Own Thermostat ("BYOT") – customers that already have a qualifying thermostat installed at their residence can enroll it at a company provided portal. BYOT participants receive a one-time bill credit of $100 upon joining AC Rewards.
- Direct Install – for customers not comfortable installing their own device, the Company can provide and install one free of charge.

In addition to discounts, bill credits and devices, customers receive an annual bill credit of $25 for their participation.

In a control event, the Company communicates with the thermostat over the customer's Wi-Fi system and adjusts the set point by a few degrees. Customers can override control events by returning the device to a different set point. However, the Company reserves the right to remove customers from the program if they opt-out of too many events. In rare circumstances the company may call mandatory events that customers are unable to over-ride.

Smart Water Heaters (water heater demand management)

This was a new offering for 2020. Customers owning qualifying electric heat pump water heaters that can receive control signals from the utility are eligible for enrollment. Qualifying enrolled water heaters will be controlled in two ways.

- *Peak demand load reduction* – In a peak load event (*i.e.*, on hot summer afternoons but also an option during winter peaks), the enrolled water heaters would be turned off for the duration of the control event. Previously, heated water would be available for customer use. But water heaters would not heat new water until the end of the event. Water heaters can be turned off at any time of system need, not just during the traditional summer afternoon peaks.
- *Daily load shifting* – The temperature setpoint of enrolled water heaters would be adjusted to shift heating load away from the daily system peaks (*i.e.*, the water temperature would be increased at night and reduced during the day). This strategy is also designed to save the customer energy. The daily load shifting is designed to be largely invisible to the customer.

To participate, customers need to have a water heater equipped with a receiver for over the air operating instructions and a mixing valve as a safety measure for when water in the tank is heated beyond the original set point. Participants in the product will receive a $100 enrollment incentive and an annual $25 bill credit for their participation.

Customers with qualifying electric resistance water heaters will be able to enroll those as well. These units will only be available for the Peak Demand Reductions outlined above. Participants will receive an annual $25 bill credit for their participation.

Since the launch of the product, the company's supplier of control modules has had significant supply chain struggles. Therefore, the company has not received meaningful quantities of the control module and the program is nascent. The Company remains hopeful that initial shipments of substantial quantities will arrive in time to make the forecasted goals put forward in this plan.

B. Forecasts, Participants & Budgets

Forecasts and Participants Saver's Switch is aimed at single family homeowners with central air conditioning. Between Saver Switch and AC Rewards, the Company aims to install/enroll over 20,000 devices per year. This will be quite challenging as Saver's Switch has been an offering for almost two decades. As a result, it has an installed base of participants that accounts for an estimated half of the eligible customers in the state. AC Rewards currently targets single family homes, attached family homes such as townhomes, as well as duplexes to reach more customer segments while adding resource options for system load relief. To the extent possible, the Company aims to promote AC Rewards in ways that minimize cannibalization of existing Saver's Switch participants.

Budgets
The primary costs in operating Saver's Switch are the cost of switches, switch installation, rebates for participating customers, and promotional expenses for recruiting participants. For AC Rewards, the primary costs are incentives (bill credits and device discounts) and promotional expenses. Over time, as Residential Demand Response has been a focus of the Company, advertising and promotional expenses have been escalating with increasing product penetration.

C. Application Process

Customers may sign up for Saver's Switch via mail-in forms, over the phone, or at the Company website[104]. Applications are generally processed, and switches installed within six to eight weeks. Due to variations in air conditioner age, code compliance, and where the AC unit is located (next to the house), the installer will make the final on-site determination as to whether the customer qualifies for the product. The installation work normally takes place entirely outside, allowing customers not to be home for the installation.

Customers wanting to join AC Rewards can do so at the Company's website.[105]

D. Marketing Objectives & Strategies

Saver's Switch and AC Rewards are promoted to residential customers using a variety of channels including bill inserts, company newsletters, print and radio advertising, direct mail, and email.

Based on an analysis of customer energy usage during the summer months and market research, Public Service estimates that approximately 325,000-375,000 residential electric customers in Colorado have central air conditioning. Where possible (*i.e.*, in direct mail and telemarketing), the Company directs its promotional efforts to customers not currently participating who also were identified as likely to have central air conditioning. Through ongoing research, the company is still determining the participation impact adding multifamily facilities will have to the product.

In this triennial plan, Public Service expects to continue an intense promotional effort with activities including:

[104] Xcel Energy - Saver's Switch.
[105] Xcel Energy - AC Rewards Smart Thermostat Program.

- Direct mail, including up-front incentives to new participants;
- E-mail marketing;
- Bill inserts;
- Digital media advertising; and
- Print advertising.

E. Product-Specific Policies

Saver's Switch has the following additional requirements:

- The product does not offer customers the choice of opting out of individual control days. The one exception is in the case of medical emergencies where customers can be removed from the product on short notice.
- When a customer moves into a premise with a pre-existing switch, they are automatically enrolled in the product, but notified that they may opt-out.
- Upon request for a Saver's Switch from a customer, a third-party implementer installs the switch. The third-party makes the determination in the field as to whether a switch can be successfully deployed. This is dependent upon the age of the A/C unit, electrical code compliance, etc.

AC Rewards has the following additional requirements:

- Participants must have central AC to join AC Rewards. As there, in most cases, is no contractor at the premise to validate this, we assume participants have central AC. The Company reserves the right to remove customers from the product who are deemed to not have central AC.
- The Company also reserves the right to remove participants from AC Rewards if the device goes 'offline' for too long or if the customer opts-out of most or all control events.

Smart Water Heaters has the following additional requirements:

- Enrolled water heaters must be heat pump water heaters capable of receiving signals with the CTA2045 communications protocol.
- In addition, enrolled water heaters must be able to receive "advanced load up" commands. Certain heat pump water heaters are CTA2045 enabled but cannot receive advanced load up commands. These are not eligible.
- Enrolled water heaters must be equipped with a mixing valve to avoid scalding risk from the adjustments to the set point of the tank.

F. Stakeholder Involvement

Public Service recognizes that the HVAC community and homebuilders can influence customer attitudes towards the product. The HVAC community may also have lingering misconceptions about Saver's Switch being harmful to customers' air conditioners. Public Service is planning to increase its efforts to educate the HVAC / builder community about the benefits of Saver's Switch to customers.

G. Rebates & Incentives

Saver's Switch participants will receive a $40 discount on their October energy bills following participation in the preceding summer control season. AC Rewards participants receive a $25 discount on their October bills. AC Rewards participants that enroll through the BYOT channel qualify for a one-time $100 bill credit. Customers without a qualifying thermostat can get a discount when purchasing one at https://www.xcelenergystore.com. Participants in water heater demand response receive an initial $75 bill credit for enrolling an annual $25 bill credit for their participation.

H. Evaluation, Measurement, & Verification

Public Service's load research organization leads an annual research project to evaluate the load relief achieved from installed Saver's Switch and AC Rewards units. The team hires a consultant that specializes in load research to conduct the data gathering and most of the analysis. A sample of participants is included in the research, undertaken annually. This is done with data loggers deployed onsite to monitor A/C run time and device operations during the cooling season. The results are used to document the extent of load relief achieved during a control day.

Cost-Benefit Analyses

The cost-benefit analyses ("CBAs") for each segment and the portfolio included in this 2024-2026 DSM & BE Plan are displayed on the following pages, with the 2024-2026 electric energy efficiency CBAs followed by the gas energy efficiency, beneficial electrification, and demand response CBAs. Company has incorporated the Social Cost of Carbon and Social Cost of Methane into these cost-benefit analyses pursuant to the language in Senate Bill 19-236, codified at § 40-3.2-106(c)(4), C.R.S., HB 21-1238, codified at § 40-3.2-107, C.R.S, respectively, and SB 21-246 and § 40-3.2-109(3), C.R.S. The also Company included a new cost test sensitivity, labeled in the tables as the "Societal Cost Test," that applies a 2.5% discount rate to all costs and benefits, except for benefits associated with Company-related or infrastructure investment which continue to utilize the Company's WACC discount rate.

EE PORTFOLIO TOTAL - EE

2024 ELECTRIC **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$174,129,682	$174,129,682	$174,129,682	$174,129,682
Trans. & Dist. Capacity	N/A	$12,316,055	$12,316,055	$12,316,055	$12,316,055
Marginal Energy	N/A	$85,663,564	$85,663,564	$85,663,564	$106,939,823
Avoided Emissions (CO2)	N/A	N/A	N/A	$61,588,681	$61,588,681
Subtotal				$333,697,982	$354,974,241
Non-Energy Benefits Adder (11.2%)				$30,384,659	$32,877,830
Subtotal	N/A	$272,109,302	$272,109,302	$364,082,642	$387,852,071
Participant Benefits					
Bill Reduction - Electric	$466,204,052	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$50,341,468	N/A	N/A	$50,341,468	$50,341,468
Incremental Capital Savings	$9,362,345	N/A	N/A	$6,771,723	$6,771,723
Incremental O&M Savings	$70,757,081	N/A	N/A	$61,356,278	$68,894,853
Subtotal	$596,664,946	N/A	N/A	$118,469,468	$126,008,043
Total Benefits	$596,664,946	$272,109,302	$272,109,302	$482,552,110	$513,860,114
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$31,556,044	$31,556,044	$31,556,044	$31,556,044
Advertising/Promotion/Customer Ed	N/A	$4,833,744	$4,833,744	$4,833,744	$4,833,744
Participant Rebates and Incentives	N/A	$50,341,468	$50,341,468	$50,341,468	$50,341,468
Equipment & Installation	N/A	$2,230,510	$2,230,510	$2,230,510	$2,230,510
Measurement and Verification	N/A	$2,830,476	$2,830,476	$2,830,476	$2,830,476
Subtotal	N/A	$91,792,243	$91,792,243	$91,792,243	$91,792,243
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$466,204,052	N/A	N/A
Subtotal	N/A	N/A	$466,204,052	N/A	N/A
Participant Costs					
Incremental Capital Costs	$138,814,713	N/A	N/A	$123,419,389	$123,419,389
Incremental O&M Costs	$2,584,757	N/A	N/A	$2,375,712	$2,631,267
Subtotal	$141,399,470	N/A	N/A	$125,795,101	$126,050,655
Total Costs	$141,399,470	$91,792,243	$557,996,295	$217,587,344	$217,842,898
Net Benefit (Cost)	$455,265,476	$180,317,059	($285,886,993)	**$264,964,766**	**$296,017,216**
Benefit/Cost Ratio	4.22	2.96	0.49	**2.22**	**2.36**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	14.7 years
T & D Loss Factor (Energy)	B	5.62%
T & D Loss Factor (Demand)	C	8.20%
Net-to-Gross (Energy)	D	90.3%
Net-to-Gross (Demand)	E	88.7%
Installation Rate (Energy)	F	**98.5%**
Installation Rate (Demand)	G	**96.3%**
Net coincident kW Saved at Generator	H	0.01 kW
Gross Annual kWh Saved at Customer	I	51.19 kWh
Net Annual kWh Saved at Generator	J	48.19 kWh

Program Summary All Unit		
Total Budget	K	**$91,792,243**
Net coincident kW Saved at Generator	L	**95,937 kW**
Gross Annual kWh Saved at Customer	M	470,692,919 kWh
Net Annual kWh Saved at Generator	N	**443,079,583 kWh**
Total MTRC Net Benefits with Adder	O	**$264,964,766**
Total MTRC Net Benefits without Adder	P	**$234,580,107**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$0.0140**
Utility Program Cost per kW at Gen	K/ L	**$957**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**758,590**

EE PORTFOLIO TOTAL - EE

2025 ELECTRIC **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$179,533,099	$179,533,099	$179,533,099	$179,533,099
Trans. & Dist. Capacity	N/A	$12,698,266	$12,698,266	$12,698,266	$12,698,266
Marginal Energy	N/A	$81,745,690	$81,745,690	$81,745,690	$102,800,173
Avoided Emissions (CO2)	N/A	N/A	N/A	$49,890,316	$49,890,316
Subtotal				$323,867,370	$344,921,854
Non-Energy Benefits Adder (11.2%)				$30,681,145	$33,170,405
Subtotal	N/A	$273,977,054	$273,977,054	$354,548,515	$378,092,258
Participant Benefits					
Bill Reduction - Electric	$477,621,342	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$51,220,484	N/A	N/A	$51,220,484	$51,220,484
Incremental Capital Savings	$9,362,345	N/A	N/A	$6,771,723	$6,771,723
Incremental O&M Savings	$72,673,328	N/A	N/A	$63,127,032	$70,817,430
Subtotal	$610,877,499	N/A	N/A	$121,119,238	$128,809,636
Total Benefits	$610,877,499	$273,977,054	$273,977,054	$475,667,753	$506,901,894
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$31,467,100	$31,467,100	$31,467,100	$31,467,100
Advertising/Promotion/Customer Ed	N/A	$4,344,217	$4,344,217	$4,344,217	$4,344,217
Participant Rebates and Incentives	N/A	$51,220,484	$51,220,484	$51,220,484	$51,220,484
Equipment & Installation	N/A	$3,154,193	$3,154,193	$3,154,193	$3,154,193
Measurement and Verification	N/A	$2,849,202	$2,849,202	$2,849,202	$2,849,202
Subtotal	N/A	$93,035,197	$93,035,197	$93,035,197	$93,035,197
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$477,621,342	N/A	N/A
Subtotal	N/A	N/A	$477,621,342	N/A	N/A
Participant Costs					
Incremental Capital Costs	$150,956,065	N/A	N/A	$136,542,988	$136,542,988
Incremental O&M Costs	$2,523,388	N/A	N/A	$2,322,136	$2,572,020
Subtotal	$153,479,453	N/A	N/A	$138,865,123	$139,115,008
Total Costs	$153,479,453	$93,035,197	$570,656,539	$231,900,320	$232,150,204
Net Benefit (Cost)	$457,398,046	$180,941,857	($296,679,485)	**$243,767,433**	**$274,751,690**
Benefit/Cost Ratio	3.98	2.94	0.48	**2.05**	**2.18**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	14.6 years
T & D Loss Factor (Energy)	B	5.64%
T & D Loss Factor (Demand)	C	8.24%
Net-to-Gross (Energy)	D	91.3%
Net-to-Gross (Demand)	E	89.6%
Installation Rate (Energy)	F	**98.5%**
Installation Rate (Demand)	G	**96.4%**
Net coincident kW Saved at Generator	H	0.01 kW
Gross Annual kWh Saved at Customer	I	47.44 kWh
Net Annual kWh Saved at Generator	J	45.15 kWh

Program Summary All Unit		
Total Budget	K	**$93,035,197**
Net coincident kW Saved at Generator	L	**97,393 kW**
Gross Annual kWh Saved at Customer	M	463,796,226 kWh
Net Annual kWh Saved at Generator	N	**441,340,449 kWh**
Total MTRC Net Benefits with Adder	O	**$243,767,433**
Total MTRC Net Benefits without Adder	P	**$213,086,288**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$0.0145**
Utility Program Cost per kW at Gen	K/ L	**$955**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**591,508**

EE PORTFOLIO TOTAL - EE

2026 ELECTRIC GOAL

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$187,315,453	$187,315,453	$187,315,453	$187,315,453
Trans. & Dist. Capacity	N/A	$13,248,771	$13,248,771	$13,248,771	$13,248,771
Marginal Energy	N/A	$78,037,703	$78,037,703	$78,037,703	$100,619,705
Avoided Emissions (CO2)	N/A	N/A	N/A	$36,619,749	$36,619,749
Subtotal				$315,221,676	$337,803,677
Non-Energy Benefits Adder (11.2%)				$31,289,809	$33,967,970
Subtotal	N/A	$278,601,926	$278,601,926	$346,511,485	$371,771,648
Participant Benefits					
Bill Reduction - Electric	$499,170,597	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$54,123,014	N/A	N/A	$54,123,014	$54,123,014
Incremental Capital Savings	$9,362,345	N/A	N/A	$6,771,723	$6,771,723
Incremental O&M Savings	$66,440,401	N/A	N/A	$57,761,482	$64,813,268
Subtotal	$629,096,356	N/A	N/A	$118,656,218	$125,708,005
Total Benefits	$629,096,356	$278,601,926	$278,601,926	$465,167,703	$497,479,652
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$30,222,584	$30,222,584	$30,222,584	$30,222,584
Advertising/Promotion/Customer Ed	N/A	$3,604,615	$3,604,615	$3,604,615	$3,604,615
Participant Rebates and Incentives	N/A	$54,123,014	$54,123,014	$54,123,014	$54,123,014
Equipment & Installation	N/A	$2,803,112	$2,803,112	$2,803,112	$2,803,112
Measurement and Verification	N/A	$2,794,548	$2,794,548	$2,794,548	$2,794,548
Subtotal	N/A	$93,547,872	$93,547,872	$93,547,872	$93,547,872
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$499,170,597	N/A	N/A
Subtotal	N/A	N/A	$499,170,597	N/A	N/A
Participant Costs					
Incremental Capital Costs	$164,912,063	N/A	N/A	$151,296,592	$151,296,592
Incremental O&M Costs	$2,259,830	N/A	N/A	$2,104,381	$2,327,525
Subtotal	$167,171,893	N/A	N/A	$153,400,973	$153,624,117
Total Costs	$167,171,893	$93,547,872	$592,718,469	$246,948,845	$247,171,989
Net Benefit (Cost)	$461,924,463	$185,054,054	($314,116,543)	**$218,218,858**	**$250,307,663**
Benefit/Cost Ratio	3.76	2.98	0.47	**1.88**	**2.01**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	14.4 years
T & D Loss Factor (Energy)	B	5.68%
T & D Loss Factor (Demand)	C	8.30%
Net-to-Gross (Energy)	D	92.3%
Net-to-Gross (Demand)	E	90.6%
Installation Rate (Energy)	F	**98.5%**
Installation Rate (Demand)	G	**96.4%**
Net coincident kW Saved at Generator	H	0.01 kW
Gross Annual kWh Saved at Customer	I	45.06 kWh
Net Annual kWh Saved at Generator	J	43.34 kWh

Program Summary All Unit		
Total Budget	K	**$93,547,872**
Net coincident kW Saved at Generator	L	**99,849 kW**
Gross Annual kWh Saved at Customer	M	462,929,649 kWh
Net Annual kWh Saved at Generator	N	**445,248,567 kWh**
Total MTRC Net Benefits with Adder	O	**$218,218,858**
Total MTRC Net Benefits without Adder	P	**$186,929,049**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$0.0146**
Utility Program Cost per kW at Gen	K/ L	**$937**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**417,410**

BUSINESS PROGRAM TOTAL - EE

2024 ELECTRIC GOAL

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$128,512,270	$128,512,270	$128,512,270	$128,512,270
Trans. & Dist. Capacity	N/A	$9,091,479	$9,091,479	$9,091,479	$9,091,479
Marginal Energy	N/A	$62,591,444	$62,591,444	$62,591,444	$77,809,484
Avoided Emissions (CO2)	N/A	N/A	N/A	$44,447,300	$44,447,300
Subtotal				$244,642,493	$259,860,534
Non-Energy Benefits Adder (10.0%)				$20,019,519	$21,541,323
Subtotal	N/A	$200,195,193	$200,195,193	$264,662,012	$281,401,857
Participant Benefits					
Bill Reduction - Electric	$327,627,732	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$32,705,454	N/A	N/A	$32,705,454	$32,705,454
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$69,102,075	N/A	N/A	$59,742,248	$67,170,790
Subtotal	$429,435,261	N/A	N/A	$92,447,702	$99,876,244
Total Benefits	$429,435,261	$200,195,193	$200,195,193	$357,109,714	$381,278,101
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$15,023,203	$15,023,203	$15,023,203	$15,023,203
Advertising/Promotion/Customer Ed	N/A	$1,098,301	$1,098,301	$1,098,301	$1,098,301
Participant Rebates and Incentives	N/A	$32,705,454	$32,705,454	$32,705,454	$32,705,454
Equipment & Installation	N/A	$0	$0	$0	$0
Measurement and Verification	N/A	$1,107,886	$1,107,886	$1,107,886	$1,107,886
Subtotal	N/A	$49,934,844	$49,934,844	$49,934,844	$49,934,844
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$327,627,732	N/A	N/A
Subtotal	N/A	N/A	$327,627,732	N/A	N/A
Participant Costs					
Incremental Capital Costs	$102,674,017	N/A	N/A	$90,269,705	$90,269,705
Incremental O&M Costs	$1,232,949	N/A	N/A	$1,152,437	$1,266,906
Subtotal	$103,906,966	N/A	N/A	$91,422,142	$91,536,611
Total Costs	$103,906,966	$49,934,844	$377,562,576	$141,356,986	$141,471,455
Net Benefit (Cost)	$325,528,295	$150,260,349	($177,367,383)	**$215,752,728**	**$239,806,646**
Benefit/Cost Ratio	4.13	4.01	0.53	**2.53**	**2.70**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	15.6 years
T & D Loss Factor (Energy)	B	5.35%
T & D Loss Factor (Demand)	C	7.75%
Net-to-Gross (Energy)	D	88.4%
Net-to-Gross (Demand)	E	87.5%
Installation Rate (Energy)	F	**99.9%**
Installation Rate (Demand)	G	**100.0%**
Net coincident kW Saved at Generator	H	0.05 kW
Gross Annual kWh Saved at Customer	I	256.60 kWh
Net Annual kWh Saved at Generator	J	239.58 kWh

Program Summary All Unit		
Total Budget	K	**$49,934,844**
Net coincident kW Saved at Generator	L	**63,480 kW**
Gross Annual kWh Saved at Customer	M	342,551,117 kWh
Net Annual kWh Saved at Generator	N	**319,830,586 kWh**
Total MTRC Net Benefits with Adder	O	**$215,752,728**
Total MTRC Net Benefits without Adder	P	**$195,733,209**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$0.0100**
Utility Program Cost per kW at Gen	K/ L	**$787**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**547,276**

BUSINESS PROGRAM TOTAL - EE

2025 ELECTRIC GOAL

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$126,853,043	$126,853,043	$126,853,043	$126,853,043
Trans. & Dist. Capacity	N/A	$8,974,099	$8,974,099	$8,974,099	$8,974,099
Marginal Energy	N/A	$57,397,366	$57,397,366	$57,397,366	$72,127,237
Avoided Emissions (CO2)	N/A	N/A	N/A	$34,132,403	$34,132,403
Subtotal				$227,356,909	$242,086,780
Non-Energy Benefits Adder (10.0%)				$19,322,451	$20,795,438
Subtotal	N/A	$193,224,507	$193,224,507	$246,679,360	$262,882,218
Participant Benefits					
Bill Reduction - Electric	$322,974,552	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$30,965,122	N/A	N/A	$30,965,122	$30,965,122
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$70,896,261	N/A	N/A	$61,390,941	$68,963,019
Subtotal	$424,835,935	N/A	N/A	$92,356,063	$99,928,141
Total Benefits	$424,835,935	$193,224,507	$193,224,507	$339,035,423	$362,810,359
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$14,627,519	$14,627,519	$14,627,519	$14,627,519
Advertising/Promotion/Customer Ed	N/A	$829,371	$829,371	$829,371	$829,371
Participant Rebates and Incentives	N/A	$30,965,122	$30,965,122	$30,965,122	$30,965,122
Equipment & Installation	N/A	$0	$0	$0	$0
Measurement and Verification	N/A	$1,135,250	$1,135,250	$1,135,250	$1,135,250
Subtotal	N/A	$47,557,263	$47,557,263	$47,557,263	$47,557,263
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$322,974,552	N/A	N/A
Subtotal	N/A	N/A	$322,974,552	N/A	N/A
Participant Costs					
Incremental Capital Costs	$100,771,182	N/A	N/A	$89,443,962	$89,443,962
Incremental O&M Costs	$1,165,636	N/A	N/A	$1,093,263	$1,201,614
Subtotal	$101,936,818	N/A	N/A	$90,537,225	$90,645,577
Total Costs	$101,936,818	$47,557,263	$370,531,815	$138,094,488	$138,202,839
Net Benefit (Cost)	$322,899,117	$145,667,244	($177,307,308)	**$200,940,935**	**$224,607,520**
Benefit/Cost Ratio	4.17	4.06	0.52	**2.46**	**2.63**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	15.5 years
T & D Loss Factor (Energy)	B	5.35%
T & D Loss Factor (Demand)	C	7.75%
Net-to-Gross (Energy)	D	89.4%
Net-to-Gross (Demand)	E	88.1%
Installation Rate (Energy)	F	**100.0%**
Installation Rate (Demand)	G	**100.0%**
Net coincident kW Saved at Generator	H	0.05 kW
Gross Annual kWh Saved at Customer	I	247.12 kWh
Net Annual kWh Saved at Generator	J	233.41 kWh

Program Summary All Unit		
Total Budget	K	**$47,557,263**
Net coincident kW Saved at Generator	L	**61,495 kW**
Gross Annual kWh Saved at Customer	M	326,140,626 kWh
Net Annual kWh Saved at Generator	N	**308,038,303 kWh**
Total MTRC Net Benefits with Adder	O	**$200,940,935**
Total MTRC Net Benefits without Adder	P	**$181,618,484**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$0.0100**
Utility Program Cost per kW at Gen	K/ L	**$773**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**404,348**

BUSINESS PROGRAM TOTAL - EE

2026 ELECTRIC GOAL

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$123,503,172	$123,503,172	$123,503,172	$123,503,172
Trans. & Dist. Capacity	N/A	$8,737,115	$8,737,115	$8,737,115	$8,737,115
Marginal Energy	N/A	$51,440,613	$51,440,613	$51,440,613	$65,883,069
Avoided Emissions (CO2)	N/A	N/A	N/A	$24,139,295	$24,139,295
Subtotal				$207,820,196	$222,262,651
Non-Energy Benefits Adder (10.0%)				$18,368,090	$19,812,336
Subtotal	N/A	$183,680,901	$183,680,901	$226,188,286	$242,074,987
Participant Benefits					
Bill Reduction - Electric	$317,103,670	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$28,841,185	N/A	N/A	$28,841,185	$28,841,185
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$64,445,689	N/A	N/A	$55,818,594	$62,737,993
Subtotal	$410,390,545	N/A	N/A	$84,659,780	$91,579,178
Total Benefits	$410,390,545	$183,680,901	$183,680,901	$310,848,065	$333,654,165
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$13,225,465	$13,225,465	$13,225,465	$13,225,465
Advertising/Promotion/Customer Ed	N/A	$743,198	$743,198	$743,198	$743,198
Participant Rebates and Incentives	N/A	$28,841,185	$28,841,185	$28,841,185	$28,841,185
Equipment & Installation	N/A	$0	$0	$0	$0
Measurement and Verification	N/A	$1,026,249	$1,026,249	$1,026,249	$1,026,249
Subtotal	N/A	$43,836,097	$43,836,097	$43,836,097	$43,836,097
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$317,103,670	N/A	N/A
Subtotal	N/A	N/A	$317,103,670	N/A	N/A
Participant Costs					
Incremental Capital Costs	$90,045,293	N/A	N/A	$81,227,256	$81,227,256
Incremental O&M Costs	$891,181	N/A	N/A	$865,304	$946,099
Subtotal	$90,936,474	N/A	N/A	$82,092,560	$82,173,355
Total Costs	$90,936,474	$43,836,097	$360,939,768	$125,928,658	$126,009,453
Net Benefit (Cost)	$319,454,070	$139,844,803	($177,258,867)	**$184,919,408**	**$207,644,712**
Benefit/Cost Ratio	4.51	4.19	0.51	**2.47**	**2.65**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	15.3 years
T & D Loss Factor (Energy)	B	5.35%
T & D Loss Factor (Demand)	C	7.75%
Net-to-Gross (Energy)	D	90.5%
Net-to-Gross (Demand)	E	89.4%
Installation Rate (Energy)	F	**100.0%**
Installation Rate (Demand)	G	**100.0%**
Net coincident kW Saved at Generator	H	0.04 kW
Gross Annual kWh Saved at Customer	I	236.12 kWh
Net Annual kWh Saved at Generator	J	225.84 kWh

Program Summary All Unit		
Total Budget	K	**$43,836,097**
Net coincident kW Saved at Generator	L	**58,969 kW**
Gross Annual kWh Saved at Customer	M	309,417,968 kWh
Net Annual kWh Saved at Generator	N	**295,953,027 kWh**
Total MTRC Net Benefits with Adder	O	**$184,919,408**
Total MTRC Net Benefits without Adder	P	**$166,551,318**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$0.0097**
Utility Program Cost per kW at Gen	K/ L	**$743**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**275,003**

RESIDENTIAL PROGRAM TOTAL - EE

2024 ELECTRIC **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$34,285,896	$34,285,896	$34,285,896	$34,285,896
Trans. & Dist. Capacity	N/A	$2,422,940	$2,422,940	$2,422,940	$2,422,940
Marginal Energy	N/A	$14,047,078	$14,047,078	$14,047,078	$17,668,333
Avoided Emissions (CO2)	N/A	N/A	N/A	$11,008,991	$11,008,991
Subtotal				$61,764,904	$65,386,159
Non-Energy Benefits Adder (10.0%)				$5,075,591	$5,437,717
Subtotal	N/A	$50,755,914	$50,755,914	$66,840,496	$70,823,876
Participant Benefits					
Bill Reduction - Electric	$80,381,343	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$11,289,582	N/A	N/A	$11,289,582	$11,289,582
Incremental Capital Savings	$8,635,408	N/A	N/A	$6,044,785	$6,044,785
Incremental O&M Savings	$1,420,508	N/A	N/A	$1,379,531	$1,473,466
Subtotal	$101,726,841	N/A	N/A	$18,713,899	$18,807,833
Total Benefits	$101,726,841	$50,755,914	$50,755,914	$85,554,395	$89,631,710
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$10,436,505	$10,436,505	$10,436,505	$10,436,505
Advertising/Promotion/Customer Ed	N/A	$1,734,588	$1,734,588	$1,734,588	$1,734,588
Participant Rebates and Incentives	N/A	$11,289,582	$11,289,582	$11,289,582	$11,289,582
Equipment & Installation	N/A	$1,969,708	$1,969,708	$1,969,708	$1,969,708
Measurement and Verification	N/A	$93,323	$93,323	$93,323	$93,323
Subtotal	N/A	$25,523,707	$25,523,707	$25,523,707	$25,523,707
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$80,381,343	N/A	N/A
Subtotal	N/A	N/A	$80,381,343	N/A	N/A
Participant Costs					
Incremental Capital Costs	$28,279,770	N/A	N/A	$25,288,757	$25,288,757
Incremental O&M Costs	$1,281,631	N/A	N/A	$1,153,099	$1,286,450
Subtotal	$29,561,400	N/A	N/A	$26,441,855	$26,575,206
Total Costs	$29,561,400	$25,523,707	$105,905,050	$51,965,562	$52,098,913
Net Benefit (Cost)	$72,165,440	$25,232,207	($55,149,136)	**$33,588,833**	**$37,532,797**
Benefit/Cost Ratio	3.44	1.99	0.48	**1.65**	**1.72**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	10.5 years
T & D Loss Factor (Energy)	B	6.31%
T & D Loss Factor (Demand)	C	9.08%
Net-to-Gross (Energy)	D	93.7%
Net-to-Gross (Demand)	E	89.7%
Installation Rate (Energy)	F	**92.9%**
Installation Rate (Demand)	G	**88.2%**
Net coincident kW Saved at Generator	H	0.01 kW
Gross Annual kWh Saved at Customer	I	18.82 kWh
Net Annual kWh Saved at Generator	J	17.42 kWh

Program Summary All Unit		
Total Budget	K	**$25,523,707**
Net coincident kW Saved at Generator	L	**27,281 kW**
Gross Annual kWh Saved at Customer	M	92,627,842 kWh
Net Annual kWh Saved at Generator	N	**85,734,899 kWh**
Total MTRC Net Benefits with Adder	O	**$33,588,833**
Total MTRC Net Benefits without Adder	P	**$28,513,241**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$0.0284**
Utility Program Cost per kW at Gen	K/ L	**$936**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**136,169**

RESIDENTIAL PROGRAM TOTAL - EE

2025 ELECTRIC **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$40,633,700	$40,633,700	$40,633,700	$40,633,700
Trans. & Dist. Capacity	N/A	$2,871,961	$2,871,961	$2,871,961	$2,871,961
Marginal Energy	N/A	$15,357,292	$15,357,292	$15,357,292	$19,123,161
Avoided Emissions (CO2)	N/A	N/A	N/A	$10,596,868	$10,596,868
Subtotal				$69,459,820	$73,225,689
Non-Energy Benefits Adder (10.0%)				$5,886,295	$6,262,882
Subtotal	N/A	$58,862,953	$58,862,953	$75,346,116	$79,488,571
Participant Benefits					
Bill Reduction - Electric	$93,941,724	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$13,218,319	N/A	N/A	$13,218,319	$13,218,319
Incremental Capital Savings	$8,635,408	N/A	N/A	$6,044,785	$6,044,785
Incremental O&M Savings	$1,498,335	N/A	N/A	$1,457,359	$1,556,579
Subtotal	$117,293,786	N/A	N/A	$20,720,463	$20,819,683
Total Benefits	$117,293,786	$58,862,953	$58,862,953	$96,066,579	$100,308,255
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$10,418,286	$10,418,286	$10,418,286	$10,418,286
Advertising/Promotion/Customer Ed	N/A	$1,519,018	$1,519,018	$1,519,018	$1,519,018
Participant Rebates and Incentives	N/A	$13,218,319	$13,218,319	$13,218,319	$13,218,319
Equipment & Installation	N/A	$2,591,018	$2,591,018	$2,591,018	$2,591,018
Measurement and Verification	N/A	$90,869	$90,869	$90,869	$90,869
Subtotal	N/A	$27,837,510	$27,837,510	$27,837,510	$27,837,510
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$93,941,724	N/A	N/A
Subtotal	N/A	N/A	$93,941,724	N/A	N/A
Participant Costs					
Incremental Capital Costs	$41,183,472	N/A	N/A	$38,097,614	$38,097,614
Incremental O&M Costs	$1,286,584	N/A	N/A	$1,157,705	$1,291,424
Subtotal	$42,470,056	N/A	N/A	$39,255,319	$39,389,039
Total Costs	$42,470,056	$27,837,510	$121,779,234	$67,092,829	$67,226,549
Net Benefit (Cost)	$74,823,730	$31,025,443	($62,916,281)	**$28,973,750**	**$33,081,706**
Benefit/Cost Ratio	2.76	2.11	0.48	**1.43**	**1.49**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	10.4 years
T & D Loss Factor (Energy)	B	6.32%
T & D Loss Factor (Demand)	C	9.09%
Net-to-Gross (Energy)	D	94.2%
Net-to-Gross (Demand)	E	90.7%
Installation Rate (Energy)	F	**93.5%**
Installation Rate (Demand)	G	**89.2%**
Net coincident kW Saved at Generator	H	0.01 kW
Gross Annual kWh Saved at Customer	I	18.44 kWh
Net Annual kWh Saved at Generator	J	17.27 kWh

Program Summary All Unit		
Total Budget	K	**$27,837,510**
Net coincident kW Saved at Generator	L	**30,427 kW**
Gross Annual kWh Saved at Customer	M	101,104,701 kWh
Net Annual kWh Saved at Generator	N	**94,680,444 kWh**
Total MTRC Net Benefits with Adder	O	**$28,973,750**
Total MTRC Net Benefits without Adder	P	**$23,087,454**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$0.0282**
Utility Program Cost per kW at Gen	K/ L	**$915**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**126,324**

RESIDENTIAL PROGRAM TOTAL - EE

2026 ELECTRIC GOAL

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$50,823,192	$50,823,192	$50,823,192	$50,823,192
Trans. & Dist. Capacity	N/A	$3,592,757	$3,592,757	$3,592,757	$3,592,757
Marginal Energy	N/A	$17,640,968	$17,640,968	$17,640,968	$22,980,774
Avoided Emissions (CO2)	N/A	N/A	N/A	$8,383,803	$8,383,803
Subtotal				$80,440,720	$85,780,526
Non-Energy Benefits Adder (10.0%)				$7,205,692	$7,739,672
Subtotal	N/A	$72,056,917	$72,056,917	$87,646,412	$93,520,198
Participant Benefits					
Bill Reduction - Electric	$118,536,982	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$16,946,936	N/A	N/A	$16,946,936	$16,946,936
Incremental Capital Savings	$8,635,408	N/A	N/A	$6,044,785	$6,044,785
Incremental O&M Savings	$1,684,714	N/A	N/A	$1,632,889	$1,744,052
Subtotal	$145,804,039	N/A	N/A	$24,624,610	$24,735,773
Total Benefits	$145,804,039	$72,056,917	$72,056,917	$112,271,022	$118,255,971
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$10,394,734	$10,394,734	$10,394,734	$10,394,734
Advertising/Promotion/Customer Ed	N/A	$899,543	$899,543	$899,543	$899,543
Participant Rebates and Incentives	N/A	$16,946,936	$16,946,936	$16,946,936	$16,946,936
Equipment & Installation	N/A	$1,950,000	$1,950,000	$1,950,000	$1,950,000
Measurement and Verification	N/A	$73,000	$73,000	$73,000	$73,000
Subtotal	N/A	$30,264,213	$30,264,213	$30,264,213	$30,264,213
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$118,536,982	N/A	N/A
Subtotal	N/A	N/A	$118,536,982	N/A	N/A
Participant Costs					
Incremental Capital Costs	$63,289,840	N/A	N/A	$58,492,407	$58,492,407
Incremental O&M Costs	$1,296,491	N/A	N/A	$1,166,918	$1,301,374
Subtotal	$64,586,331	N/A	N/A	$59,659,325	$59,793,781
Total Costs	$64,586,331	$30,264,213	$148,801,195	$89,923,537	$90,057,993
Net Benefit (Cost)	$81,217,708	$41,792,704	($76,744,278)	**$22,347,485**	**$28,197,977**
Benefit/Cost Ratio	2.26	2.38	0.48	**1.25**	**1.31**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	10.9 years
T & D Loss Factor (Energy)	B	6.33%
T & D Loss Factor (Demand)	C	9.09%
Net-to-Gross (Energy)	D	94.3%
Net-to-Gross (Demand)	E	91.2%
Installation Rate (Energy)	F	**94.2%**
Installation Rate (Demand)	G	**90.4%**
Net coincident kW Saved at Generator	H	0.01 kW
Gross Annual kWh Saved at Customer	I	19.44 kWh
Net Annual kWh Saved at Generator	J	18.37 kWh

Program Summary All Unit		
Total Budget	K	**$30,264,213**
Net coincident kW Saved at Generator	L	**35,061 kW**
Gross Annual kWh Saved at Customer	M	115,960,072 kWh
Net Annual kWh Saved at Generator	N	**109,604,932 kWh**
Total MTRC Net Benefits with Adder	O	**$22,347,485**
Total MTRC Net Benefits without Adder	P	**$15,141,793**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$0.0254**
Utility Program Cost per kW at Gen	K/ L	**$863**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**96,000**

INCOME QUALIFIED PROGRAM TOTAL - EE

2024 ELECTRIC **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$11,331,517	$11,331,517	$11,331,517	$11,331,517
Trans. & Dist. Capacity	N/A	$801,636	$801,636	$801,636	$801,636
Marginal Energy	N/A	$9,025,043	$9,025,043	$9,025,043	$11,462,006
Avoided Emissions (CO2)	N/A	N/A	N/A	$6,132,390	$6,132,390
Subtotal				$27,290,585	$29,727,548
Non-Energy Benefits Adder (25.0%)				$5,289,549	$5,898,790
Subtotal	N/A	$21,158,195	$21,158,195	$32,580,134	$35,626,338
Participant Benefits					
Bill Reduction - Electric	$58,194,977	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$5,657,847	N/A	N/A	$5,657,847	$5,657,847
Incremental Capital Savings	$726,937	N/A	N/A	$726,937	$726,937
Incremental O&M Savings	$234,498	N/A	N/A	$234,498	$250,597
Subtotal	$64,814,260	N/A	N/A	$6,619,283	$6,635,381
Total Benefits	$64,814,260	$21,158,195	$21,158,195	$39,199,416	$42,261,719
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$1,298,058	$1,298,058	$1,298,058	$1,298,058
Advertising/Promotion/Customer Ed	N/A	$1,079,164	$1,079,164	$1,079,164	$1,079,164
Participant Rebates and Incentives	N/A	$5,657,847	$5,657,847	$5,657,847	$5,657,847
Equipment & Installation	N/A	$260,802	$260,802	$260,802	$260,802
Measurement and Verification	N/A	$342,121	$342,121	$342,121	$342,121
Subtotal	N/A	$8,637,992	$8,637,992	$8,637,992	$8,637,992
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$58,194,977	N/A	N/A
Subtotal	N/A	N/A	$58,194,977	N/A	N/A
Participant Costs					
Incremental Capital Costs	$7,860,927	N/A	N/A	$7,860,927	$7,860,927
Incremental O&M Costs	$70,177	N/A	N/A	$70,177	$77,911
Subtotal	$7,931,104	N/A	N/A	$7,931,104	$7,938,838
Total Costs	$7,931,104	$8,637,992	$66,832,969	$16,569,095	$16,576,830
Net Benefit (Cost)	$56,883,156	$12,520,203	($45,674,773)	**$22,630,321**	**$25,684,890**
Benefit/Cost Ratio	8.17	2.45	0.32	**2.37**	**2.55**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	17.7 years
T & D Loss Factor (Energy)	B	6.34%
T & D Loss Factor (Demand)	C	9.03%
Net-to-Gross (Energy)	D	100.0%
Net-to-Gross (Demand)	E	100.0%
Installation Rate (Energy)	F	**98.9%**
Installation Rate (Demand)	G	**99.3%**
Net coincident kW Saved at Generator	H	0.00 kW
Gross Annual kWh Saved at Customer	I	12.08 kWh
Net Annual kWh Saved at Generator	J	12.76 kWh

Program Summary All Unit		
Total Budget	K	**$8,637,992**
Net coincident kW Saved at Generator	L	**5,176 kW**
Gross Annual kWh Saved at Customer	M	35,513,961 kWh
Net Annual kWh Saved at Generator	N	**37,514,099 kWh**
Total MTRC Net Benefits with Adder	O	**$22,630,321**
Total MTRC Net Benefits without Adder	P	**$17,340,772**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$0.0130**
Utility Program Cost per kW at Gen	K/ L	**$1,669**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**75,146**

INCOME QUALIFIED PROGRAM TOTAL - EE

2025 ELECTRIC **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$12,046,356	$12,046,356	$12,046,356	$12,046,356
Trans. & Dist. Capacity	N/A	$852,206	$852,206	$852,206	$852,206
Marginal Energy	N/A	$8,991,032	$8,991,032	$8,991,032	$11,549,776
Avoided Emissions (CO2)	N/A	N/A	N/A	$5,161,046	$5,161,046
Subtotal				$27,050,640	$29,609,384
Non-Energy Benefits Adder (25.0%)				$5,472,399	$6,112,085
Subtotal	N/A	$21,889,595	$21,889,595	$32,523,039	$35,721,469
Participant Benefits					
Bill Reduction - Electric	$60,705,067	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$6,343,904	N/A	N/A	$6,343,904	$6,343,904
Incremental Capital Savings	$726,937	N/A	N/A	$726,937	$726,937
Incremental O&M Savings	$278,732	N/A	N/A	$278,732	$297,831
Subtotal	$68,054,639	N/A	N/A	$7,349,573	$7,368,672
Total Benefits	$68,054,639	$21,889,595	$21,889,595	$39,872,612	$43,090,141
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$1,554,835	$1,554,835	$1,554,835	$1,554,835
Advertising/Promotion/Customer Ed	N/A	$980,175	$980,175	$980,175	$980,175
Participant Rebates and Incentives	N/A	$6,343,904	$6,343,904	$6,343,904	$6,343,904
Equipment & Installation	N/A	$563,175	$563,175	$563,175	$563,175
Measurement and Verification	N/A	$310,593	$310,593	$310,593	$310,593
Subtotal	N/A	$9,752,681	$9,752,681	$9,752,681	$9,752,681
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$60,705,067	N/A	N/A
Subtotal	N/A	N/A	$60,705,067	N/A	N/A
Participant Costs					
Incremental Capital Costs	$9,001,411	N/A	N/A	$9,001,411	$9,001,411
Incremental O&M Costs	$71,168	N/A	N/A	$71,168	$78,981
Subtotal	$9,072,579	N/A	N/A	$9,072,579	$9,080,392
Total Costs	$9,072,579	$9,752,681	$70,457,748	$18,825,260	$18,833,074
Net Benefit (Cost)	$58,982,060	$12,136,914	($48,568,153)	**$21,047,352**	**$24,257,067**
Benefit/Cost Ratio	7.50	2.24	0.31	**2.12**	**2.29**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	17.5 years
T & D Loss Factor (Energy)	B	6.34%
T & D Loss Factor (Demand)	C	9.03%
Net-to-Gross (Energy)	D	100.0%
Net-to-Gross (Demand)	E	100.0%
Installation Rate (Energy)	F	**99.0%**
Installation Rate (Demand)	G	**99.3%**
Net coincident kW Saved at Generator	H	0.00 kW
Gross Annual kWh Saved at Customer	I	12.29 kWh
Net Annual kWh Saved at Generator	J	12.99 kWh

Program Summary All Unit		
Total Budget	K	**$9,752,681**
Net coincident kW Saved at Generator	L	**5,470 kW**
Gross Annual kWh Saved at Customer	M	36,550,899 kWh
Net Annual kWh Saved at Generator	N	**38,621,702 kWh**
Total MTRC Net Benefits with Adder	O	**$21,047,352**
Total MTRC Net Benefits without Adder	P	**$15,574,953**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$0.0144**
Utility Program Cost per kW at Gen	K/ L	**$1,783**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**60,835**

INCOME QUALIFIED PROGRAM TOTAL - EE

2026 ELECTRIC GOAL

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$12,989,088	$12,989,088	$12,989,088	$12,989,088
Trans. & Dist. Capacity	N/A	$918,899	$918,899	$918,899	$918,899
Marginal Energy	N/A	$8,956,122	$8,956,122	$8,956,122	$11,755,862
Avoided Emissions (CO2)	N/A	N/A	N/A	$4,096,651	$4,096,651
Subtotal				$26,960,760	$29,760,500
Non-Energy Benefits Adder (25.0%)				$5,716,027	$6,415,962
Subtotal	N/A	$22,864,109	$22,864,109	$32,676,787	$36,176,462
Participant Benefits					
Bill Reduction - Electric	$63,529,945	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$7,638,005	N/A	N/A	$7,638,005	$7,638,005
Incremental Capital Savings	$726,937	N/A	N/A	$726,937	$726,937
Incremental O&M Savings	$309,998	N/A	N/A	$309,998	$331,224
Subtotal	$72,204,885	N/A	N/A	$8,674,941	$8,696,167
Total Benefits	$72,204,885	$22,864,109	$22,864,109	$41,351,728	$44,872,629
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$1,525,697	$1,525,697	$1,525,697	$1,525,697
Advertising/Promotion/Customer Ed	N/A	$926,481	$926,481	$926,481	$926,481
Participant Rebates and Incentives	N/A	$7,638,005	$7,638,005	$7,638,005	$7,638,005
Equipment & Installation	N/A	$853,112	$853,112	$853,112	$853,112
Measurement and Verification	N/A	$289,539	$289,539	$289,539	$289,539
Subtotal	N/A	$11,232,834	$11,232,834	$11,232,834	$11,232,834
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$63,529,945	N/A	N/A
Subtotal	N/A	N/A	$63,529,945	N/A	N/A
Participant Costs					
Incremental Capital Costs	$11,576,930	N/A	N/A	$11,576,930	$11,576,930
Incremental O&M Costs	$72,158	N/A	N/A	$72,158	$80,051
Subtotal	$11,649,088	N/A	N/A	$11,649,088	$11,656,981
Total Costs	$11,649,088	$11,232,834	$74,762,778	$22,881,922	$22,889,815
Net Benefit (Cost)	$60,555,797	$11,631,275	($51,898,669)	**$18,469,806**	**$21,982,814**
Benefit/Cost Ratio	6.20	2.04	0.31	**1.81**	**1.96**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	17.5 years
T & D Loss Factor (Energy)	B	6.34%
T & D Loss Factor (Demand)	C	9.04%
Net-to-Gross (Energy)	D	100.0%
Net-to-Gross (Demand)	E	100.0%
Installation Rate (Energy)	F	**99.0%**
Installation Rate (Demand)	G	**99.4%**
Net coincident kW Saved at Generator	H	0.00 kW
Gross Annual kWh Saved at Customer	I	12.53 kWh
Net Annual kWh Saved at Generator	J	13.24 kWh

Program Summary All Unit		
Total Budget	K	**$11,232,834**
Net coincident kW Saved at Generator	L	**5,819 kW**
Gross Annual kWh Saved at Customer	M	37,551,609 kWh
Net Annual kWh Saved at Generator	N	**39,690,608 kWh**
Total MTRC Net Benefits with Adder	O	**$18,469,806**
Total MTRC Net Benefits without Adder	P	**$12,753,779**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$0.0162**
Utility Program Cost per kW at Gen	K/ L	**$1,930**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**46,407**

EE PORTFOLIO TOTAL - EE

2024 GAS **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Commodity Cost Reduction	N/A	$32,516,877	$32,516,877	$32,516,877	$43,834,655
Variable O&M Savings	N/A	$369,540	$369,540	$369,540	$478,754
Bulk System Demand Savings	N/A	$5,585,400	$5,585,400	$5,585,400	$7,236,113
Targeted Demand Savings	N/A	$434,407	$434,407	$434,407	$434,407
Avoided Emissions (CO2)	N/A	N/A	N/A	$60,138,926	$60,138,926
Avoided Emissions (CH4)	N/A	N/A	N/A	$9,513,796	$9,513,796
Subtotal				$108,558,946	$121,636,650
Non-Energy Benefits Adder (12.4%)				$4,836,136	$6,380,099
Subtotal	N/A	$38,471,817	$38,471,817	$113,395,082	$128,016,749
Participant Benefits					
Bill Reduction - Gas	$68,458,771	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$12,101,025	N/A	N/A	$12,101,025	$12,101,025
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$34,791,735	N/A	N/A	$32,159,921	$34,783,878
Subtotal	$115,351,532	N/A	N/A	$44,260,946	$46,884,903
Total Benefits	$115,351,532	$38,906,224	$38,906,224	$157,656,028	$174,901,652
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$6,357,184	$6,357,184	$6,357,184	$6,357,184
Advertising/Promotion/Customer Ed	N/A	$1,356,558	$1,356,558	$1,356,558	$1,356,558
Participant Rebates and Incentives	N/A	$12,101,025	$12,101,025	$12,101,025	$12,101,025
Equipment & Installation	N/A	$1,723,425	$1,723,425	$1,723,425	$1,723,425
Measurement and Verification	N/A	$816,848	$816,848	$816,848	$816,848
Subtotal	N/A	$22,355,040	$22,355,040	$22,355,040	$22,355,040
Utility Revenue Reduction					
Revenue Reduction - Gas	N/A	N/A	$68,458,771	N/A	N/A
Subtotal	N/A	N/A	$68,458,771	N/A	N/A
Participant Costs					
Incremental Capital Costs	$34,780,497	N/A	N/A	$29,965,228	$29,965,228
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$34,780,497	N/A	N/A	$29,965,228	$29,965,228
Total Costs	$34,780,497	$22,355,040	$90,813,811	$52,320,268	$52,320,268
Net Benefit (Cost)	$80,571,034	$16,551,184	($51,907,587)	**$105,335,761**	**$122,581,385**
Benefit/Cost Ratio	3.32	1.74	0.43	**3.01**	**3.34**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Dth		
Lifetime (Weighted on Dth)	A	14.5 years
Net-to-Gross (Weighted on Dth)	B	64.3%
Install Rate (Weighted on Dth)	C	71.7%

Program Summary per Participant		
Gross Annual Dth Saved	D	0.5
Net Annual Dth Saved	E	0.3

Program Summary All Participants		
Total Budget	F	**$22,355,040**
Net Targeted Peak Dth/hr Saved	G	**139.57 Dth**
Gross Annual Dth Saved	H	**1,265,692 Dth**
Net Annual Dth Saved	I	**814,198 Dth**
Total MTRC Net Benefits with Adder	J	**$105,335,761**
Total MTRC Net Benefits without Adder	K	**$100,499,624**
Utility Program Cost per Dth Lifetime	F /(A x I)	**$1.8948**
Avoided Lifetime CO2 Emissions, Total Program (tons CO2)		**689,263**
Avoided Lifetime CH4 Emissions, Total Program (tons CH4)		**3,787**

EE PORTFOLIO TOTAL - EE

2025 GAS **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Commodity Cost Reduction	N/A	$31,021,580	$31,021,580	$31,021,580	$40,078,356
Variable O&M Savings	N/A	$351,281	$351,281	$351,281	$440,458
Bulk System Demand Savings	N/A	$5,309,431	$5,309,431	$5,309,431	$6,657,301
Targeted Demand Savings	N/A	$468,950	$468,950	$468,950	$468,950
Avoided Emissions (CO2)	N/A	N/A	N/A	$54,993,568	$54,993,568
Avoided Emissions (CH4)	N/A	N/A	N/A	$8,691,381	$8,691,381
Subtotal				$100,836,191	$111,330,014
Non-Energy Benefits Adder (13.0%)				$4,823,362	$6,152,978
Subtotal	N/A	$36,682,291	$36,682,291	$105,659,553	$117,482,993
Participant Benefits					
Bill Reduction - Gas	$65,294,187	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$11,735,765	N/A	N/A	$11,735,765	$11,735,765
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$32,190,097	N/A	N/A	$29,956,424	$32,338,313
Subtotal	$109,220,049	N/A	N/A	$41,692,190	$44,074,078
Total Benefits	$109,220,049	$37,151,241	$37,151,241	$147,351,743	$161,557,071
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$6,124,798	$6,124,798	$6,124,798	$6,124,798
Advertising/Promotion/Customer Ed	N/A	$1,218,410	$1,218,410	$1,218,410	$1,218,410
Participant Rebates and Incentives	N/A	$11,735,765	$11,735,765	$11,735,765	$11,735,765
Equipment & Installation	N/A	$2,481,624	$2,481,624	$2,481,624	$2,481,624
Measurement and Verification	N/A	$798,293	$798,293	$798,293	$798,293
Subtotal	N/A	$22,358,890	$22,358,890	$22,358,890	$22,358,890
Utility Revenue Reduction					
Revenue Reduction - Gas	N/A	N/A	$65,294,187	N/A	N/A
Subtotal	N/A	N/A	$65,294,187	N/A	N/A
Participant Costs					
Incremental Capital Costs	$27,978,014	N/A	N/A	$25,416,746	$25,416,746
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$27,978,014	N/A	N/A	$25,416,746	$25,416,746
Total Costs	$27,978,014	$22,358,890	$87,653,077	$47,775,637	$47,775,637
Net Benefit (Cost)	$81,242,035	$14,792,351	($50,501,836)	**$99,576,106**	**$113,781,434**
Benefit/Cost Ratio	3.90	1.66	0.42	**3.08**	**3.38**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Dth		
Lifetime (Weighted on Dth)	A	12.2 years
Net-to-Gross (Weighted on Dth)	B	66.8%
Install Rate (Weighted on Dth)	C	70.2%

Program Summary per Participant		
Gross Annual Dth Saved	D	0.4
Net Annual Dth Saved	E	0.2

Program Summary All Participants		
Total Budget	F	**$22,358,890**
Net Targeted Peak Dth/hr Saved	G	**159.40 Dth**
Gross Annual Dth Saved	H	**1,293,985 Dth**
Net Annual Dth Saved	I	**863,763 Dth**
Total MTRC Net Benefits with Adder	J	**$99,576,106**
Total MTRC Net Benefits without Adder	K	**$94,752,744**
Utility Program Cost per Dth Lifetime	F /(A x I)	**$2.1209**
Avoided Lifetime CO2 Emissions, Total Program (tons CO2)		**615,881**
Avoided Lifetime CH4 Emissions, Total Program (tons CH4)		**3,383**

EE PORTFOLIO TOTAL - EE

2026 GAS **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Commodity Cost Reduction	N/A	$31,735,193	$31,735,193	$31,735,193	$41,385,721
Variable O&M Savings	N/A	$359,161	$359,161	$359,161	$448,384
Bulk System Demand Savings	N/A	$5,428,531	$5,428,531	$5,428,531	$6,777,086
Targeted Demand Savings	N/A	$502,949	$502,949	$502,949	$502,949
Avoided Emissions (CO2)	N/A	N/A	N/A	$50,247,991	$50,247,991
Avoided Emissions (CH4)	N/A	N/A	N/A	$8,002,984	$8,002,984
Subtotal				$96,276,810	$107,365,116
Non-Energy Benefits Adder (13.0%)				$4,956,119	$6,369,411
Subtotal	N/A	$37,522,885	$37,522,885	$101,232,929	$113,734,526
Participant Benefits					
Bill Reduction - Gas	$67,855,750	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$12,156,206	N/A	N/A	$12,156,206	$12,156,206
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$28,020,799	N/A	N/A	$26,503,117	$28,435,395
Subtotal	$108,032,754	N/A	N/A	$38,659,322	$40,591,601
Total Benefits	$108,032,754	$38,025,834	$38,025,834	$139,892,251	$154,326,127
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$6,022,043	$6,022,043	$6,022,043	$6,022,043
Advertising/Promotion/Customer Ed	N/A	$1,245,288	$1,245,288	$1,245,288	$1,245,288
Participant Rebates and Incentives	N/A	$12,156,206	$12,156,206	$12,156,206	$12,156,206
Equipment & Installation	N/A	$2,226,211	$2,226,211	$2,226,211	$2,226,211
Measurement and Verification	N/A	$910,824	$910,824	$910,824	$910,824
Subtotal	N/A	$22,560,572	$22,560,572	$22,560,572	$22,560,572
Utility Revenue Reduction					
Revenue Reduction - Gas	N/A	N/A	$67,855,750	N/A	N/A
Subtotal	N/A	N/A	$67,855,750	N/A	N/A
Participant Costs					
Incremental Capital Costs	$30,180,492	N/A	N/A	$27,299,728	$27,299,728
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$30,180,492	N/A	N/A	$27,299,728	$27,299,728
Total Costs	$30,180,492	$22,560,572	$90,416,322	$49,860,299	$49,860,299
Net Benefit (Cost)	$77,852,262	$15,465,263	($52,390,488)	**$90,031,952**	**$104,465,828**
Benefit/Cost Ratio	3.58	1.69	0.42	**2.81**	**3.10**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Dth		
Lifetime (Weighted on Dth)	A	11.8 years
Net-to-Gross (Weighted on Dth)	B	67.5%
Install Rate (Weighted on Dth)	C	67.9%

Program Summary per Participant		
Gross Annual Dth Saved	D	0.4
Net Annual Dth Saved	E	0.2

Program Summary All Participants		
Total Budget	F	**$22,560,572**
Net Targeted Peak Dth/hr Saved	G	**179.34 Dth**
Gross Annual Dth Saved	H	**1,337,249 Dth**
Net Annual Dth Saved	I	**903,118 Dth**
Total MTRC Net Benefits with Adder	J	**$90,031,952**
Total MTRC Net Benefits without Adder	K	**$85,075,833**
Utility Program Cost per Dth Lifetime	F /(A x I)	**$2.1086**
Avoided Lifetime CO2 Emissions, Total Program (tons CO2)		**625,049**
Avoided Lifetime CH4 Emissions, Total Program (tons CH4)		**3,434**

BUSINESS PROGRAM TOTAL - EE

2024 GAS **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Commodity Cost Reduction	N/A	$7,901,591	$7,901,591	$7,901,591	$10,738,795
Variable O&M Savings	N/A	$89,182	$89,182	$89,182	$117,743
Bulk System Demand Savings	N/A	$1,347,932	$1,347,932	$1,347,932	$1,779,619
Targeted Demand Savings	N/A	$123,566	$123,566	$123,566	$123,566
Avoided Emissions (CO2)	N/A	N/A	N/A	$14,890,112	$14,890,112
Avoided Emissions (CH4)	N/A	N/A	N/A	$2,363,492	$2,363,492
Subtotal				$26,715,874	$30,013,326
Non-Energy Benefits Adder (10.0%)				$946,227	$1,263,616
Subtotal	N/A	$9,338,705	$9,338,705	$27,662,101	$31,276,942
Participant Benefits					
Bill Reduction - Gas	$15,439,210	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$1,011,051	N/A	N/A	$1,011,051	$1,011,051
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$16,658,980	N/A	N/A	$14,457,668	$16,000,240
Subtotal	$33,109,241	N/A	N/A	$15,468,719	$17,011,291
Total Benefits	$33,109,241	$9,462,270	$9,462,270	$43,130,820	$48,288,233
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$476,384	$476,384	$476,384	$476,384
Advertising/Promotion/Customer Ed	N/A	$85,256	$85,256	$85,256	$85,256
Participant Rebates and Incentives	N/A	$1,011,051	$1,011,051	$1,011,051	$1,011,051
Equipment & Installation	N/A	$0	$0	$0	$0
Measurement and Verification	N/A	$54,981	$54,981	$54,981	$54,981
Subtotal	N/A	$1,627,672	$1,627,672	$1,627,672	$1,627,672
Utility Revenue Reduction					
Revenue Reduction - Gas	N/A	N/A	$15,439,210	N/A	N/A
Subtotal	N/A	N/A	$15,439,210	N/A	N/A
Participant Costs					
Incremental Capital Costs	$5,209,989	N/A	N/A	$4,539,978	$4,539,978
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$5,209,989	N/A	N/A	$4,539,978	$4,539,978
Total Costs	$5,209,989	$1,627,672	$17,066,882	$6,167,651	$6,167,651
Net Benefit (Cost)	$27,899,252	$7,834,598	($7,604,612)	**$36,963,170**	**$42,120,582**
Benefit/Cost Ratio	6.35	5.81	0.55	**6.99**	**7.83**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Dth		
Lifetime (Weighted on Dth)	A	18.1 years
Net-to-Gross (Weighted on Dth)	B	89.4%
Install Rate (Weighted on Dth)	C	100.0%

Program Summary per Participant		
Gross Annual Dth Saved	D	194.0
Net Annual Dth Saved	E	173.4

Program Summary All Participants		
Total Budget	F	**$1,627,672**
Net Targeted Peak Dth/hr Saved	G	**21.05 Dth**
Gross Annual Dth Saved	H	**180,445 Dth**
Net Annual Dth Saved	I	**161,264 Dth**
Total MTRC Net Benefits with Adder	J	**$36,963,170**
Total MTRC Net Benefits without Adder	K	**$36,016,943**

Utility Program Cost per Dth Lifetime	F /(A x I)	**$0.5579**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**170,427**
Avoided Lifetime CH4 Emissions, Total Program (tons CH4)	**936**

BUSINESS PROGRAM TOTAL - EE

2025 GAS **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Commodity Cost Reduction	N/A	$7,267,635	$7,267,635	$7,267,635	$9,831,883
Variable O&M Savings	N/A	$80,233	$80,233	$80,233	$105,435
Bulk System Demand Savings	N/A	$1,212,673	$1,212,673	$1,212,673	$1,593,600
Targeted Demand Savings	N/A	$120,250	$120,250	$120,250	$120,250
Avoided Emissions (CO2)	N/A	N/A	N/A	$13,722,473	$13,722,473
Avoided Emissions (CH4)	N/A	N/A	N/A	$2,192,846	$2,192,846
Subtotal				$24,596,110	$27,566,487
Non-Energy Benefits Adder (10.0%)				$868,079	$1,153,092
Subtotal	N/A	$8,560,541	$8,560,541	$25,464,189	$28,719,579
Participant Benefits					
Bill Reduction - Gas	$14,194,635	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$941,703	N/A	N/A	$941,703	$941,703
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$14,178,508	N/A	N/A	$12,325,385	$13,627,680
Subtotal	$29,314,847	N/A	N/A	$13,267,088	$14,569,383
Total Benefits	$29,314,847	$8,680,791	$8,680,791	$38,731,277	$43,288,962
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$531,337	$531,337	$531,337	$531,337
Advertising/Promotion/Customer Ed	N/A	$71,042	$71,042	$71,042	$71,042
Participant Rebates and Incentives	N/A	$941,703	$941,703	$941,703	$941,703
Equipment & Installation	N/A	$0	$0	$0	$0
Measurement and Verification	N/A	$35,039	$35,039	$35,039	$35,039
Subtotal	N/A	$1,579,121	$1,579,121	$1,579,121	$1,579,121
Utility Revenue Reduction					
Revenue Reduction - Gas	N/A	N/A	$14,194,635	N/A	N/A
Subtotal	N/A	N/A	$14,194,635	N/A	N/A
Participant Costs					
Incremental Capital Costs	$4,968,919	N/A	N/A	$4,213,192	$4,213,192
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$4,968,919	N/A	N/A	$4,213,192	$4,213,192
Total Costs	$4,968,919	$1,579,121	$15,773,757	$5,792,313	$5,792,313
Net Benefit (Cost)	$24,345,928	$7,101,670	($7,092,966)	**$32,938,964**	**$37,496,649**
Benefit/Cost Ratio	5.90	5.50	0.55	**6.69**	**7.47**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Dth		
Lifetime (Weighted on Dth)	A	17.7 years
Net-to-Gross (Weighted on Dth)	B	89.9%
Install Rate (Weighted on Dth)	C	110.3%

Program Summary per Participant		
Gross Annual Dth Saved	D	174.0
Net Annual Dth Saved	E	156.4

Program Summary All Participants		
Total Budget	F	**$1,579,121**
Net Targeted Peak Dth/hr Saved	G	**20.83 Dth**
Gross Annual Dth Saved	H	**163,548 Dth**
Net Annual Dth Saved	I	**146,975 Dth**
Total MTRC Net Benefits with Adder	J	**$32,938,964**
Total MTRC Net Benefits without Adder	K	**$32,070,885**
Utility Program Cost per Dth Lifetime	F /(A x I)	**$0.6068**
Avoided Lifetime CO2 Emissions, Total Program (tons CO2)		**152,023**
Avoided Lifetime CH4 Emissions, Total Program (tons CH4)		**835**

BUSINESS PROGRAM TOTAL - EE

2026 GAS **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Commodity Cost Reduction	N/A	$5,285,738	$5,285,738	$5,285,738	$7,444,118
Variable O&M Savings	N/A	$60,205	$60,205	$60,205	$78,426
Bulk System Demand Savings	N/A	$909,969	$909,969	$909,969	$1,185,369
Targeted Demand Savings	N/A	$120,814	$120,814	$120,814	$120,814
Avoided Emissions (CO2)	N/A	N/A	N/A	$9,807,829	$9,807,829
Avoided Emissions (CH4)	N/A	N/A	N/A	$1,570,149	$1,570,149
Subtotal				$17,754,704	$20,206,706
Non-Energy Benefits Adder (10.0%)				$637,673	$870,791
Subtotal	N/A	$6,255,912	$6,255,912	$18,392,377	$21,077,497
Participant Benefits					
Bill Reduction - Gas	$10,832,079	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$738,399	N/A	N/A	$738,399	$738,399
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$8,754,778	N/A	N/A	$7,661,019	$8,438,200
Subtotal	$20,325,256	N/A	N/A	$8,399,418	$9,176,599
Total Benefits	$20,325,256	$6,376,726	$6,376,726	$26,791,795	$30,254,096
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$207,639	$207,639	$207,639	$207,639
Advertising/Promotion/Customer Ed	N/A	$69,697	$69,697	$69,697	$69,697
Participant Rebates and Incentives	N/A	$738,399	$738,399	$738,399	$738,399
Equipment & Installation	N/A	$0	$0	$0	$0
Measurement and Verification	N/A	$11,222	$11,222	$11,222	$11,222
Subtotal	N/A	$1,026,957	$1,026,957	$1,026,957	$1,026,957
Utility Revenue Reduction					
Revenue Reduction - Gas	N/A	N/A	$10,832,079	N/A	N/A
Subtotal	N/A	N/A	$10,832,079	N/A	N/A
Participant Costs					
Incremental Capital Costs	$3,779,283	N/A	N/A	$3,174,099	$3,174,099
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$3,779,283	N/A	N/A	$3,174,099	$3,174,099
Total Costs	$3,779,283	$1,026,957	$11,859,037	$4,201,057	$4,201,057
Net Benefit (Cost)	$16,545,973	$5,349,769	($5,482,311)	**$22,590,738**	**$26,053,039**
Benefit/Cost Ratio	5.38	6.21	0.54	**6.38**	**7.20**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Dth		
Lifetime (Weighted on Dth)	A	16.9 years
Net-to-Gross (Weighted on Dth)	B	91.0%
Install Rate (Weighted on Dth)	C	144.5%

Program Summary per Participant		
Gross Annual Dth Saved	D	134.5
Net Annual Dth Saved	E	122.5

Program Summary All Participants		
Total Budget	F	**$1,026,957**
Net Targeted Peak Dth/hr Saved	G	**20.77 Dth**
Gross Annual Dth Saved	H	**124,860 Dth**
Net Annual Dth Saved	I	**113,650 Dth**
Total MTRC Net Benefits with Adder	J	**$22,590,738**
Total MTRC Net Benefits without Adder	K	**$21,953,065**
Utility Program Cost per Dth Lifetime	F /(A x I)	**$0.5341**
Avoided Lifetime CO2 Emissions, Total Program (tons CO2)		**112,323**
Avoided Lifetime CH4 Emissions, Total Program (tons CH4)		**617**

RESIDENTIAL PROGRAM TOTAL - EE

2024 GAS **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Commodity Cost Reduction	N/A	$19,372,780	$19,372,780	$19,372,780	$26,171,859
Variable O&M Savings	N/A	$220,380	$220,380	$220,380	$283,836
Bulk System Demand Savings	N/A	$3,330,923	$3,330,923	$3,330,923	$4,290,026
Targeted Demand Savings	N/A	$216,445	$216,445	$216,445	$216,445
Avoided Emissions (CO2)	N/A	N/A	N/A	$35,747,431	$35,747,431
Avoided Emissions (CH4)	N/A	N/A	N/A	$5,653,146	$5,653,146
Subtotal				$64,541,105	$72,362,742
Non-Energy Benefits Adder (10.0%)				$2,314,053	$3,074,572
Subtotal	N/A	$22,924,083	$22,924,083	$66,855,158	$75,437,314
Participant Benefits					
Bill Reduction - Gas	$41,851,804	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$4,467,932	N/A	N/A	$4,467,932	$4,467,932
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$16,986,950	N/A	N/A	$16,556,447	$17,562,216
Subtotal	$63,306,687	N/A	N/A	$21,024,380	$22,030,148
Total Benefits	$63,306,687	$23,140,529	$23,140,529	$87,879,538	$97,467,463
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$3,665,558	$3,665,558	$3,665,558	$3,665,558
Advertising/Promotion/Customer Ed	N/A	$763,827	$763,827	$763,827	$763,827
Participant Rebates and Incentives	N/A	$4,467,932	$4,467,932	$4,467,932	$4,467,932
Equipment & Installation	N/A	$1,551,171	$1,551,171	$1,551,171	$1,551,171
Measurement and Verification	N/A	$40,349	$40,349	$40,349	$40,349
Subtotal	N/A	$10,488,837	$10,488,837	$10,488,837	$10,488,837
Utility Revenue Reduction					
Revenue Reduction - Gas	N/A	N/A	$41,851,804	N/A	N/A
Subtotal	N/A	N/A	$41,851,804	N/A	N/A
Participant Costs					
Incremental Capital Costs	$21,617,495	N/A	N/A	$17,472,236	$17,472,236
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$21,617,495	N/A	N/A	$17,472,236	$17,472,236
Total Costs	$21,617,495	$10,488,837	$52,340,642	$27,961,073	$27,961,073
Net Benefit (Cost)	$41,689,192	$12,651,692	($29,200,113)	**$59,918,465**	**$69,506,390**
Benefit/Cost Ratio	2.93	2.21	0.44	**3.14**	**3.49**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Dth		
Lifetime (Weighted on Dth)	A	13.1 years
Net-to-Gross (Weighted on Dth)	B	55.4%
Install Rate (Weighted on Dth)	C	63.2%

Program Summary per Participant		
Gross Annual Dth Saved	D	0.4
Net Annual Dth Saved	E	0.2

Program Summary All Participants		
Total Budget	F	**$10,488,837**
Net Targeted Peak Dth/hr Saved	G	**71.84 Dth**
Gross Annual Dth Saved	H	**964,241 Dth**
Net Annual Dth Saved	I	**534,480 Dth**
Total MTRC Net Benefits with Adder	J	**$59,918,465**
Total MTRC Net Benefits without Adder	K	**$57,604,412**

Utility Program Cost per Dth Lifetime	F /(A x I)	**$1.4971**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**409,294**
Avoided Lifetime CH4 Emissions, Total Program (tons CH4)	**2,248**

RESIDENTIAL PROGRAM TOTAL - EE

2025 GAS GOAL

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Commodity Cost Reduction	N/A	$17,597,348	$17,597,348	$17,597,348	$22,102,635
Variable O&M Savings	N/A	$202,322	$202,322	$202,322	$246,576
Bulk System Demand Savings	N/A	$3,057,989	$3,057,989	$3,057,989	$3,726,873
Targeted Demand Savings	N/A	$224,537	$224,537	$224,537	$224,537
Avoided Emissions (CO2)	N/A	N/A	N/A	$29,997,263	$29,997,263
Avoided Emissions (CH4)	N/A	N/A	N/A	$4,707,800	$4,707,800
Subtotal				$55,787,258	$61,005,684
Non-Energy Benefits Adder (10.0%)				$2,108,220	$2,607,608
Subtotal	N/A	$20,857,658	$20,857,658	$57,895,478	$63,613,293
Participant Benefits					
Bill Reduction - Gas	$37,998,773	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$3,743,237	N/A	N/A	$3,743,237	$3,743,237
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$16,628,108	N/A	N/A	$16,247,558	$17,234,632
Subtotal	$58,370,118	N/A	N/A	$19,990,794	$20,977,869
Total Benefits	$58,370,118	$21,082,196	$21,082,196	$77,886,272	$84,591,161
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$3,324,504	$3,324,504	$3,324,504	$3,324,504
Advertising/Promotion/Customer Ed	N/A	$483,463	$483,463	$483,463	$483,463
Participant Rebates and Incentives	N/A	$3,743,237	$3,743,237	$3,743,237	$3,743,237
Equipment & Installation	N/A	$2,112,201	$2,112,201	$2,112,201	$2,112,201
Measurement and Verification	N/A	$44,467	$44,467	$44,467	$44,467
Subtotal	N/A	$9,707,872	$9,707,872	$9,707,872	$9,707,872
Utility Revenue Reduction					
Revenue Reduction - Gas	N/A	N/A	$37,998,773	N/A	N/A
Subtotal	N/A	N/A	$37,998,773	N/A	N/A
Participant Costs					
Incremental Capital Costs	$14,062,507	N/A	N/A	$12,256,967	$12,256,967
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$14,062,507	N/A	N/A	$12,256,967	$12,256,967
Total Costs	$14,062,507	$9,707,872	$47,706,646	$21,964,839	$21,964,839
Net Benefit (Cost)	$44,307,611	$11,374,323	($26,624,450)	**$55,921,433**	**$62,626,323**
Benefit/Cost Ratio	4.15	2.17	0.44	**3.55**	**3.85**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Dth		
Lifetime (Weighted on Dth)	A	10.0 years
Net-to-Gross (Weighted on Dth)	B	58.6%
Install Rate (Weighted on Dth)	C	61.4%

Program Summary per Participant		
Gross Annual Dth Saved	D	0.3
Net Annual Dth Saved	E	0.2

Program Summary All Participants		
Total Budget	F	**$9,707,872**
Net Targeted Peak Dth/hr Saved	G	**85.63 Dth**
Gross Annual Dth Saved	H	**992,105 Dth**
Net Annual Dth Saved	I	**581,007 Dth**
Total MTRC Net Benefits with Adder	J	**$55,921,433**
Total MTRC Net Benefits without Adder	K	**$53,813,214**
Utility Program Cost per Dth Lifetime	F /(A x I)	**$1.6766**
Avoided Lifetime CO2 Emissions, Total Program (tons CO2)		**338,268**
Avoided Lifetime CH4 Emissions, Total Program (tons CH4)		**1,858**

RESIDENTIAL PROGRAM TOTAL - EE

2026 GAS GOAL

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Commodity Cost Reduction	N/A	$20,042,877	$20,042,877	$20,042,877	$25,350,884
Variable O&M Savings	N/A	$228,484	$228,484	$228,484	$279,073
Bulk System Demand Savings	N/A	$3,453,422	$3,453,422	$3,453,422	$4,218,042
Targeted Demand Savings	N/A	$234,089	$234,089	$234,089	$234,089
Avoided Emissions (CO2)	N/A	N/A	N/A	$29,216,951	$29,216,951
Avoided Emissions (CH4)	N/A	N/A	N/A	$4,641,344	$4,641,344
Subtotal				$57,817,168	$63,940,384
Non-Energy Benefits Adder (10.0%)				$2,395,887	$2,984,800
Subtotal	N/A	$23,724,784	$23,724,784	$60,213,055	$66,925,184
Participant Benefits					
Bill Reduction - Gas	$43,294,317	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$4,283,379	N/A	N/A	$4,283,379	$4,283,379
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$17,779,330	N/A	N/A	$17,355,407	$18,409,701
Subtotal	$65,357,027	N/A	N/A	$21,638,786	$22,693,080
Total Benefits	$65,357,027	$23,958,872	$23,958,872	$81,851,841	$89,618,264
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$3,484,576	$3,484,576	$3,484,576	$3,484,576
Advertising/Promotion/Customer Ed	N/A	$477,309	$477,309	$477,309	$477,309
Participant Rebates and Incentives	N/A	$4,283,379	$4,283,379	$4,283,379	$4,283,379
Equipment & Installation	N/A	$1,788,307	$1,788,307	$1,788,307	$1,788,307
Measurement and Verification	N/A	$36,041	$36,041	$36,041	$36,041
Subtotal	N/A	$10,069,612	$10,069,612	$10,069,612	$10,069,612
Utility Revenue Reduction					
Revenue Reduction - Gas	N/A	N/A	$43,294,317	N/A	N/A
Subtotal	N/A	N/A	$43,294,317	N/A	N/A
Participant Costs					
Incremental Capital Costs	$17,129,819	N/A	N/A	$14,854,238	$14,854,238
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$17,129,819	N/A	N/A	$14,854,238	$14,854,238
Total Costs	$17,129,819	$10,069,612	$53,363,929	$24,923,850	$24,923,850
Net Benefit (Cost)	$48,227,207	$13,889,260	($29,405,057)	**$56,927,991**	**$64,694,414**
Benefit/Cost Ratio	3.82	2.38	0.45	**3.28**	**3.60**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Dth		
Lifetime (Weighted on Dth)	A	10.1 years
Net-to-Gross (Weighted on Dth)	B	60.8%
Install Rate (Weighted on Dth)	C	56.9%

Program Summary per Participant		
Gross Annual Dth Saved	D	0.3
Net Annual Dth Saved	E	0.2

Program Summary All Participants		
Total Budget	F	**$10,069,612**
Net Targeted Peak Dth/hr Saved	G	**103.85 Dth**
Gross Annual Dth Saved	H	**1,071,297 Dth**
Net Annual Dth Saved	I	**650,926 Dth**
Total MTRC Net Benefits with Adder	J	**$56,927,991**
Total MTRC Net Benefits without Adder	K	**$54,532,104**
Utility Program Cost per Dth Lifetime	F /(A x I)	**$1.5342**
Avoided Lifetime CO2 Emissions, Total Program (tons CO2)		**383,428**
Avoided Lifetime CH4 Emissions, Total Program (tons CH4)		**2,106**

INCOME QUALIFIED PROGRAM TOTAL - EE

2024 GAS GOAL

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Commodity Cost Reduction	N/A	$5,242,506	$5,242,506	$5,242,506	$6,924,001
Variable O&M Savings	N/A	$59,979	$59,979	$59,979	$77,175
Bulk System Demand Savings	N/A	$906,545	$906,545	$906,545	$1,166,467
Targeted Demand Savings	N/A	$94,396	$94,396	$94,396	$94,396
Avoided Emissions (CO2)	N/A	N/A	N/A	$9,501,384	$9,501,384
Avoided Emissions (CH4)	N/A	N/A	N/A	$1,497,158	$1,497,158
Subtotal				$17,301,967	$19,260,581
Non-Energy Benefits Adder (25.0%)				$1,575,856	$2,041,911
Subtotal	N/A	$6,209,030	$6,209,030	$18,877,823	$21,302,492
Participant Benefits					
Bill Reduction - Gas	$11,167,757	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$6,331,401	N/A	N/A	$6,331,401	$6,331,401
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$1,145,805	N/A	N/A	$1,145,805	$1,221,422
Subtotal	$18,644,963	N/A	N/A	$7,477,206	$7,552,823
Total Benefits	$18,644,963	$6,303,425	$6,303,425	$26,355,029	$28,855,315
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$774,890	$774,890	$774,890	$774,890
Advertising/Promotion/Customer Ed	N/A	$420,164	$420,164	$420,164	$420,164
Participant Rebates and Incentives	N/A	$6,331,401	$6,331,401	$6,331,401	$6,331,401
Equipment & Installation	N/A	$172,254	$172,254	$172,254	$172,254
Measurement and Verification	N/A	$232,283	$232,283	$232,283	$232,283
Subtotal	N/A	$7,930,992	$7,930,992	$7,930,992	$7,930,992
Utility Revenue Reduction					
Revenue Reduction - Gas	N/A	N/A	$11,167,757	N/A	N/A
Subtotal	N/A	N/A	$11,167,757	N/A	N/A
Participant Costs					
Incremental Capital Costs	$7,953,014	N/A	N/A	$7,953,014	$7,953,014
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$7,953,014	N/A	N/A	$7,953,014	$7,953,014
Total Costs	$7,953,014	$7,930,992	$19,098,748	$15,884,005	$15,884,005
Net Benefit (Cost)	$10,691,949	($1,627,567)	($12,795,323)	**$10,471,024**	**$12,971,310**
Benefit/Cost Ratio	2.34	0.79	0.33	**1.66**	**1.82**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Dth		
Lifetime (Weighted on Dth)	A	15.8 years
Net-to-Gross (Weighted on Dth)	B	97.9%
Install Rate (Weighted on Dth)	C	97.9%

Program Summary per Participant		
Gross Annual Dth Saved	D	5.1
Net Annual Dth Saved	E	4.9

Program Summary All Participants		
Total Budget	F	**$7,930,992**
Net Targeted Peak Dth/hr Saved	G	**46.69 Dth**
Gross Annual Dth Saved	H	**121,006 Dth**
Net Annual Dth Saved	I	**118,455 Dth**
Total MTRC Net Benefits with Adder	J	**$10,471,024**
Total MTRC Net Benefits without Adder	K	**$8,895,168**
Utility Program Cost per Dth Lifetime	F /(A x I)	**$4.2297**
Avoided Lifetime CO2 Emissions, Total Program (tons CO2)		**109,542**
Avoided Lifetime CH4 Emissions, Total Program (tons CH4)		**602**

INCOME QUALIFIED PROGRAM TOTAL - EE

2025 GAS GOAL

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Commodity Cost Reduction	N/A	$6,156,597	$6,156,597	$6,156,597	$8,143,838
Variable O&M Savings	N/A	$68,727	$68,727	$68,727	$88,447
Bulk System Demand Savings	N/A	$1,038,768	$1,038,768	$1,038,768	$1,336,828
Targeted Demand Savings	N/A	$124,162	$124,162	$124,162	$124,162
Avoided Emissions (CO2)	N/A	N/A	N/A	$11,273,832	$11,273,832
Avoided Emissions (CH4)	N/A	N/A	N/A	$1,790,736	$1,790,736
Subtotal				$20,452,823	$22,757,843
Non-Energy Benefits Adder (25.0%)				$1,847,064	$2,392,278
Subtotal	N/A	$7,264,092	$7,264,092	$22,299,886	$25,150,121
Participant Benefits					
Bill Reduction - Gas	$13,100,778	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$6,764,117	N/A	N/A	$6,764,117	$6,764,117
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$1,383,482	N/A	N/A	$1,383,482	$1,476,001
Subtotal	$21,248,377	N/A	N/A	$8,147,599	$8,240,118
Total Benefits	$21,248,377	$7,388,255	$7,388,255	$30,447,485	$33,390,239
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$930,077	$930,077	$930,077	$930,077
Advertising/Promotion/Customer Ed	N/A	$567,721	$567,721	$567,721	$567,721
Participant Rebates and Incentives	N/A	$6,764,117	$6,764,117	$6,764,117	$6,764,117
Equipment & Installation	N/A	$369,423	$369,423	$369,423	$369,423
Measurement and Verification	N/A	$219,371	$219,371	$219,371	$219,371
Subtotal	N/A	$8,850,708	$8,850,708	$8,850,708	$8,850,708
Utility Revenue Reduction					
Revenue Reduction - Gas	N/A	N/A	$13,100,778	N/A	N/A
Subtotal	N/A	N/A	$13,100,778	N/A	N/A
Participant Costs					
Incremental Capital Costs	$8,946,588	N/A	N/A	$8,946,588	$8,946,588
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$8,946,588	N/A	N/A	$8,946,588	$8,946,588
Total Costs	$8,946,588	$8,850,708	$21,951,486	$17,797,296	$17,797,296
Net Benefit (Cost)	$12,301,789	($1,462,453)	($14,563,231)	**$12,650,189**	**$15,592,943**
Benefit/Cost Ratio	2.38	0.83	0.34	**1.71**	**1.88**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Dth		
Lifetime (Weighted on Dth)	A	15.8 years
Net-to-Gross (Weighted on Dth)	B	98.2%
Install Rate (Weighted on Dth)	C	85.6%

Program Summary per Participant		
Gross Annual Dth Saved	D	5.4
Net Annual Dth Saved	E	5.3

Program Summary All Participants		
Total Budget	F	**$8,850,708**
Net Targeted Peak Dth/hr Saved	G	**52.94 Dth**
Gross Annual Dth Saved	H	**138,332 Dth**
Net Annual Dth Saved	I	**135,781 Dth**
Total MTRC Net Benefits with Adder	J	**$12,650,189**
Total MTRC Net Benefits without Adder	K	**$10,803,126**
Utility Program Cost per Dth Lifetime	F /(A x I)	**$4.1170**
Avoided Lifetime CO2 Emissions, Total Program (tons CO2)		**125,590**
Avoided Lifetime CH4 Emissions, Total Program (tons CH4)		**690**

INCOME QUALIFIED PROGRAM TOTAL - EE

2026 GAS GOAL

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Commodity Cost Reduction	N/A	$6,406,579	$6,406,579	$6,406,579	$8,590,719
Variable O&M Savings	N/A	$70,471	$70,471	$70,471	$90,885
Bulk System Demand Savings	N/A	$1,065,140	$1,065,140	$1,065,140	$1,373,674
Targeted Demand Savings	N/A	$148,046	$148,046	$148,046	$148,046
Avoided Emissions (CO2)	N/A	N/A	N/A	$11,223,211	$11,223,211
Avoided Emissions (CH4)	N/A	N/A	N/A	$1,791,491	$1,791,491
Subtotal				$20,704,938	$23,218,026
Non-Energy Benefits Adder (25.0%)				$1,922,559	$2,513,819
Subtotal	N/A	$7,542,190	$7,542,190	$22,627,497	$25,731,845
Participant Benefits					
Bill Reduction - Gas	$13,729,354	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$6,849,284	N/A	N/A	$6,849,284	$6,849,284
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$1,486,691	N/A	N/A	$1,486,691	$1,587,495
Subtotal	$22,065,329	N/A	N/A	$8,335,975	$8,436,779
Total Benefits	$22,065,329	$7,690,236	$7,690,236	$30,963,472	$34,168,624
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$979,267	$979,267	$979,267	$979,267
Advertising/Promotion/Customer Ed	N/A	$591,464	$591,464	$591,464	$591,464
Participant Rebates and Incentives	N/A	$6,849,284	$6,849,284	$6,849,284	$6,849,284
Equipment & Installation	N/A	$437,904	$437,904	$437,904	$437,904
Measurement and Verification	N/A	$202,432	$202,432	$202,432	$202,432
Subtotal	N/A	$9,060,352	$9,060,352	$9,060,352	$9,060,352
Utility Revenue Reduction					
Revenue Reduction - Gas	N/A	N/A	$13,729,354	N/A	N/A
Subtotal	N/A	N/A	$13,729,354	N/A	N/A
Participant Costs					
Incremental Capital Costs	$9,271,390	N/A	N/A	$9,271,390	$9,271,390
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$9,271,390	N/A	N/A	$9,271,390	$9,271,390
Total Costs	$9,271,390	$9,060,352	$22,789,705	$18,331,742	$18,331,742
Net Benefit (Cost)	$12,793,938	($1,370,116)	($15,099,469)	**$12,631,730**	**$15,836,883**
Benefit/Cost Ratio	2.38	0.85	0.34	**1.69**	**1.86**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Dth		
Lifetime (Weighted on Dth)	A	16.0 years
Net-to-Gross (Weighted on Dth)	B	98.2%
Install Rate (Weighted on Dth)	C	84.0%

Program Summary per Participant		
Gross Annual Dth Saved	D	5.7
Net Annual Dth Saved	E	5.6

Program Summary All Participants		
Total Budget	F	**$9,060,352**
Net Targeted Peak Dth/hr Saved	G	**54.72 Dth**
Gross Annual Dth Saved	H	**141,092 Dth**
Net Annual Dth Saved	I	**138,541 Dth**
Total MTRC Net Benefits with Adder	J	**$12,631,730**
Total MTRC Net Benefits without Adder	K	**$10,709,171**

Utility Program Cost per Dth Lifetime	F /(A x I)	**$4.0937**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**129,298**
Avoided Lifetime CH4 Emissions, Total Program (tons CH4)	**710**

EE PORTFOLIO TOTAL	Beneficial Electrification	2024

Net Present Cost Benefit Summary Analysis For All Participants Benefits (Positive Values) Costs (Negative Values)

	Participant Test ($Total)	Utility Test ($Total)	Electric Rate Impact Test ($Total)	Gas Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Electric System Impacts						
Generation Capacity	N/A	($3,067,545)	($3,067,545)	N/A	($3,067,545)	($3,067,545)
Trans. & Dist. Capacity	N/A	($217,011)	($217,011)	N/A	($217,011)	($217,011)
Marginal Energy	N/A	($6,736,924)	($6,736,924)	N/A	($6,736,924)	($8,767,294)
Subtotal	**$0**	**($10,021,479)**	**($10,021,479)**	**N/A**	**($10,021,479)**	**($12,051,850)**
Non-Energy Benefits Adder (0.0%)	N/A	N/A	N/A	N/A	$0	$0
Subtotal	**N/A**	**($10,021,479)**	**($10,021,479)**	**N/A**	**($10,021,479)**	**($12,051,850)**
Gas System Impacts						
Commodity Cost	N/A	$12,829,004	N/A	$12,829,004	$12,829,004	$17,305,721
Variable O&M	N/A	$145,057	N/A	$145,057	$145,057	$190,631
Bulk System Demand	N/A	$2,192,458	N/A	$2,192,458	$2,192,458	$2,881,282
Targeted Demand	N/A	$489,260	N/A	$489,260	$489,260	$489,260
Subtotal	**N/A**	**$15,655,779**	**N/A**	**$15,655,779**	**$15,655,779**	**$20,866,894**
Non-Energy Benefits Adder (11.2%)	N/A	N/A	N/A	N/A	$1,745,885	$2,271,903
Subtotal	**N/A**	**$15,655,779**	**N/A**	**$15,655,779**	**$17,401,664**	**$23,138,797**
Emissions Impacts						
Electric Emissions (CO2)	N/A	N/A	N/A	N/A	($4,589,195)	($4,589,195)
Gas Emissions (CO2)	N/A	N/A	N/A	N/A	$24,239,617	$24,239,617
Gas Emissions (CH4)	N/A	N/A	N/A	N/A	$3,791,725	$3,791,725
Subtotal	N/A	N/A	N/A	N/A	$23,442,147	$23,442,147
Participant Impacts						
Electric Bill	($43,318,753)	N/A	N/A	N/A	N/A	N/A
Gas Bill	$26,977,380	N/A	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$7,925,800	N/A	N/A	N/A	$7,925,800	$7,925,800
Incremental Capital Savings	($45,415,540)	N/A	N/A	N/A	($42,603,605)	($42,603,605)
Incremental O&M Savings	$6,837,421	N/A	N/A	N/A	$6,358,802	$7,117,806
Subtotal	**($46,993,692)**	**N/A**	**N/A**	**N/A**	**($28,319,003)**	**($27,559,998)**
Utility Impacts						
Utility Project Costs						
Program Planning & Design	N/A	$0	$0	$0	$0	$0
Administration & Program Delivery	N/A	$2,594,184	$1,351,928	$1,242,256	$2,594,184	$2,594,184
Advertising/Promotion/Customer Ed	N/A	$459,067	$264,400	$194,667	$459,067	$459,067
Participant Rebates and Incentives	N/A	$7,925,800	$4,010,814	$3,914,986	$7,925,800	$7,925,800
Equipment & Installation	N/A	$0	$0	$0	$0	$0
Measurement and Verification	N/A	$399,538	$153,470	$246,069	$399,538	$399,538
Subtotal	N/A	$11,378,589	$5,780,611	$5,597,978	$11,378,589	$11,378,589
Non-Participant Impacts						
Electric Bill	N/A	N/A	$43,318,753	N/A	N/A	N/A
Gas Bill	N/A	N/A	N/A	($26,977,380)	N/A	N/A
Subtotal	N/A	N/A	$43,318,753	($26,977,380)	N/A	N/A

Benefits	$41,740,601	$15,655,779	$43,318,753	$15,655,779	$59,717,608	$66,213,745
Costs	$88,734,293	$21,400,068	$15,802,090	$32,575,358	$68,592,868	$70,623,239
Net Benefit (Cost)	($46,993,692)	($5,744,289)	$27,516,663	($16,919,578)	($8,875,260)	($4,409,493)
Benefit/Cost Ratio	0.47	0.73	2.74	0.48	0.87	0.94

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Beneficial Electrification Impacts

Lifetime (Weighted on Generator kWh)	18.4 years
Lifetime (Weighted on Dth)	18.3 years
T & D Loss Factor (Energy)	6.07%
T & D Loss Factor (Demand)	7.75%
Net-to-Gross (kWh)	93.5%
Net-to-Gross (kW)	93.0%
Net-to-Gross (Dth)	93.6%
Installation Rate (Energy)	100.0%
Installation Rate (Demand)	100.0%
Net coincident kW Saved at Generator	-1339.09 kW
Gross Annual kWh Saved at Customer	-29,869,258 kWh
Net Annual kWh Saved at Generator	-29,746,869 kWh
Net Annual Dth Saved	257,268 Dth
Net Targeted Peak Dth/hr Savings	67.55 Dth
Net Annual Other Fuels Dth Saved	11,554 Dth

First Year Carbon Emissions Reductions

Electric Electrification	-13,124.8 tons CO2
Gas Electrification	15,218.2 tons CO2
TOTAL	**2,093.4 tons CO2**

Lifetime Carbon Emissions Reductions

Electric Electrification	-56,294.5 tons CO2
Gas Electrification	277,969.1 tons CO2
TOTAL	**221,674.6 tons CO2**

EE PORTFOLIO TOTAL	Beneficial Electrification	2025

Net Present Cost Benefit Summary Analysis For All Participants Benefits (Positive Values) Costs (Negative Values)

	Participant Test ($Total)	Utility Test ($Total)	Electric Rate Impact Test ($Total)	Gas Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Electric System Impacts						
Generation Capacity	N/A	($8,115,355)	($8,115,355)	N/A	($8,115,355)	($8,115,355)
Trans. & Dist. Capacity	N/A	($574,113)	($574,113)	N/A	($574,113)	($574,113)
Marginal Energy	N/A	($16,565,555)	($16,565,555)	N/A	($16,565,555)	($22,035,258)
Subtotal	**$0**	**($25,255,023)**	**($25,255,023)**	**N/A**	**($25,255,023)**	**($30,724,726)**
Non-Energy Benefits Adder (0.0%)	N/A	N/A	N/A	N/A	$0	$0
Subtotal	**N/A**	**($25,255,023)**	**($25,255,023)**	**N/A**	**($25,255,023)**	**($30,724,726)**
Gas System Impacts						
Commodity Cost	N/A	$31,886,125	N/A	$31,886,125	$31,886,125	$43,082,633
Variable O&M	N/A	$351,599	N/A	$351,599	$351,599	$462,284
Bulk System Demand	N/A	$5,314,237	N/A	$5,314,237	$5,314,237	$6,987,177
Targeted Demand	N/A	$1,295,251	N/A	$1,295,251	$1,295,251	$1,295,251
Subtotal	**N/A**	**$38,847,212**	**N/A**	**$38,847,212**	**$38,847,212**	**$51,827,345**
Non-Energy Benefits Adder (10.7%)	N/A	N/A	N/A	N/A	$4,155,497	$5,402,742
Subtotal	**N/A**	**$38,847,212**	**N/A**	**$38,847,212**	**$43,002,709**	**$57,230,087**
Emissions Impacts						
Electric Emissions (CO2)	N/A	N/A	N/A	N/A	($9,307,337)	($9,307,337)
Gas Emissions (CO2)	N/A	N/A	N/A	N/A	$61,178,069	$61,178,069
Gas Emissions (CH4)	N/A	N/A	N/A	N/A	$9,597,716	$9,597,716
Subtotal	N/A	N/A	N/A	N/A	$61,468,448	$61,468,448
Participant Impacts						
Electric Bill	($109,368,465)	N/A	N/A	N/A	N/A	N/A
Gas Bill	$67,162,579	N/A	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$17,176,790	N/A	N/A	N/A	$17,176,790	$17,176,790
Incremental Capital Savings	($125,813,114)	N/A	N/A	N/A	($117,662,919)	($117,662,919)
Incremental O&M Savings	$18,415,837	N/A	N/A	N/A	$17,126,728	$19,171,024
Subtotal	**($132,426,372)**	**N/A**	**N/A**	**N/A**	**($83,359,401)**	**($81,315,105)**
Utility Impacts						
Utility Project Costs						
Program Planning & Design	N/A	$0	$0	$0	$0	$0
Administration & Program Delivery	N/A	$5,016,145	$2,749,449	$2,266,696	$5,016,145	$5,016,145
Advertising/Promotion/Customer Ed	N/A	$1,277,935	$769,917	$508,018	$1,277,935	$1,277,935
Participant Rebates and Incentives	N/A	$17,176,790	$8,686,747	$8,490,043	$17,176,790	$17,176,790
Equipment & Installation	N/A	$0	$0	$0	$0	$0
Measurement and Verification	N/A	$726,300	$316,083	$410,216	$726,300	$726,300
Subtotal	N/A	$24,197,170	$12,522,197	$11,674,973	$24,197,170	$24,197,170
Non-Participant Impacts						
Electric Bill	N/A	N/A	$109,368,465	N/A	N/A	N/A
Gas Bill	N/A	N/A	N/A	($67,162,579)	N/A	N/A
Subtotal	N/A	N/A	$109,368,465	($67,162,579)	N/A	N/A

Benefits	$102,755,206	$38,847,212	$109,368,465	$38,847,212	$148,082,012	$164,353,686
Costs	$235,181,578	$49,452,193	$37,777,220	$78,837,552	$176,422,449	$181,892,151
Net Benefit (Cost)	($132,426,372)	($10,604,981)	$71,591,245	($39,990,340)	($28,340,437)	($17,538,466)
Benefit/Cost Ratio	0.44	0.79	2.90	0.49	0.84	0.90

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Beneficial Electrification Impacts	
Lifetime (Weighted on Generator kWh)	18.5 years
Lifetime (Weighted on Dth)	18.3 years
T & D Loss Factor (Energy)	6.07%
T & D Loss Factor (Demand)	7.75%
Net-to-Gross (kWh)	93.3%
Net-to-Gross (kW)	93.0%
Net-to-Gross (Dth)	93.4%
Installation Rate (Energy)	100.0%
Installation Rate (Demand)	100.0%
Net coincident kW Saved at Generator	-3401.00 kW
Gross Annual kWh Saved at Customer	-74,377,672 kWh
Net Annual kWh Saved at Generator	-73,892,452 kWh
Net Annual Dth Saved	622,073 Dth
Net Targeted Peak Dth/hr Savings	172.55 Dth
Net Annual Other Fuels Dth Saved	46,674 Dth

First Year Carbon Emissions Reductions	
Electric Electrification	-30,742.9 tons CO2
Gas Electrification	36,989.4 tons CO2
TOTAL	**6,246.5 tons CO2**

Lifetime Carbon Emissions Reductions	
Electric Electrification	-109,774.3 tons CO2
Gas Electrification	677,919.2 tons CO2
TOTAL	**568,144.9 tons CO2**

EE PORTFOLIO TOTAL	Beneficial Electrification	2026

Net Present Cost Benefit Summary Analysis For All Participants Benefits (Positive Values) Costs (Negative Values)

	Participant Test ($Total)	Utility Test ($Total)	Electric Rate Impact Test ($Total)	Gas Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Electric System Impacts						
Generation Capacity	N/A	($14,600,022)	($14,600,022)	N/A	($14,600,022)	($14,600,022)
Trans. & Dist. Capacity	N/A	($1,032,865)	($1,032,865)	N/A	($1,032,865)	($1,032,865)
Marginal Energy	N/A	($31,727,330)	($31,727,330)	N/A	($31,727,330)	($43,604,960)
Subtotal	**$0**	**($47,360,217)**	**($47,360,217)**	**N/A**	**($47,360,217)**	**($59,237,847)**
Non-Energy Benefits Adder (0.0%)	N/A	N/A	N/A	N/A	$0	$0
Subtotal	**N/A**	**($47,360,217)**	**($47,360,217)**	**N/A**	**($47,360,217)**	**($59,237,847)**
Gas System Impacts						
Commodity Cost	N/A	$61,173,178	N/A	$61,173,178	$61,173,178	$83,985,114
Variable O&M	N/A	$666,841	N/A	$666,841	$666,841	$877,644
Bulk System Demand	N/A	$10,078,962	N/A	$10,078,962	$10,078,962	$13,265,137
Targeted Demand	N/A	$2,968,242	N/A	$2,968,242	$2,968,242	$2,968,242
Subtotal	**N/A**	**$74,887,224**	**N/A**	**$74,887,224**	**$74,887,224**	**$101,096,137**
Non-Energy Benefits Adder (10.6%)	N/A	N/A	N/A	N/A	$7,949,137	$10,393,433
Subtotal	**N/A**	**$74,887,224**	**N/A**	**$74,887,224**	**$82,836,361**	**$111,489,569**
Emissions Impacts						
Electric Emissions (CO2)	N/A	N/A	N/A	N/A	($13,756,108)	($13,756,108)
Gas Emissions (CO2)	N/A	N/A	N/A	N/A	$112,514,760	$112,514,760
Gas Emissions (CH4)	N/A	N/A	N/A	N/A	$17,858,529	$17,858,529
Subtotal	N/A	N/A	N/A	N/A	$116,617,181	$116,617,181
Participant Impacts						
Electric Bill	($214,964,879)	N/A	N/A	N/A	N/A	N/A
Gas Bill	$130,664,996	N/A	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$33,349,835	N/A	N/A	N/A	$33,349,835	$33,349,835
Incremental Capital Savings	($254,158,654)	N/A	N/A	N/A	($237,565,038)	($237,565,038)
Incremental O&M Savings	$32,169,276	N/A	N/A	N/A	$29,917,427	$31,611,431
Subtotal	**($272,939,426)**	**N/A**	**N/A**	**N/A**	**($174,297,776)**	**($172,603,772)**
Utility Impacts						
Utility Project Costs						
Program Planning & Design	N/A	$0	$0	$0	$0	$0
Administration & Program Delivery	N/A	$7,541,816	$5,025,814	$2,516,002	$7,541,816	$7,541,816
Advertising/Promotion/Customer Ed	N/A	$2,017,097	$1,411,177	$605,919	$2,017,097	$2,017,097
Participant Rebates and Incentives	N/A	$33,349,835	$16,880,418	$16,469,417	$33,349,835	$33,349,835
Equipment & Installation	N/A	$0	$0	$0	$0	$0
Measurement and Verification	N/A	$1,018,917	$671,201	$347,717	$1,018,917	$1,018,917
Subtotal	N/A	$43,927,664	$23,988,609	$19,939,055	$43,927,664	$43,927,664
Non-Participant Impacts						
Electric Bill	N/A	N/A	$214,964,879	N/A	N/A	N/A
Gas Bill	N/A	N/A	N/A	($130,664,996)	N/A	N/A
Subtotal	N/A	N/A	$214,964,879	($130,664,996)	N/A	N/A

Benefits	$196,184,107	$74,887,224	$214,964,879	$74,887,224	$276,476,912	$306,824,124
Costs	$469,123,534	$91,287,881	$71,348,826	$150,604,051	$342,609,027	$354,486,658
Net Benefit (Cost)	($272,939,426)	($16,400,657)	$143,616,053	($75,716,827)	($66,132,115)	($47,662,533)
Benefit/Cost Ratio	0.42	0.82	3.01	0.50	0.81	0.87

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Beneficial Electrification Impacts	
Lifetime (Weighted on Generator kWh)	18.6 years
Lifetime (Weighted on Dth)	18.4 years
T & D Loss Factor (Energy)	6.07%
T & D Loss Factor (Demand)	7.75%
Net-to-Gross (kWh)	93.3%
Net-to-Gross (kW)	93.0%
Net-to-Gross (Dth)	93.3%
Installation Rate (Energy)	100.0%
Installation Rate (Demand)	100.0%
Net coincident kW Saved at Generator	-5973.74 kW
Gross Annual kWh Saved at Customer	-143,541,213 kWh
Net Annual kWh Saved at Generator	-142,519,101 kWh
Net Annual Dth Saved	1,179,077 Dth
Net Targeted Peak Dth/hr Savings	378.92 Dth
Net Annual Other Fuels Dth Saved	120,858 Dth

First Year Carbon Emissions Reductions	
Electric Electrification	-30,757.8 tons CO2
Gas Electrification	69,588.2 tons CO2
TOTAL	**38,830.4 tons CO2**

Lifetime Carbon Emissions Reductions	
Electric Electrification	-155,890.4 tons CO2
Gas Electrification	1,279,067.7 tons CO2
TOTAL	**1,123,177.2 tons CO2**

BUSINESS PROGRAM TOTAL	Beneficial Electrification	2024

Net Present Cost Benefit Summary Analysis For All Participants Benefits (Positive Values) Costs (Negative Values)

	Participant Test ($Total)	Utility Test ($Total)	Electric Rate Impact Test ($Total)	Gas Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Electric System Impacts						
Generation Capacity	N/A	($3,067,386)	($3,067,386)	N/A	($3,067,386)	($3,067,386)
Trans. & Dist. Capacity	N/A	($216,999)	($216,999)	N/A	($216,999)	($216,999)
Marginal Energy	N/A	($1,925,132)	($1,925,132)	N/A	($1,925,132)	($2,489,761)
Subtotal	**$0**	**($5,209,518)**	**($5,209,518)**	**N/A**	**($5,209,518)**	**($5,774,146)**
Non-Energy Benefits Adder (0.0%)	N/A	N/A	N/A	N/A	$0	$0
Subtotal	**N/A**	**($5,209,518)**	**($5,209,518)**	**N/A**	**($5,209,518)**	**($5,774,146)**
Gas System Impacts						
Commodity Cost	N/A	$3,643,573	N/A	$3,643,573	$3,643,573	$4,959,221
Variable O&M	N/A	$41,075	N/A	$41,075	$41,075	$54,368
Bulk System Demand	N/A	$620,825	N/A	$620,825	$620,825	$821,750
Targeted Demand	N/A	$160,857	N/A	$160,857	$160,857	$160,857
Subtotal	**N/A**	**$4,466,331**	**N/A**	**$4,466,331**	**$4,466,331**	**$5,996,197**
Non-Energy Benefits Adder (9.9%)	N/A	N/A	N/A	N/A	$440,474	$575,610
Subtotal	**N/A**	**$4,466,331**	**N/A**	**$4,466,331**	**$4,906,805**	**$6,571,807**
Emissions Impacts						
Electric Emissions (CO2)	N/A	N/A	N/A	N/A	($1,297,657)	($1,297,657)
Gas Emissions (CO2)	N/A	N/A	N/A	N/A	$7,187,207	$7,187,207
Gas Emissions (CH4)	N/A	N/A	N/A	N/A	$1,093,759	$1,093,759
Subtotal	N/A	N/A	N/A	N/A	$6,983,309	$6,983,309
Participant Impacts						
Electric Bill	($10,310,214)	N/A	N/A	N/A	N/A	N/A
Gas Bill	$7,119,237	N/A	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$1,129,608	N/A	N/A	N/A	$1,129,608	$1,129,608
Incremental Capital Savings	($9,346,745)	N/A	N/A	N/A	($8,692,473)	($8,692,473)
Incremental O&M Savings	$6,837,421	N/A	N/A	N/A	$6,358,802	$7,117,806
Subtotal	**($4,570,693)**	**N/A**	**N/A**	**N/A**	**($1,204,063)**	**($445,058)**
Utility Impacts						
Utility Project Costs						
Program Planning & Design	N/A	$0	$0	$0	$0	$0
Administration & Program Delivery	N/A	$749,604	$484,437	$265,167	$749,604	$749,604
Advertising/Promotion/Customer Ed	N/A	$50,237	$34,408	$15,829	$50,237	$50,237
Participant Rebates and Incentives	N/A	$1,129,608	$603,745	$525,863	$1,129,608	$1,129,608
Equipment & Installation	N/A	$0	$0	$0	$0	$0
Measurement and Verification	N/A	$60,675	$41,770	$18,906	$60,675	$60,675
Subtotal	N/A	$1,990,124	$1,164,359	$825,764	$1,990,124	$1,990,124
Non-Participant Impacts						
Electric Bill	N/A	N/A	$10,310,214	N/A	N/A	N/A
Gas Bill	N/A	N/A	N/A	($7,119,237)	N/A	N/A
Subtotal	N/A	N/A	$10,310,214	($7,119,237)	N/A	N/A

Benefits	$15,086,266	$4,466,331	$10,310,214	$4,466,331	$20,676,180	$23,100,187
Costs	$19,656,959	$7,199,642	$6,373,877	$7,945,001	$17,189,771	$17,754,400
Net Benefit (Cost)	($4,570,693)	($2,733,311)	$3,936,337	($3,478,671)	$3,486,409	$5,345,787
Benefit/Cost Ratio	0.77	0.62	1.62	0.56	1.20	1.30

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Beneficial Electrification Impacts

Lifetime (Weighted on Generator kWh)	18.8 years
Lifetime (Weighted on Dth)	18.6 years
T & D Loss Factor (Energy)	5.35%
T & D Loss Factor (Demand)	7.75%
Net-to-Gross (kWh)	93.0%
Net-to-Gross (kW)	93.0%
Net-to-Gross (Dth)	93.0%
Installation Rate (Energy)	100.0%
Installation Rate (Demand)	100.0%
Net coincident kW Saved at Generator	-1339.02 kW
Gross Annual kWh Saved at Customer	-8,935,265 kWh
Net Annual kWh Saved at Generator	-8,779,500 kWh
Net Annual Dth Saved	72,519 Dth
Net Targeted Peak Dth/hr Savings	24.89 Dth
Net Annual Other Fuels Dth Saved	11,554 Dth

First Year Carbon Emissions Reductions

Electric Electrification	-3,801.3 tons CO2
Gas Electrification	4,421.8 tons CO2
TOTAL	**620.5 tons CO2**

Lifetime Carbon Emissions Reductions

Electric Electrification	-15,913.0 tons CO2
Gas Electrification	82,223.6 tons CO2
TOTAL	**66,310.6 tons CO2**

BUSINESS PROGRAM TOTAL	Beneficial Electrification	2025

Net Present Cost Benefit Summary Analysis For All Participants Benefits (Positive Values) Costs (Negative Values)

	Participant Test ($Total)	Utility Test ($Total)	Electric Rate Impact Test ($Total)	Gas Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Electric System Impacts						
Generation Capacity	N/A	($8,115,193)	($8,115,193)	N/A	($8,115,193)	($8,115,193)
Trans. & Dist. Capacity	N/A	($574,102)	($574,102)	N/A	($574,102)	($574,102)
Marginal Energy	N/A	($4,794,404)	($4,794,404)	N/A	($4,794,404)	($6,375,227)
Subtotal	**$0**	**($13,483,699)**	**($13,483,699)**	**N/A**	**($13,483,699)**	**($15,064,522)**
Non-Energy Benefits Adder (0.0%)	N/A	N/A	N/A	N/A	$0	$0
Subtotal	**N/A**	**($13,483,699)**	**($13,483,699)**	**N/A**	**($13,483,699)**	**($15,064,522)**
Gas System Impacts						
Commodity Cost	N/A	$8,487,157	N/A	$8,487,157	$8,487,157	$11,637,237
Variable O&M	N/A	$92,864	N/A	$92,864	$92,864	$123,632
Bulk System Demand	N/A	$1,403,595	N/A	$1,403,595	$1,403,595	$1,868,636
Targeted Demand	N/A	$319,219	N/A	$319,219	$319,219	$319,219
Subtotal	**N/A**	**$10,302,834**	**N/A**	**$10,302,834**	**$10,302,834**	**$13,948,723**
Non-Energy Benefits Adder (9.9%)	N/A	N/A	N/A	N/A	$1,023,988	$1,354,838
Subtotal	**N/A**	**$10,302,834**	**N/A**	**$10,302,834**	**$11,326,822**	**$15,303,562**
Emissions Impacts						
Electric Emissions (CO2)	N/A	N/A	N/A	N/A	($2,656,172)	($2,656,172)
Gas Emissions (CO2)	N/A	N/A	N/A	N/A	$17,367,757	$17,367,757
Gas Emissions (CH4)	N/A	N/A	N/A	N/A	$2,612,523	$2,612,523
Subtotal	N/A	N/A	N/A	N/A	$17,324,108	$17,324,108
Participant Impacts						
Electric Bill	($26,614,311)	N/A	N/A	N/A	N/A	N/A
Gas Bill	$16,575,942	N/A	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$2,874,955	N/A	N/A	N/A	$2,874,955	$2,874,955
Incremental Capital Savings	($23,489,423)	N/A	N/A	N/A	($21,845,163)	($21,845,163)
Incremental O&M Savings	$18,415,837	N/A	N/A	N/A	$17,126,728	$19,171,024
Subtotal	**($12,236,999)**	**N/A**	**N/A**	**N/A**	**($1,843,480)**	**$200,816**
Utility Impacts						
Utility Project Costs						
Program Planning & Design	N/A	$0	$0	$0	$0	$0
Administration & Program Delivery	N/A	$1,533,249	$930,341	$602,908	$1,533,249	$1,533,249
Advertising/Promotion/Customer Ed	N/A	$198,100	$166,479	$31,621	$198,100	$198,100
Participant Rebates and Incentives	N/A	$2,874,955	$1,516,121	$1,358,834	$2,874,955	$2,874,955
Equipment & Installation	N/A	$0	$0	$0	$0	$0
Measurement and Verification	N/A	$129,106	$93,393	$35,713	$129,106	$129,106
Subtotal	N/A	$4,735,410	$2,706,333	$2,029,077	$4,735,410	$4,735,410
Non-Participant Impacts						
Electric Bill	N/A	N/A	$26,614,311	N/A	N/A	N/A
Gas Bill	N/A	N/A	N/A	($16,575,942)	N/A	N/A
Subtotal	N/A	N/A	$26,614,311	($16,575,942)	N/A	N/A

Benefits	$37,866,734	$10,302,834	$26,614,311	$10,302,834	$51,308,785	$57,329,820
Costs	$50,103,733	$18,219,109	$16,190,032	$18,605,019	$42,720,444	$44,301,267
Net Benefit (Cost)	($12,236,999)	($7,916,275)	$10,424,279	($8,302,185)	$8,588,341	$13,028,553
Benefit/Cost Ratio	0.76	0.57	1.64	0.55	1.20	1.29

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Beneficial Electrification Impacts

Lifetime (Weighted on Generator kWh)	19.4 years
Lifetime (Weighted on Dth)	19.2 years
T & D Loss Factor (Energy)	5.35%
T & D Loss Factor (Demand)	7.75%
Net-to-Gross (kWh)	93.0%
Net-to-Gross (kW)	93.0%
Net-to-Gross (Dth)	93.0%
Installation Rate (Energy)	100.0%
Installation Rate (Demand)	100.0%
Net coincident kW Saved at Generator	-3400.92 kW
Gross Annual kWh Saved at Customer	-22,385,179 kWh
Net Annual kWh Saved at Generator	-21,994,946 kWh
Net Annual Dth Saved	160,311 Dth
Net Targeted Peak Dth/hr Savings	48.14 Dth
Net Annual Other Fuels Dth Saved	46,674 Dth

First Year Carbon Emissions Reductions

Electric Electrification	-8,943.3 tons CO2
Gas Electrification	9,983.5 tons CO2
TOTAL	**1,040.2 tons CO2**

Lifetime Carbon Emissions Reductions

Electric Electrification	-31,284.1 tons CO2
Gas Electrification	191,766.7 tons CO2
TOTAL	**160,482.7 tons CO2**

BUSINESS PROGRAM TOTAL	Beneficial Electrification	2026

Net Present Cost Benefit Summary Analysis For All Participants Benefits (Positive Values) Costs (Negative Values)

	Participant Test ($Total)	Utility Test ($Total)	Electric Rate Impact Test ($Total)	Gas Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Electric System Impacts						
Generation Capacity	N/A	($14,599,857)	($14,599,857)	N/A	($14,599,857)	($14,599,857)
Trans. & Dist. Capacity	N/A	($1,032,853)	($1,032,853)	N/A	($1,032,853)	($1,032,853)
Marginal Energy	N/A	($8,967,621)	($8,967,621)	N/A	($8,967,621)	($12,303,647)
Subtotal	**$0**	**($24,600,331)**	**($24,600,331)**	**N/A**	**($24,600,331)**	**($27,936,357)**
Non-Energy Benefits Adder (0.0%)	N/A	N/A	N/A	N/A	$0	$0
Subtotal	**N/A**	**($24,600,331)**	**($24,600,331)**	**N/A**	**($24,600,331)**	**($27,936,357)**
Gas System Impacts						
Commodity Cost	N/A	$14,701,638	N/A	$14,701,638	$14,701,638	$21,285,788
Variable O&M	N/A	$164,935	N/A	$164,935	$164,935	$219,952
Bulk System Demand	N/A	$2,492,904	N/A	$2,492,904	$2,492,904	$3,324,459
Targeted Demand	N/A	$553,256	N/A	$553,256	$553,256	$553,256
Subtotal	**N/A**	**$17,912,733**	**N/A**	**$17,912,733**	**$17,912,733**	**$25,383,456**
Non-Energy Benefits Adder (10.0%)	N/A	N/A	N/A	N/A	$1,785,101	$2,474,720
Subtotal	**N/A**	**$17,912,733**	**N/A**	**$17,912,733**	**$19,697,834**	**$27,858,175**
Emissions Impacts						
Electric Emissions (CO2)	N/A	N/A	N/A	N/A	($3,857,385)	($3,857,385)
Gas Emissions (CO2)	N/A	N/A	N/A	N/A	$29,519,213	$29,519,213
Gas Emissions (CH4)	N/A	N/A	N/A	N/A	$4,568,891	$4,568,891
Subtotal	N/A	N/A	N/A	N/A	$30,230,719	$30,230,719
Participant Impacts						
Electric Bill	($51,771,773)	N/A	N/A	N/A	N/A	N/A
Gas Bill	$30,197,364	N/A	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$6,070,576	N/A	N/A	N/A	$6,070,576	$6,070,576
Incremental Capital Savings	($47,327,605)	N/A	N/A	N/A	($44,014,673)	($44,014,673)
Incremental O&M Savings	$32,169,276	N/A	N/A	N/A	$29,917,427	$31,611,431
Subtotal	**($30,662,162)**	**N/A**	**N/A**	**N/A**	**($8,026,670)**	**($6,332,666)**
Utility Impacts						
Utility Project Costs						
Program Planning & Design	N/A	$0	$0	$0	$0	$0
Administration & Program Delivery	N/A	$3,057,658	$2,418,901	$638,757	$3,057,658	$3,057,658
Advertising/Promotion/Customer Ed	N/A	$319,943	$284,409	$35,534	$319,943	$319,943
Participant Rebates and Incentives	N/A	$6,070,576	$3,212,564	$2,858,012	$6,070,576	$6,070,576
Equipment & Installation	N/A	$0	$0	$0	$0	$0
Measurement and Verification	N/A	$326,059	$257,316	$68,743	$326,059	$326,059
Subtotal	N/A	$9,774,235	$6,173,190	$3,601,045	$9,774,235	$9,774,235
Non-Participant Impacts						
Electric Bill	N/A	N/A	$51,771,773	N/A	N/A	N/A
Gas Bill	N/A	N/A	N/A	($30,197,364)	N/A	N/A
Subtotal	N/A	N/A	$51,771,773	($30,197,364)	N/A	N/A

Benefits	$68,437,216	$17,912,733	$51,771,773	$17,912,733	$89,773,941	$99,628,286
Costs	$99,099,378	$34,374,567	$30,773,522	$33,798,409	$82,246,624	$85,582,650
Net Benefit (Cost)	($30,662,162)	($16,461,834)	$20,998,252	($15,885,676)	$7,527,316	$14,045,636
Benefit/Cost Ratio	0.69	0.52	1.68	0.53	1.09	1.16

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Beneficial Electrification Impacts	
Lifetime (Weighted on Generator kWh)	19.6 years
Lifetime (Weighted on Dth)	19.4 years
T & D Loss Factor (Energy)	5.35%
T & D Loss Factor (Demand)	7.75%
Net-to-Gross (kWh)	93.0%
Net-to-Gross (kW)	93.0%
Net-to-Gross (Dth)	93.0%
Installation Rate (Energy)	100.0%
Installation Rate (Demand)	100.0%
Net coincident kW Saved at Generator	-5973.66 kW
Gross Annual kWh Saved at Customer	-42,882,822 kWh
Net Annual kWh Saved at Generator	-42,135,261 kWh
Net Annual Dth Saved	282,832 Dth
Net Targeted Peak Dth/hr Savings	81.80 Dth
Net Annual Other Fuels Dth Saved	120,858 Dth

First Year Carbon Emissions Reductions	
Electric Electrification	-8,606.1 tons CO2
Gas Electrification	17,192.7 tons CO2
TOTAL	**8,586.6 tons CO2**

Lifetime Carbon Emissions Reductions	
Electric Electrification	-43,614.5 tons CO2
Gas Electrification	333,418.6 tons CO2
TOTAL	**289,804.1 tons CO2**

RESIDENTIAL PROGRAM TOTAL	Beneficial Electrification	2024

Net Present Cost Benefit Summary Analysis For All Participants Benefits (Positive Values) Costs (Negative Values)

	Participant Test ($Total)	Utility Test ($Total)	Electric Rate Impact Test ($Total)	Gas Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Electric System Impacts						
Generation Capacity	N/A	($158)	($158)	N/A	($158)	($158)
Trans. & Dist. Capacity	N/A	($11)	($11)	N/A	($11)	($11)
Marginal Energy	N/A	($4,283,510)	($4,283,510)	N/A	($4,283,510)	($5,618,257)
Subtotal	**$0**	**($4,283,680)**	**($4,283,680)**	**N/A**	**($4,283,680)**	**($5,618,427)**
Non-Energy Benefits Adder (0.0%)	N/A	N/A	N/A	N/A	$0	$0
Subtotal	**N/A**	**($4,283,680)**	**($4,283,680)**	**N/A**	**($4,283,680)**	**($5,618,427)**
Gas System Impacts						
Commodity Cost	N/A	$8,136,949	N/A	$8,136,949	$8,136,949	$10,981,377
Variable O&M	N/A	$91,904	N/A	$91,904	$91,904	$120,833
Bulk System Demand	N/A	$1,389,087	N/A	$1,389,087	$1,389,087	$1,826,330
Targeted Demand	N/A	$328,403	N/A	$328,403	$328,403	$328,403
Subtotal	**N/A**	**$9,946,343**	**N/A**	**$9,946,343**	**$9,946,343**	**$13,256,943**
Non-Energy Benefits Adder (10.0%)	N/A	N/A	N/A	N/A	$994,634	$1,292,854
Subtotal	**N/A**	**$9,946,343**	**N/A**	**$9,946,343**	**$10,940,977**	**$14,549,797**
Emissions Impacts						
Electric Emissions (CO2)	N/A	N/A	N/A	N/A	($2,915,627)	($2,915,627)
Gas Emissions (CO2)	N/A	N/A	N/A	N/A	$15,179,102	$15,179,102
Gas Emissions (CH4)	N/A	N/A	N/A	N/A	$2,403,802	$2,403,802
Subtotal	N/A	N/A	N/A	N/A	$14,667,277	$14,667,277
Participant Impacts						
Electric Bill	($29,341,413)	N/A	N/A	N/A	N/A	N/A
Gas Bill	$17,591,411	N/A	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$2,757,070	N/A	N/A	N/A	$2,757,070	$2,757,070
Incremental Capital Savings	($30,823,754)	N/A	N/A	N/A	($28,666,091)	($28,666,091)
Incremental O&M Savings	$0	N/A	N/A	N/A	$0	$0
Subtotal	**($39,816,686)**	**N/A**	**N/A**	**N/A**	**($25,909,021)**	**($25,909,021)**
Utility Impacts						
Utility Project Costs						
Program Planning & Design	N/A	$0	$0	$0	$0	$0
Administration & Program Delivery	N/A	$702,199	$254,487	$447,712	$702,199	$702,199
Advertising/Promotion/Customer Ed	N/A	$115,872	$49,275	$66,597	$115,872	$115,872
Participant Rebates and Incentives	N/A	$2,757,070	$1,380,383	$1,376,687	$2,757,070	$2,757,070
Equipment & Installation	N/A	$0	$0	$0	$0	$0
Measurement and Verification	N/A	$29,328	$14,677	$14,651	$29,328	$29,328
Subtotal	N/A	$3,604,469	$1,698,822	$1,905,647	$3,604,469	$3,604,469
Non-Participant Impacts						
Electric Bill	N/A	N/A	$29,341,413	N/A	N/A	N/A
Gas Bill	N/A	N/A	N/A	($17,591,411)	N/A	N/A
Subtotal	N/A	N/A	$29,341,413	($17,591,411)	N/A	N/A

Benefits	$20,348,481	$9,946,343	$29,341,413	$9,946,343	$31,280,951	$34,889,771
Costs	$60,165,167	$7,888,149	$5,982,502	$19,497,058	$39,469,867	$40,804,614
Net Benefit (Cost)	($39,816,686)	$2,058,194	$23,358,911	($9,550,715)	($8,188,916)	($5,914,843)
Benefit/Cost Ratio	0.34	1.26	4.90	0.51	0.79	0.86

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Beneficial Electrification Impacts

Lifetime (Weighted on Generator kWh)	18.5 years
Lifetime (Weighted on Dth)	18.4 years
T & D Loss Factor (Energy)	6.38%
T & D Loss Factor (Demand)	9.13%
Net-to-Gross (kWh)	93.0%
Net-to-Gross (kW)	93.0%
Net-to-Gross (Dth)	93.0%
Installation Rate (Energy)	100.0%
Installation Rate (Demand)	100.0%
Net coincident kW Saved at Generator	-0.08 kW
Gross Annual kWh Saved at Customer	-18,633,460 kWh
Net Annual kWh Saved at Generator	-18,510,060 kWh
Net Annual Dth Saved	161,862 Dth
Net Targeted Peak Dth/hr Savings	42.60 Dth
Net Annual Other Fuels Dth Saved	0 Dth

First Year Carbon Emissions Reductions

Electric Electrification	-8,234.3 tons CO2
Gas Electrification	9,456.0 tons CO2
TOTAL	**1,221.6 tons CO2**

Lifetime Carbon Emissions Reductions

Electric Electrification	-35,760.3 tons CO2
Gas Electrification	174,061.0 tons CO2
TOTAL	**138,300.7 tons CO2**

RESIDENTIAL PROGRAM TOTAL	Beneficial Electrification	2025

Net Present Cost Benefit Summary Analysis For All Participants Benefits (Positive Values) Costs (Negative Values)

	Participant Test ($Total)	Utility Test ($Total)	Electric Rate Impact Test ($Total)	Gas Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Electric System Impacts						
Generation Capacity	N/A	($162)	($162)	N/A	($162)	($162)
Trans. & Dist. Capacity	N/A	($11)	($11)	N/A	($11)	($11)
Marginal Energy	N/A	($11,038,789)	($11,038,789)	N/A	($11,038,789)	($14,742,866)
Subtotal	**$0**	**($11,038,962)**	**($11,038,962)**	**N/A**	**($11,038,962)**	**($14,743,039)**
Non-Energy Benefits Adder (0.0%)	N/A	N/A	N/A	N/A	$0	$0
Subtotal	**N/A**	**($11,038,962)**	**($11,038,962)**	**N/A**	**($11,038,962)**	**($14,743,039)**
Gas System Impacts						
Commodity Cost	N/A	$21,836,257	N/A	$21,836,257	$21,836,257	$29,422,503
Variable O&M	N/A	$241,084	N/A	$241,084	$241,084	$316,224
Bulk System Demand	N/A	$3,643,859	N/A	$3,643,859	$3,643,859	$4,779,562
Targeted Demand	N/A	$976,032	N/A	$976,032	$976,032	$976,032
Subtotal	**N/A**	**$26,697,232**	**N/A**	**$26,697,232**	**$26,697,232**	**$35,494,322**
Non-Energy Benefits Adder (10.0%)	N/A	N/A	N/A	N/A	$2,669,723	$3,451,829
Subtotal	**N/A**	**$26,697,232**	**N/A**	**$26,697,232**	**$29,366,955**	**$38,946,151**
Emissions Impacts						
Electric Emissions (CO2)	N/A	N/A	N/A	N/A	($6,213,575)	($6,213,575)
Gas Emissions (CO2)	N/A	N/A	N/A	N/A	$41,009,179	$41,009,179
Gas Emissions (CH4)	N/A	N/A	N/A	N/A	$6,542,366	$6,542,366
Subtotal	N/A	N/A	N/A	N/A	$41,337,969	$41,337,969
Participant Impacts						
Electric Bill	($77,404,627)	N/A	N/A	N/A	N/A	N/A
Gas Bill	$47,208,185	N/A	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$8,473,795	N/A	N/A	N/A	$8,473,795	$8,473,795
Incremental Capital Savings	($92,941,926)	N/A	N/A	N/A	($86,435,991)	($86,435,991)
Incremental O&M Savings	$0	N/A	N/A	N/A	$0	$0
Subtotal	**($114,664,573)**	**N/A**	**N/A**	**N/A**	**($77,962,196)**	**($77,962,196)**
Utility Impacts						
Utility Project Costs						
Program Planning & Design	N/A	$0	$0	$0	$0	$0
Administration & Program Delivery	N/A	$1,664,764	$736,817	$927,947	$1,664,764	$1,664,764
Advertising/Promotion/Customer Ed	N/A	$694,713	$371,714	$322,998	$694,713	$694,713
Participant Rebates and Incentives	N/A	$8,473,795	$4,238,726	$4,235,069	$8,473,795	$8,473,795
Equipment & Installation	N/A	$0	$0	$0	$0	$0
Measurement and Verification	N/A	$52,664	$32,131	$20,533	$52,664	$52,664
Subtotal	N/A	$10,885,935	$5,379,388	$5,506,547	$10,885,935	$10,885,935
Non-Participant Impacts						
Electric Bill	N/A	N/A	$77,404,627	N/A	N/A	N/A
Gas Bill	N/A	N/A	N/A	($47,208,185)	N/A	N/A
Subtotal	N/A	N/A	$77,404,627	($47,208,185)	N/A	N/A

Benefits	$55,681,980	$26,697,232	$77,404,627	$26,697,232	$85,392,294	$94,971,490
Costs	$170,346,553	$21,924,897	$16,418,350	$52,714,732	$114,574,464	$118,278,541
Net Benefit (Cost)	($114,664,573)	$4,772,335	$60,986,277	($26,017,500)	($29,182,170)	($23,307,051)
Benefit/Cost Ratio	0.33	1.22	4.71	0.51	0.75	0.80

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Beneficial Electrification Impacts	
Lifetime (Weighted on Generator kWh)	18.3 years
Lifetime (Weighted on Dth)	18.2 years
T & D Loss Factor (Energy)	6.38%
T & D Loss Factor (Demand)	9.13%
Net-to-Gross (kWh)	93.0%
Net-to-Gross (kW)	93.0%
Net-to-Gross (Dth)	93.0%
Installation Rate (Energy)	100.0%
Installation Rate (Demand)	100.0%
Net coincident kW Saved at Generator	-0.08 kW
Gross Annual kWh Saved at Customer	-48,657,832 kWh
Net Annual kWh Saved at Generator	-48,335,594 kWh
Net Annual Dth Saved	427,806 Dth
Net Targeted Peak Dth/hr Savings	124.27 Dth
Net Annual Other Fuels Dth Saved	0 Dth

First Year Carbon Emissions Reductions	
Electric Electrification	-20,312.8 tons CO2
Gas Electrification	24,992.5 tons CO2
TOTAL	**4,679.6 tons CO2**

Lifetime Carbon Emissions Reductions	
Electric Electrification	-73,312.3 tons CO2
Gas Electrification	454,769.6 tons CO2
TOTAL	**381,457.3 tons CO2**

RESIDENTIAL PROGRAM TOTAL	Beneficial Electrification	2026

Net Present Cost Benefit Summary Analysis For All Participants Benefits (Positive Values) Costs (Negative Values)

	Participant Test ($Total)	Utility Test ($Total)	Electric Rate Impact Test ($Total)	Gas Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Electric System Impacts						
Generation Capacity	N/A	($165)	($165)	N/A	($165)	($165)
Trans. & Dist. Capacity	N/A	($12)	($12)	N/A	($12)	($12)
Marginal Energy	N/A	($21,615,976)	($21,615,976)	N/A	($21,615,976)	($29,788,007)
Subtotal	**$0**	**($21,616,152)**	**($21,616,152)**	**N/A**	**($21,616,152)**	**($29,788,184)**
Non-Energy Benefits Adder (0.0%)	N/A	N/A	N/A	N/A	$0	$0
Subtotal	**N/A**	**($21,616,152)**	**($21,616,152)**	**N/A**	**($21,616,152)**	**($29,788,184)**
Gas System Impacts						
Commodity Cost	N/A	$43,912,894	N/A	$43,912,894	$43,912,894	$59,352,549
Variable O&M	N/A	$473,726	N/A	$473,726	$473,726	$621,730
Bulk System Demand	N/A	$7,160,115	N/A	$7,160,115	$7,160,115	$9,397,126
Targeted Demand	N/A	$2,317,173	N/A	$2,317,173	$2,317,173	$2,317,173
Subtotal	**N/A**	**$53,863,908**	**N/A**	**$53,863,908**	**$53,863,908**	**$71,688,578**
Non-Energy Benefits Adder (10.0%)	N/A	N/A	N/A	N/A	$5,386,391	$6,937,141
Subtotal	**N/A**	**$53,863,908**	**N/A**	**$53,863,908**	**$59,250,299**	**$78,625,719**
Emissions Impacts						
Electric Emissions (CO2)	N/A	N/A	N/A	N/A	($9,381,447)	($9,381,447)
Gas Emissions (CO2)	N/A	N/A	N/A	N/A	$78,620,268	$78,620,268
Gas Emissions (CH4)	N/A	N/A	N/A	N/A	$12,594,141	$12,594,141
Subtotal	N/A	N/A	N/A	N/A	$81,832,962	$81,832,962
Participant Impacts						
Electric Bill	($154,580,022)	N/A	N/A	N/A	N/A	N/A
Gas Bill	$94,936,051	N/A	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$18,191,550	N/A	N/A	N/A	$18,191,550	$18,191,550
Incremental Capital Savings	($189,724,056)	N/A	N/A	N/A	($176,443,372)	($176,443,372)
Incremental O&M Savings	$0	N/A	N/A	N/A	$0	$0
Subtotal	**($231,176,477)**	**N/A**	**N/A**	**N/A**	**($158,251,822)**	**($158,251,822)**
Utility Impacts						
Utility Project Costs						
Program Planning & Design	N/A	$0	$0	$0	$0	$0
Administration & Program Delivery	N/A	$2,285,762	$1,196,268	$1,089,494	$2,285,762	$2,285,762
Advertising/Promotion/Customer Ed	N/A	$1,153,053	$797,689	$355,364	$1,153,053	$1,153,053
Participant Rebates and Incentives	N/A	$18,191,550	$9,098,775	$9,092,775	$18,191,550	$18,191,550
Equipment & Installation	N/A	$0	$0	$0	$0	$0
Measurement and Verification	N/A	$103,959	$45,000	$58,959	$103,959	$103,959
Subtotal	N/A	$21,734,324	$11,137,732	$10,596,592	$21,734,324	$21,734,324
Non-Participant Impacts						
Electric Bill	N/A	N/A	$154,580,022	N/A	N/A	N/A
Gas Bill	N/A	N/A	N/A	($94,936,051)	N/A	N/A
Subtotal	N/A	N/A	$154,580,022	($94,936,051)	N/A	N/A

Benefits	$113,127,601	$53,863,908	$154,580,022	$53,863,908	$168,656,258	$188,031,678
Costs	$344,304,078	$43,350,477	$32,753,885	$105,532,643	$229,175,296	$237,347,328
Net Benefit (Cost)	($231,176,477)	$10,513,432	$121,826,138	($51,668,734)	($60,519,038)	($49,315,650)
Benefit/Cost Ratio	0.33	1.24	4.72	0.51	0.74	0.79

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Beneficial Electrification Impacts	
Lifetime (Weighted on Generator kWh)	18.4 years
Lifetime (Weighted on Dth)	18.2 years
T & D Loss Factor (Energy)	6.38%
T & D Loss Factor (Demand)	9.13%
Net-to-Gross (kWh)	93.0%
Net-to-Gross (kW)	93.0%
Net-to-Gross (Dth)	93.0%
Installation Rate (Energy)	100.0%
Installation Rate (Demand)	100.0%
Net coincident kW Saved at Generator	-0.08 kW
Gross Annual kWh Saved at Customer	-95,414,856 kWh
Net Annual kWh Saved at Generator	-94,782,970 kWh
Net Annual Dth Saved	841,916 Dth
Net Targeted Peak Dth/hr Savings	285.47 Dth
Net Annual Other Fuels Dth Saved	0 Dth

First Year Carbon Emissions Reductions	
Electric Electrification	-20,937.9 tons CO2
Gas Electrification	49,184.7 tons CO2
TOTAL	**28,246.8 tons CO2**

Lifetime Carbon Emissions Reductions	
Electric Electrification	-106,389.0 tons CO2
Gas Electrification	895,022.8 tons CO2
TOTAL	**788,633.7 tons CO2**

INCOME QUALIFIED PROGRAM TOTAL	Beneficial Electrification	2024

Net Present Cost Benefit Summary Analysis For All Participants Benefits (Positive Values) Costs (Negative Values)

	Participant Test ($Total)	Utility Test ($Total)	Electric Rate Impact Test ($Total)	Gas Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Electric System Impacts						
Generation Capacity	N/A	$0	$0	N/A	$0	$0
Trans. & Dist. Capacity	N/A	$0	$0	N/A	$0	$0
Marginal Energy	N/A	($528,281)	($528,281)	N/A	($528,281)	($659,277)
Subtotal	**$0**	**($528,281)**	**($528,281)**	**N/A**	**($528,281)**	**($659,277)**
Non-Energy Benefits Adder (0.0%)	N/A	N/A	N/A	N/A	$0	$0
Subtotal	**N/A**	**($528,281)**	**($528,281)**	**N/A**	**($528,281)**	**($659,277)**
Gas System Impacts						
Commodity Cost	N/A	$1,048,482	N/A	$1,048,482	$1,048,482	$1,365,123
Variable O&M	N/A	$12,078	N/A	$12,078	$12,078	$15,429
Bulk System Demand	N/A	$182,546	N/A	$182,546	$182,546	$233,202
Targeted Demand	N/A	$0	N/A	$0	$0	$0
Subtotal	**N/A**	**$1,243,106**	**N/A**	**$1,243,106**	**$1,243,106**	**$1,613,754**
Non-Energy Benefits Adder (25.0%)	N/A	N/A	N/A	N/A	$310,776	$403,439
Subtotal	**N/A**	**$1,243,106**	**N/A**	**$1,243,106**	**$1,553,882**	**$2,017,193**
Emissions Impacts						
Electric Emissions (CO2)	N/A	N/A	N/A	N/A	($375,911)	($375,911)
Gas Emissions (CO2)	N/A	N/A	N/A	N/A	$1,873,308	$1,873,308
Gas Emissions (CH4)	N/A	N/A	N/A	N/A	$294,163	$294,163
Subtotal	N/A	N/A	N/A	N/A	$1,791,561	$1,791,561
Participant Impacts						
Electric Bill	($3,667,125)	N/A	N/A	N/A	N/A	N/A
Gas Bill	$2,266,732	N/A	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$3,980,155	N/A	N/A	N/A	$3,980,155	$3,980,155
Incremental Capital Savings	($5,245,042)	N/A	N/A	N/A	($5,245,042)	($5,245,042)
Incremental O&M Savings	$0	N/A	N/A	N/A	$0	$0
Subtotal	**($2,665,280)**	**N/A**	**N/A**	**N/A**	**($1,264,886)**	**($1,264,886)**
Utility Impacts						
Utility Project Costs						
Program Planning & Design	N/A	$0	$0	$0	$0	$0
Administration & Program Delivery	N/A	$273,159	$142,146	$131,013	$273,159	$273,159
Advertising/Promotion/Customer Ed	N/A	$137,048	$86,548	$50,499	$137,048	$137,048
Participant Rebates and Incentives	N/A	$3,980,155	$1,990,078	$1,990,078	$3,980,155	$3,980,155
Equipment & Installation	N/A	$0	$0	$0	$0	$0
Measurement and Verification	N/A	$87,796	$53,879	$33,917	$87,796	$87,796
Subtotal	N/A	$4,478,159	$2,272,652	$2,205,507	$4,478,159	$4,478,159
Non-Participant Impacts						
Electric Bill	N/A	N/A	$3,667,125	N/A	N/A	N/A
Gas Bill	N/A	N/A	N/A	($2,266,732)	N/A	N/A
Subtotal	N/A	N/A	$3,667,125	($2,266,732)	N/A	N/A

Benefits	$6,246,887	$1,243,106	$3,667,125	$1,243,106	$7,701,509	$8,164,820
Costs	$8,912,167	$5,006,440	$2,800,933	$4,472,238	$10,627,393	$10,758,388
Net Benefit (Cost)	($2,665,280)	($3,763,335)	$866,192	($3,229,133)	($2,925,884)	($2,593,568)
Benefit/Cost Ratio	0.70	0.25	1.31	0.28	0.72	0.76

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Beneficial Electrification Impacts	
Lifetime (Weighted on Generator kWh)	16.6 years
Lifetime (Weighted on Dth)	16.2 years
T & D Loss Factor (Energy)	6.38%
T & D Loss Factor (Demand)	N/A
Net-to-Gross (kWh)	100.0%
Net-to-Gross (kW)	N/A
Net-to-Gross (Dth)	100.0%
Installation Rate (Energy)	100.0%
Installation Rate (Demand)	N/A
Net coincident kW Saved at Generator	0.00 kW
Gross Annual kWh Saved at Customer	-2,300,532 kWh
Net Annual kWh Saved at Generator	-2,457,308 kWh
Net Annual Dth Saved	22,887 Dth
Net Targeted Peak Dth/hr Savings	0.06 Dth
Net Annual Other Fuels Dth Saved	0 Dth

First Year Carbon Emissions Reductions	
Electric Electrification	-1,089.1 tons CO2
Gas Electrification	1,337.1 tons CO2
TOTAL	**247.9 tons CO2**

Lifetime Carbon Emissions Reductions	
Electric Electrification	-4,621.1 tons CO2
Gas Electrification	21,684.4 tons CO2
TOTAL	**17,063.3 tons CO2**

INCOME QUALIFIED PROGRAM TOTAL	Beneficial Electrification	2025

Net Present Cost Benefit Summary Analysis For All Participants Benefits (Positive Values) Costs (Negative Values)

	Participant Test ($Total)	Utility Test ($Total)	Electric Rate Impact Test ($Total)	Gas Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Electric System Impacts						
Generation Capacity	N/A	$0	$0	N/A	$0	$0
Trans. & Dist. Capacity	N/A	$0	$0	N/A	$0	$0
Marginal Energy	N/A	($732,362)	($732,362)	N/A	($732,362)	($917,164)
Subtotal	**$0**	**($732,362)**	**($732,362)**	**N/A**	**($732,362)**	**($917,164)**
Non-Energy Benefits Adder (0.0%)	N/A	N/A	N/A	N/A	$0	$0
Subtotal	**N/A**	**($732,362)**	**($732,362)**	**N/A**	**($732,362)**	**($917,164)**
Gas System Impacts						
Commodity Cost	N/A	$1,562,711	N/A	$1,562,711	$1,562,711	$2,022,893
Variable O&M	N/A	$17,651	N/A	$17,651	$17,651	$22,427
Bulk System Demand	N/A	$266,784	N/A	$266,784	$266,784	$338,979
Targeted Demand	N/A	$0	N/A	$0	$0	$0
Subtotal	**N/A**	**$1,847,146**	**N/A**	**$1,847,146**	**$1,847,146**	**$2,384,300**
Non-Energy Benefits Adder (25.0%)	N/A	N/A	N/A	N/A	$461,786	$596,075
Subtotal	**N/A**	**$1,847,146**	**N/A**	**$1,847,146**	**$2,308,932**	**$2,980,375**
Emissions Impacts						
Electric Emissions (CO2)	N/A	N/A	N/A	N/A	($437,590)	($437,590)
Gas Emissions (CO2)	N/A	N/A	N/A	N/A	$2,801,133	$2,801,133
Gas Emissions (CH4)	N/A	N/A	N/A	N/A	$442,827	$442,827
Subtotal	N/A	N/A	N/A	N/A	$2,806,371	$2,806,371
Participant Impacts						
Electric Bill	($5,349,527)	N/A	N/A	N/A	N/A	N/A
Gas Bill	$3,378,452	N/A	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$5,739,694	N/A	N/A	N/A	$5,739,694	$5,739,694
Incremental Capital Savings	($9,381,765)	N/A	N/A	N/A	($9,381,765)	($9,381,765)
Incremental O&M Savings	$0	N/A	N/A	N/A	$0	$0
Subtotal	**($5,613,146)**	**N/A**	**N/A**	**N/A**	**($3,642,071)**	**($3,642,071)**
Utility Impacts						
Utility Project Costs						
Program Planning & Design	N/A	$0	$0	$0	$0	$0
Administration & Program Delivery	N/A	$428,692	$259,438	$169,254	$428,692	$428,692
Advertising/Promotion/Customer Ed	N/A	$212,231	$119,663	$92,567	$212,231	$212,231
Participant Rebates and Incentives	N/A	$5,739,694	$2,869,847	$2,869,847	$5,739,694	$5,739,694
Equipment & Installation	N/A	$0	$0	$0	$0	$0
Measurement and Verification	N/A	$132,237	$85,407	$46,829	$132,237	$132,237
Subtotal	N/A	$6,512,853	$3,334,356	$3,178,498	$6,512,853	$6,512,853
Non-Participant Impacts						
Electric Bill	N/A	N/A	$5,349,527	N/A	N/A	N/A
Gas Bill	N/A	N/A	N/A	($3,378,452)	N/A	N/A
Subtotal	N/A	N/A	$5,349,527	($3,378,452)	N/A	N/A

Benefits	$9,118,146	$1,847,146	$5,349,527	$1,847,146	$11,292,587	$11,964,030
Costs	$14,731,292	$7,245,216	$4,066,718	$6,556,950	$17,064,570	$17,249,372
Net Benefit (Cost)	($5,613,146)	($5,398,070)	$1,282,809	($4,709,804)	($5,771,983)	($5,285,343)
Benefit/Cost Ratio	0.62	0.25	1.32	0.28	0.66	0.69

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Beneficial Electrification Impacts	
Lifetime (Weighted on Generator kWh)	16.2 years
Lifetime (Weighted on Dth)	15.8 years
T & D Loss Factor (Energy)	6.38%
T & D Loss Factor (Demand)	N/A
Net-to-Gross (kWh)	100.0%
Net-to-Gross (kW)	N/A
Net-to-Gross (Dth)	100.0%
Installation Rate (Energy)	100.0%
Installation Rate (Demand)	N/A
Net coincident kW Saved at Generator	0.00 kW
Gross Annual kWh Saved at Customer	-3,334,662 kWh
Net Annual kWh Saved at Generator	-3,561,912 kWh
Net Annual Dth Saved	33,956 Dth
Net Targeted Peak Dth/hr Savings	0.14 Dth
Net Annual Other Fuels Dth Saved	0 Dth

First Year Carbon Emissions Reductions	
Electric Electrification	-1,486.8 tons CO2
Gas Electrification	1,983.7 tons CO2
TOTAL	**496.9 tons CO2**

Lifetime Carbon Emissions Reductions	
Electric Electrification	-5,178.0 tons CO2
Gas Electrification	31,382.9 tons CO2
TOTAL	**26,205.0 tons CO2**

INCOME QUALIFIED PROGRAM TOTAL	Beneficial Electrification	2026

Net Present Cost Benefit Summary Analysis For All Participants Benefits (Positive Values) Costs (Negative Values)

	Participant Test ($Total)	Utility Test ($Total)	Electric Rate Impact Test ($Total)	Gas Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Electric System Impacts						
Generation Capacity	N/A	$0	$0	N/A	$0	$0
Trans. & Dist. Capacity	N/A	$0	$0	N/A	$0	$0
Marginal Energy	N/A	($1,143,733)	($1,143,733)	N/A	($1,143,733)	($1,513,306)
Subtotal	**$0**	**($1,143,733)**	**($1,143,733)**	**N/A**	**($1,143,733)**	**($1,513,306)**
Non-Energy Benefits Adder (0.0%)	N/A	N/A	N/A	N/A	$0	$0
Subtotal	**N/A**	**($1,143,733)**	**($1,143,733)**	**N/A**	**($1,143,733)**	**($1,513,306)**
Gas System Impacts						
Commodity Cost	N/A	$2,558,646	N/A	$2,558,646	$2,558,646	$3,346,776
Variable O&M	N/A	$28,181	N/A	$28,181	$28,181	$35,962
Bulk System Demand	N/A	$425,943	N/A	$425,943	$425,943	$543,551
Targeted Demand	N/A	$97,813	N/A	$97,813	$97,813	$97,813
Subtotal	**N/A**	**$3,110,583**	**N/A**	**$3,110,583**	**$3,110,583**	**$4,024,103**
Non-Energy Benefits Adder (25.0%)	N/A	N/A	N/A	N/A	$777,646	$981,572
Subtotal	**N/A**	**$3,110,583**	**N/A**	**$3,110,583**	**$3,888,229**	**$5,005,675**
Emissions Impacts						
Electric Emissions (CO2)	N/A	N/A	N/A	N/A	($517,276)	($517,276)
Gas Emissions (CO2)	N/A	N/A	N/A	N/A	$4,375,279	$4,375,279
Gas Emissions (CH4)	N/A	N/A	N/A	N/A	$695,497	$695,497
Subtotal	N/A	N/A	N/A	N/A	$4,553,500	$4,553,500
Participant Impacts						
Electric Bill	($8,613,084)	N/A	N/A	N/A	N/A	N/A
Gas Bill	$5,531,582	N/A	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$8,981,546	N/A	N/A	N/A	$8,981,546	$8,981,546
Incremental Capital Savings	($17,106,993)	N/A	N/A	N/A	($17,106,993)	($17,106,993)
Incremental O&M Savings	$0	N/A	N/A	N/A	$0	$0
Subtotal	**($11,206,950)**	**N/A**	**N/A**	**N/A**	**($8,125,448)**	**($8,125,448)**
Utility Impacts						
Utility Project Costs						
Program Planning & Design	N/A	$0	$0	$0	$0	$0
Administration & Program Delivery	N/A	$577,390	$353,712	$223,678	$577,390	$577,390
Advertising/Promotion/Customer Ed	N/A	$342,931	$190,082	$152,849	$342,931	$342,931
Participant Rebates and Incentives	N/A	$8,981,546	$4,490,773	$4,490,773	$8,981,546	$8,981,546
Equipment & Installation	N/A	$0	$0	$0	$0	$0
Measurement and Verification	N/A	$180,229	$111,461	$68,768	$180,229	$180,229
Subtotal	N/A	$10,082,096	$5,146,028	$4,936,068	$10,082,096	$10,082,096
Non-Participant Impacts						
Electric Bill	N/A	N/A	$8,613,084	N/A	N/A	N/A
Gas Bill	N/A	N/A	N/A	($5,531,582)	N/A	N/A
Subtotal	N/A	N/A	$8,613,084	($5,531,582)	N/A	N/A

Benefits	$14,513,127	$3,110,583	$8,613,084	$3,110,583	$17,940,551	$19,057,997
Costs	$25,720,077	$11,225,829	$6,289,761	$10,467,650	$28,850,099	$29,219,671
Net Benefit (Cost)	($11,206,950)	($8,115,246)	$2,323,322	($7,357,066)	($10,909,548)	($10,161,674)
Benefit/Cost Ratio	0.56	0.28	1.37	0.30	0.62	0.65

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Beneficial Electrification Impacts	
Lifetime (Weighted on Generator kWh)	16.4 years
Lifetime (Weighted on Dth)	16.0 years
T & D Loss Factor (Energy)	6.38%
T & D Loss Factor (Demand)	N/A
Net-to-Gross (kWh)	100.0%
Net-to-Gross (kW)	N/A
Net-to-Gross (Dth)	100.0%
Installation Rate (Energy)	100.0%
Installation Rate (Demand)	N/A
Net coincident kW Saved at Generator	0.00 kW
Gross Annual kWh Saved at Customer	-5,243,535 kWh
Net Annual kWh Saved at Generator	-5,600,870 kWh
Net Annual Dth Saved	54,329 Dth
Net Targeted Peak Dth/hr Savings	11.65 Dth
Net Annual Other Fuels Dth Saved	0 Dth

First Year Carbon Emissions Reductions	
Electric Electrification	-1,213.8 tons CO2
Gas Electrification	3,173.9 tons CO2
TOTAL	**1,960.0 tons CO2**

Lifetime Carbon Emissions Reductions	
Electric Electrification	-5,886.9 tons CO2
Gas Electrification	50,626.3 tons CO2
TOTAL	**44,739.4 tons CO2**

DR PROGRAM TOTAL - DM

2024 ELECTRIC **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$66,118,285	$66,118,285	$66,118,285	$66,118,285
Trans. & Dist. Capacity	N/A	$0	$0	$0	$0
Marginal Energy	N/A	$206,687	$206,687	$206,687	$234,487
Avoided Emissions (CO2)	N/A	N/A	N/A	$186,772	$186,772
Subtotal				$66,511,744	$66,539,544
Non-Energy Benefits Adder (10.0%)				$6,632,497	$6,635,277
Subtotal	N/A	$66,324,971	$66,324,971	$73,144,241	$73,174,821
Participant Benefits					
Bill Reduction - Electric	$974,676	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$11,756,855	N/A	N/A	$11,756,855	$11,756,855
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$0	N/A	N/A	$0	$0
Subtotal	$12,731,531	N/A	N/A	$11,756,855	$11,756,855
Total Benefits	$12,731,531	$66,324,971	$66,324,971	$84,901,096	$84,931,676
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$7,688,582	$7,688,582	$7,688,582	$7,688,582
Advertising/Promotion/Customer Ed	N/A	$1,050,500	$1,050,500	$1,050,500	$1,050,500
Participant Rebates and Incentives	N/A	$11,756,855	$11,756,855	$11,756,855	$11,756,855
Equipment & Installation	N/A	$30,000	$30,000	$30,000	$30,000
Measurement and Verification	N/A	$269,000	$269,000	$269,000	$269,000
Subtotal	N/A	$20,794,937	$20,794,937	$20,794,937	$20,794,937
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$974,676	N/A	N/A
Subtotal	N/A	N/A	$974,676	N/A	N/A
Participant Costs					
Incremental Capital Costs	$122,722	N/A	N/A	$122,722	$122,722
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$122,722	N/A	N/A	$122,722	$122,722
Total Costs	$122,722	$20,794,937	$21,769,613	$20,917,659	$20,917,659
Net Benefit (Cost)	$12,608,809	$45,530,035	$44,555,359	**$63,983,436**	**$64,014,017**
Benefit/Cost Ratio	103.74	3.19	3.05	**4.06**	**4.06**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	1.9 years
T & D Loss Factor (Energy)	B	5.42%
T & D Loss Factor (Demand)	C	8.11%
Net-to-Gross (Energy)	D	100.0%
Net-to-Gross (Demand)	E	100.0%
Installation Rate (Energy)	F	**100.0%**
Installation Rate (Demand)	G	**100.0%**
Net coincident kW Saved at Generator	H	0.50 kW
Gross Annual kWh Saved at Customer	I	10.82 kWh
Net Annual kWh Saved at Generator	J	11.44 kWh

Program Summary All Unit		
Total Budget	K	**$20,794,937**
Net coincident kW Saved at Generator	L	**128,422 kW**
Gross Annual kWh Saved at Customer	M	2,782,068 kWh
Net Annual kWh Saved at Generator	N	**2,941,548 kWh**
Total MTRC Net Benefits with Adder	O	**$63,983,436**
Total MTRC Net Benefits without Adder	P	**$57,350,939**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$3.7908**
Utility Program Cost per kW at Gen	K/ L	**$162**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**2,316**

DR PROGRAM TOTAL - DM

2025 ELECTRIC **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$71,079,829	$71,079,829	$71,079,829	$71,079,829
Trans. & Dist. Capacity	N/A	$0	$0	$0	$0
Marginal Energy	N/A	$260,065	$260,065	$260,065	$280,855
Avoided Emissions (CO2)	N/A	N/A	N/A	$234,636	$234,636
Subtotal				$71,574,530	$71,595,319
Non-Energy Benefits Adder (10.0%)				$7,133,989	$7,136,068
Subtotal	N/A	$71,339,894	$71,339,894	$78,708,519	$78,731,388
Participant Benefits					
Bill Reduction - Electric	$1,079,219	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$12,132,039	N/A	N/A	$12,132,039	$12,132,039
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$0	N/A	N/A	$0	$0
Subtotal	$13,211,257	N/A	N/A	$12,132,039	$12,132,039
Total Benefits	$13,211,257	$71,339,894	$71,339,894	$90,840,558	$90,863,426
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$8,434,723	$8,434,723	$8,434,723	$8,434,723
Advertising/Promotion/Customer Ed	N/A	$1,050,500	$1,050,500	$1,050,500	$1,050,500
Participant Rebates and Incentives	N/A	$12,132,039	$12,132,039	$12,132,039	$12,132,039
Equipment & Installation	N/A	$30,000	$30,000	$30,000	$30,000
Measurement and Verification	N/A	$251,000	$251,000	$251,000	$251,000
Subtotal	N/A	$21,898,262	$21,898,262	$21,898,262	$21,898,262
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$1,079,219	N/A	N/A
Subtotal	N/A	N/A	$1,079,219	N/A	N/A
Participant Costs					
Incremental Capital Costs	$350,813	N/A	N/A	$350,813	$350,813
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$350,813	N/A	N/A	$350,813	$350,813
Total Costs	$350,813	$21,898,262	$22,977,480	$22,249,075	$22,249,075
Net Benefit (Cost)	$12,860,444	$49,441,632	$48,362,413	**$68,591,483**	**$68,614,352**
Benefit/Cost Ratio	37.66	3.26	3.10	**4.08**	**4.08**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	1.8 years
T & D Loss Factor (Energy)	B	5.42%
T & D Loss Factor (Demand)	C	8.08%
Net-to-Gross (Energy)	D	100.0%
Net-to-Gross (Demand)	E	100.0%
Installation Rate (Energy)	F	**100.0%**
Installation Rate (Demand)	G	**100.0%**
Net coincident kW Saved at Generator	H	0.53 kW
Gross Annual kWh Saved at Customer	I	11.54 kWh
Net Annual kWh Saved at Generator	J	12.20 kWh

Program Summary All Unit		
Total Budget	K	**$21,898,262**
Net coincident kW Saved at Generator	L	**141,851 kW**
Gross Annual kWh Saved at Customer	M	3,097,323 kWh
Net Annual kWh Saved at Generator	N	**3,274,646 kWh**
Total MTRC Net Benefits with Adder	O	**$68,591,483**
Total MTRC Net Benefits without Adder	P	**$61,457,494**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$3.6389**
Utility Program Cost per kW at Gen	K/ L	**$154**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**2,825**

DR PROGRAM TOTAL - DM

2026 ELECTRIC **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$73,831,935	$73,831,935	$73,831,935	$73,831,935
Trans. & Dist. Capacity	N/A	$0	$0	$0	$0
Marginal Energy	N/A	$186,177	$186,177	$186,177	$205,956
Avoided Emissions (CO2)	N/A	N/A	N/A	$207,234	$207,234
Subtotal				$74,225,347	$74,245,125
Non-Energy Benefits Adder (10.0%)				$7,401,811	$7,403,789
Subtotal	N/A	$74,018,112	$74,018,112	$81,627,158	$81,648,915
Participant Benefits					
Bill Reduction - Electric	$1,172,144	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$12,152,958	N/A	N/A	$12,152,958	$12,152,958
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$0	N/A	N/A	$0	$0
Subtotal	$13,325,103	N/A	N/A	$12,152,958	$12,152,958
Total Benefits	$13,325,103	$74,018,112	$74,018,112	$93,780,116	$93,801,873
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$8,969,106	$8,969,106	$8,969,106	$8,969,106
Advertising/Promotion/Customer Ed	N/A	$1,050,500	$1,050,500	$1,050,500	$1,050,500
Participant Rebates and Incentives	N/A	$12,152,958	$12,152,958	$12,152,958	$12,152,958
Equipment & Installation	N/A	$30,000	$30,000	$30,000	$30,000
Measurement and Verification	N/A	$261,000	$261,000	$261,000	$261,000
Subtotal	N/A	$22,463,564	$22,463,564	$22,463,564	$22,463,564
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$1,172,144	N/A	N/A
Subtotal	N/A	N/A	$1,172,144	N/A	N/A
Participant Costs					
Incremental Capital Costs	$185,720	N/A	N/A	$185,720	$185,720
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$185,720	N/A	N/A	$185,720	$185,720
Total Costs	$185,720	$22,463,564	$23,635,708	$22,649,284	$22,649,284
Net Benefit (Cost)	$13,139,382	$51,554,548	$50,382,404	**$71,130,832**	**$71,152,588**
Benefit/Cost Ratio	71.75	3.30	3.13	**4.14**	**4.14**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	1.7 years
T & D Loss Factor (Energy)	B	5.41%
T & D Loss Factor (Demand)	C	8.05%
Net-to-Gross (Energy)	D	100.0%
Net-to-Gross (Demand)	E	100.0%
Installation Rate (Energy)	F	**100.0%**
Installation Rate (Demand)	G	**100.0%**
Net coincident kW Saved at Generator	H	0.57 kW
Gross Annual kWh Saved at Customer	I	12.74 kWh
Net Annual kWh Saved at Generator	J	13.47 kWh

Program Summary All Unit		
Total Budget	K	**$22,463,564**
Net coincident kW Saved at Generator	L	**154,864 kW**
Gross Annual kWh Saved at Customer	M	3,488,230 kWh
Net Annual kWh Saved at Generator	N	**3,687,744 kWh**
Total MTRC Net Benefits with Adder	O	**$71,130,832**
Total MTRC Net Benefits without Adder	P	**$63,729,020**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$3.4960**
Utility Program Cost per kW at Gen	K/ L	**$145**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**2,408**

DR PORTFOLIO TOTAL - DM

2024 ELECTRIC **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Cost Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$66,118,285	$66,118,285	$66,118,285	$66,118,285
Trans. & Dist. Capacity	N/A	$0	$0	$0	$0
Marginal Energy	N/A	$206,687	$206,687	$206,687	$234,487
Avoided Emissions (CO2)	N/A	N/A	N/A	$186,772	$186,772
Subtotal				$66,511,744	$66,539,544
Non-Energy Benefits Adder (10.0%)				$6,632,497	$6,635,277
Subtotal	N/A	$66,324,971	$66,324,971	$73,144,241	$73,174,821
Participant Benefits					
Bill Reduction - Electric	$974,676	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$11,756,855	N/A	N/A	$11,756,855	$11,756,855
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$0	N/A	N/A	$0	$0
Subtotal	$12,731,531	N/A	N/A	$11,756,855	$11,756,855
Total Benefits	$12,731,531	$66,324,971	$66,324,971	$84,901,096	$84,931,676
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$9,298,298	$9,298,298	$9,298,298	$9,298,298
Advertising/Promotion/Customer Ed	N/A	$1,050,500	$1,050,500	$1,050,500	$1,050,500
Participant Rebates and Incentives	N/A	$11,756,855	$11,756,855	$11,756,855	$11,756,855
Equipment & Installation	N/A	$30,000	$30,000	$30,000	$30,000
Measurement and Verification	N/A	$744,000	$744,000	$744,000	$744,000
Subtotal	N/A	$22,879,653	$22,879,653	$22,879,653	$22,879,653
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$974,676	N/A	N/A
Subtotal	N/A	N/A	$974,676	N/A	N/A
Participant Costs					
Incremental Capital Costs	$122,722	N/A	N/A	$122,722	$122,722
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$122,722	N/A	N/A	$122,722	$122,722
Total Costs	$122,722	$22,879,653	$23,854,329	$23,002,375	$23,002,375
Net Benefit (Cost)	$12,608,809	$43,445,319	$42,470,642	**$61,898,720**	**$61,929,301**
Benefit/Cost Ratio	103.74	2.90	2.78	**3.69**	**3.69**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	1.9 years
T & D Loss Factor (Energy)	B	5.42%
T & D Loss Factor (Demand)	C	8.11%
Net-to-Gross (Energy)	D	100.0%
Net-to-Gross (Demand)	E	100.0%
Installation Rate (Energy)	F	**100.0%**
Installation Rate (Demand)	G	**100.0%**
Net coincident kW Saved at Generator	H	0.50 kW
Gross Annual kWh Saved at Customer	I	10.82 kWh
Net Annual kWh Saved at Generator	J	11.44 kWh

Program Summary All Unit		
Total Budget	K	**$22,879,653**
Net coincident kW Saved at Generator	L	**128,422 kW**
Gross Annual kWh Saved at Customer	M	2,782,068 kWh
Net Annual kWh Saved at Generator	N	**2,941,548 kWh**
Total MTRC Net Benefits with Adder	O	**$61,898,720**
Total MTRC Net Benefits without Adder	P	**$55,266,223**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$4.1708**
Utility Program Cost per kW at Gen	K/ L	**$178**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**2,316**

DR PORTFOLIO TOTAL - DM

2025 ELECTRIC **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$71,079,829	$71,079,829	$71,079,829	$71,079,829
Trans. & Dist. Capacity	N/A	$0	$0	$0	$0
Marginal Energy	N/A	$260,065	$260,065	$260,065	$280,855
Avoided Emissions (CO2)	N/A	N/A	N/A	$234,636	$234,636
Subtotal				$71,574,530	$71,595,319
Non-Energy Benefits Adder (10.0%)				$7,133,989	$7,136,068
Subtotal	N/A	$71,339,894	$71,339,894	$78,708,519	$78,731,388
Participant Benefits					
Bill Reduction - Electric	$1,079,219	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$12,132,039	N/A	N/A	$12,132,039	$12,132,039
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$0	N/A	N/A	$0	$0
Subtotal	$13,211,257	N/A	N/A	$12,132,039	$12,132,039
Total Benefits	$13,211,257	$71,339,894	$71,339,894	$90,840,558	$90,863,426
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$10,001,401	$10,001,401	$10,001,401	$10,001,401
Advertising/Promotion/Customer Ed	N/A	$1,050,500	$1,050,500	$1,050,500	$1,050,500
Participant Rebates and Incentives	N/A	$12,132,039	$12,132,039	$12,132,039	$12,132,039
Equipment & Installation	N/A	$30,000	$30,000	$30,000	$30,000
Measurement and Verification	N/A	$766,000	$766,000	$766,000	$766,000
Subtotal	N/A	$23,979,939	$23,979,939	$23,979,939	$23,979,939
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$1,079,219	N/A	N/A
Subtotal	N/A	N/A	$1,079,219	N/A	N/A
Participant Costs					
Incremental Capital Costs	$350,813	N/A	N/A	$350,813	$350,813
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$350,813	N/A	N/A	$350,813	$350,813
Total Costs	$350,813	$23,979,939	$25,059,158	$24,330,752	$24,330,752
Net Benefit (Cost)	$12,860,444	$47,359,954	$46,280,736	**$66,509,806**	**$66,532,674**
Benefit/Cost Ratio	37.66	2.97	2.85	**3.73**	**3.73**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	1.8 years
T & D Loss Factor (Energy)	B	5.42%
T & D Loss Factor (Demand)	C	8.08%
Net-to-Gross (Energy)	D	100.0%
Net-to-Gross (Demand)	E	100.0%
Installation Rate (Energy)	F	**100.0%**
Installation Rate (Demand)	G	**100.0%**
Net coincident kW Saved at Generator	H	0.53 kW
Gross Annual kWh Saved at Customer	I	11.54 kWh
Net Annual kWh Saved at Generator	J	12.20 kWh

Program Summary All Unit		
Total Budget	K	**$23,979,939**
Net coincident kW Saved at Generator	L	**141,851 kW**
Gross Annual kWh Saved at Customer	M	3,097,323 kWh
Net Annual kWh Saved at Generator	N	**3,274,646 kWh**
Total MTRC Net Benefits with Adder	O	**$66,509,806**
Total MTRC Net Benefits without Adder	P	**$59,375,816**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$3.9849**
Utility Program Cost per kW at Gen	K/ L	**$169**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**2,825**

DR PORTFOLIO TOTAL - DM

2026 ELECTRIC **GOAL**

Net Present Cost Benefit Summary Analysis For All Participants

	Participant Test ($Total)	Utility Test ($Total)	Rate Impact Test ($Total)	Modified Total Resource Test ($Total)	Societal Cost Test ($Total)
Benefits					
Avoided Revenue Requirements					
Generation Capacity	N/A	$73,831,935	$73,831,935	$73,831,935	$73,831,935
Trans. & Dist. Capacity	N/A	$0	$0	$0	$0
Marginal Energy	N/A	$186,177	$186,177	$186,177	$205,956
Avoided Emissions (CO2)	N/A	N/A	N/A	$207,234	$207,234
Subtotal				$74,225,347	$74,245,125
Non-Energy Benefits Adder (10.0%)				$7,401,811	$7,403,789
Subtotal	N/A	$74,018,112	$74,018,112	$81,627,158	$81,648,915
Participant Benefits					
Bill Reduction - Electric	$1,172,144	N/A	N/A	N/A	N/A
Participant Rebates and Incentives	$12,152,958	N/A	N/A	$12,152,958	$12,152,958
Incremental Capital Savings	$0	N/A	N/A	$0	$0
Incremental O&M Savings	$0	N/A	N/A	$0	$0
Subtotal	$13,325,103	N/A	N/A	$12,152,958	$12,152,958
Total Benefits	$13,325,103	$74,018,112	$74,018,112	$93,780,116	$93,801,873
Costs					
Utility Project Costs					
Program Planning & Design	N/A	$0	$0	$0	$0
Administration & Program Delivery	N/A	$10,400,284	$10,400,284	$10,400,284	$10,400,284
Advertising/Promotion/Customer Ed	N/A	$1,050,500	$1,050,500	$1,050,500	$1,050,500
Participant Rebates and Incentives	N/A	$12,152,958	$12,152,958	$12,152,958	$12,152,958
Equipment & Installation	N/A	$30,000	$30,000	$30,000	$30,000
Measurement and Verification	N/A	$791,000	$791,000	$791,000	$791,000
Subtotal	N/A	$24,424,742	$24,424,742	$24,424,742	$24,424,742
Utility Revenue Reduction					
Revenue Reduction - Electric	N/A	N/A	$1,172,144	N/A	N/A
Subtotal	N/A	N/A	$1,172,144	N/A	N/A
Participant Costs					
Incremental Capital Costs	$185,720	N/A	N/A	$185,720	$185,720
Incremental O&M Costs	$0	N/A	N/A	$0	$0
Subtotal	$185,720	N/A	N/A	$185,720	$185,720
Total Costs	$185,720	$24,424,742	$25,596,886	$24,610,462	$24,610,462
Net Benefit (Cost)	$13,139,382	$49,593,370	$48,421,226	**$69,169,654**	**$69,191,410**
Benefit/Cost Ratio	71.75	3.03	2.89	**3.81**	**3.81**

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Input Summary and Totals

Program "Inputs" per Customer kW and per Unit		
Lifetime (Weighted on Generator kWh)	A	1.7 years
T & D Loss Factor (Energy)	B	5.41%
T & D Loss Factor (Demand)	C	8.05%
Net-to-Gross (Energy)	D	100.0%
Net-to-Gross (Demand)	E	100.0%
Installation Rate (Energy)	F	**100.0%**
Installation Rate (Demand)	G	**100.0%**
Net coincident kW Saved at Generator	H	0.57 kW
Gross Annual kWh Saved at Customer	I	12.74 kWh
Net Annual kWh Saved at Generator	J	13.47 kWh

Program Summary All Unit		
Total Budget	K	**$24,424,742**
Net coincident kW Saved at Generator	L	**154,864 kW**
Gross Annual kWh Saved at Customer	M	3,488,230 kWh
Net Annual kWh Saved at Generator	N	**3,687,744 kWh**
Total MTRC Net Benefits with Adder	O	**$69,169,654**
Total MTRC Net Benefits without Adder	P	**$61,767,842**

Utility Program Cost per kWh Lifetime	K/(A x N)	**$3.8012**
Utility Program Cost per kW at Gen	K/ L	**$158**

Avoided Lifetime CO2 Emissions, Total Program (tons CO2)	**2,408**

Appendix A – List of Acronyms

Acronym	Meaning
ACCA	Air Conditioning Contractors of America
AFCOM	Association for Computer Operations Management
AFUE	Annual Fuel Utilization Efficiency
AHRI	Air-Conditioning, Heating, and Refrigeration Institute
ALR	Acknowledgement of Lost Revenue
AMI	Area Median Income
ASHP	Air Source Heat Pump
ASHRAE	American Society of Heating, Refrigeration and Air-conditioning Engineers
BE	Beneficial Electrification
BSC	Business Solutions Center
BTC	Beyond the Code
BYOT	Bring Your Own Thermostat
CAZ	Combustion Appliance Zone
CBA	Cost Benefit Analysis
CCEF	Colorado Clean Energy Fund
CDs	Construction Documents
CEE	Consortium for Energy Efficiency
CEO	Colorado Energy Office
CFL	Compact-fluorescent lights
CFM	Cubic Feet Per Minute
C&I	Commercial and Industrial
CIL	Contract Interruptible Load
CLGBR	Commercial Large Gas Service Base Rate per Therm
Commission	Colorado Public Utilities Commission
COP	Coefficient of Performance
C-PACE	Colorado Property Assessed Clean Energy
CPHC	Certified Passive House Consultant
CPP	Critical Peak Pricing
CRAC	Computer Room Air Conditioner
CSGBR	Commercial Small Gas Service Base Rate per Therm
CT	Combustion Turbine
DDC	Direct Digital Controls
DEPACC	Direct-Evaporative Pre-Cooling for Air-Cooled Condensers
DI	Direct Install
DI	Disproportionately Impacted
DI	Distributed Intelligence
DIC	Disproportionately Impacted Communities
DLC	Direct Load Control
DOE	U.S. Department of Energy
DR	Demand Response
DRMS	Demand Response Management System
DSM	Demand-Side Management
DSMCA	Demand-Side Management Cost Adjustment
DTV	Dollar per Therm Value

Acronym	Meaning
DTVNR	Non-Residence Service Dollar per Therm Value
EDA	Energy Design Assistance
EEB	Energy Efficient Buildings
EEBC	Energy Efficiency Business Coalition
EER	Energy Efficiency Ratio
EF	Energy Factor
EIA	Energy Information Administration
EMA	Energy Management Assessment
EMIS	Energy Management Information System
EMS	Energy Management System
EM&V	Evaluation, Measurement and Verification
EOC	Energy Outreach Colorado
EPA	U.S. Environmental Protection Agency
ESCO	Energy Service Company
ESPM	ENERGY STAR® Portfolio Manager
EV	Electric Vehicle
EV-CPP	Electric Vehicle Critical Peak Pricing
FEMP	Federal Energy Management Program
FPL	Federal Poverty Level
GSHP	Ground Source Heat Pump
HAN	Home Area Network
HBA	High Bill Alerts
HEI	Home Energy Insights
HER	Home Energy Report
HERS	Home Energy Rating System
HP	Horsepower
HSPF2	Heating Seasonal Performance Factor
HVAC+R	Heating, Ventilation, Air Conditioning, and Refrigeration
IECC	International Energy Conservation Code
IGBR	Interruptible Industrial Gas Service Vase Rate per Therm
IPMVP	International Performance Measurement and Verification Protocol
IQ	Income-Qualified
ISOC	Interruptible Service Option Credit
kW	Kilowatt
LEAP	Low-Income Energy Assistance Program
LED	Light-emitting Diode
LEED	Leadership in Energy and Environmental Design
LIHEAP	Low Income Home Energy Assistance Program
MEC	My Energy Connection
MOU	Memorandum of Understanding
MSHP	Mini-Split Heat Pump
mTRC	Modified Total Resource Cost Test
M&V	Measurement and Verification
MW	Megawatts
NACH	Natural Air Changes per Hour
NAIOP	National Association of Industrial and Office Properties
NEIF	National Energy Improvement Fund

Acronym	Meaning
NEMA	National Electrical Manufacturers Association
NTG	Net-to-Gross
O&M	Operations and Maintenance
OBF	On-Bill Financing
PPR	Peak Partner Rewards
QA/QC	Quality Assurance/Quality Control
RAD	Responsible Appliance Disposal
RBR	Residential Base Rate per Therm
RESNET	Residential Energy Services Network
RFP	Request for Proposal
RR	Realization Rate
QI	Quality Installation
SBES	Small Business Energy Solutions
SEER2	Seasonal Energy Efficiency Ratio
SEM	Strategic Energy Management
SEMC	Strategic Energy Management Consultant
SL	Street Lighting
SWEEP	Southwest Energy Efficiency Project
T&D	Transmission and Distribution
TDLF	Transmission/Distribution Loss Factor
TOBF	Tariffed On-Bill Financing
TOU	Time of Use
TRM	Technical Reference Manual
WCC	Western Cooling Control
WRA	Western Resource Advocates
UEF	Uniform Energy Factor
VC	Verification Contractor
VCT	Variable Cost per Therm
VCx	Virtual Commissioning
VDI	Virtual Desktop Infrastructures
VFD	Variable Frequency Drive
VRF	Variable Refrigerant Flow
ZERHv2	Zero Home Ready Home version 2

Appendix B – Key Terms

Beneficial Electrification – C.R.S 40-1-102(1.2) states "'Beneficial electrification' means converting the energy source of a customer's end use from a nonelectric fuel source to a high-efficiency electric source, or avoiding the use of nonelectric fuel sources in new construction or industrial applications, if the result of the conversion or avoidance is to: (I) Reduce net greenhouse gas emissions over the lifetime of the conversion or avoidance; and (II) Reduce societal costs or provide for more efficient utilization of grid resources." In accordance with SB 21-246, the Company files a BE plan with its DSM plan.

Forecasts – The Company refers to "forecasts" as the Company's estimated achievements for a given year for our portfolio, programs, and products.

Goal – The Company refers to "goal" as the Commission-approved annual GWh savings goal for the Company's electric portfolio, such as those ordered in Proceeding No. 22A-0309EG for years 2024 through 2026.

Measure – Gas Rule 4751(g) states that "DSM measure" means an individual component or technology, such as attic insulation or replacement of equipment." The Company uses the term "measure" when referring to individual components or technologies offered as part of a specific product. For example, each of the energy efficient lighting technologies offered as part of the Lighting Efficiency product are considered to be individual "measures."

Plan – Gas Rule 4751(i) states that "DSM plan" means the DSM programs, goals, and budgets over a specified DSM period, generally considered in one-year increments, as may be proposed by the utility." C.R.S. 40-3.2-103 (3)(a) dictates that "…each gas utility shall: (a) Develop and begin implementing a set of cost-effective DSM programs for its full-service customers. Such programs shall be of the gas utility's choosing, taking into account the characteristics of the gas utility and its customers…" The Company submits DSM plans on an annual or biennial basis to obtain Commission approval of specific DSM programs, pilots, annual energy savings and peak demand reduction goals, and annual budgets, in accordance with Paragraph 170 of Decision No. C08-0560 which states that the Commission "concur with Public Service's plan to file DSM plans biennially and to combine electric and gas DSM into one filing."

Portfolio – Gas Rule 4757(e) states that, "A utility has the discretion and the responsibility of managing the portfolio of DSM programs to meet the benefit to cost ratio and the energy and savings forecasts. In implementing DSM programs, a utility shall use reasonable efforts to maximize energy savings consistent with the approved DSM plan." Consistent with the use of the term portfolio in Gas Rule 4757(e), the Company uses the term DSM "portfolio" when referring to the entire group of electric or gas programs, products, and measures that the Company implements in a given plan-year.

Product – The term "product" is used by the Company to refer to one of the approximately three dozen DSM offerings that are included as the principal components of the business, residential, and low-income programs included in the DSM plan and offered to customers.

> *For example, Small Business Solutions and Lighting Efficiency are individual products within the Business Program under the electric energy efficiency portfolio.*

Program – C.R.S. 40-1-102(6) states that “"Demand-side management programs" or "DSM programs" means energy efficiency, conservation, load management, and demand response programs or any combination of these programs.” Gas Rule 4751(j) states that “‘DSM program’ means any combination of DSM measures, information and services offered to customers to reduce natural gas usage.” Consistent with these definitions, depending on the context, the Company may use the term “program” to refer to the entire group of energy efficiency, conservation, load management, and demand response programs it offers, to only one of the described initiatives, as in the case of the Interruptible Service Option Credit program, or Third-Party Demand Response Program, or to a subset of the energy efficiency products it provides as in the case of the Residential, Business and Low-Income and Indirect gas and electric energy efficiency programs.

Third-Party Implementer – The Company considers third-party implementers to be contracted agents that support DSM product delivery. This does not include trade partners or other consultants.

Appendix C – Product Rankings

DSM & BE Product rankings are established by determining market segments that could participate in the product, customer classes available, total projected savings, cost-effectiveness, and participation rates (as a number and a percent of the market). This ranking is a requirement from Gas Rules 723-4, Proceeding No. 07R-371G.

2024-26	Rank
Home Energy Insights	1
School Education Kits	2
Energy Efficient Showerhead	3
Lighting Efficiency	4
Residential Heating & Cooling	5
New Construction	6
Single-Family Weatherization	7
Tiered Geographic Prequalification	8
Strategic Energy Management	9
Small Business Solutions	10
Residential New Home Construction	11
Business HVAC+R Systems	12
Business Energy Assessments	13
Energy Savings Kit	14
Home Energy Squad	15
Home Lighting & Recycling	16
Data Center Efficiency	17
Multi-Family Buildings Efficiency	18
Compressed Air Efficiency	19
Insulation & Air Sealing	20
Energy Management Systems	21
Refrigerator & Freezer Recycling	22
Self Direct	23
LED Street Lighting	24
Non-Profit	25
Custom Efficiency	26
Whole Home Efficiency	27
Multifamily Weatherization	28
Income Qualified Home Energy Squad	29
All-Electric Affordable New Home Construction	30

Appendix D – Budget Categories

The Company uses the following six budget categories to track and report its annual expenditures for DSM & BE programs and products within its portfolio:

1. **Program Planning and Design**
   Expenditures for:
   - Labor for product development and product managers.
   - Expenditures related to product development, planning, and design.

2. **Administration and Program Delivery**
   Expenditures for:
   - Labor for product managers, sales representatives, call center, rebate processing, technical consulting, and other fulfillment activities associated with delivering a product directly to the customer.
   - Labor for installation contractors, vendors, technical consultants, fulfillment contractors, and alternative providers that Xcel Energy contracts with to provide DSM & BE services.
   - Project fulfillment, implementation and program support activities associate with delivering a program directly to the customer.

3. **Advertising / Promotion / Customer Education**
   Expenditures for:
   - Labor for communication staff and others.
   - TV, radio, newspaper, and print media; direct promotion and sales support materials; postage, promotional events; contracted outbound telephone sales.
   - Customer education through seminars, pamphlets, videos, and computer games.

4. **Participant Rebates and Incentives**
   Expenditures for:
   - Customer rebates, finance interest subsidies, subsidies for engineering studies, trade incentives, and incentives given in the form of subsidized products or equipment.

5. **Equipment and Installation**
   Expenditures for:
   - The costs to purchase energy efficient equipment and to install efficiency equipment at the customer site.

6. **Measurement and Verification**
   Expenditures for:
   - Labor for market research and load research.
   - Labor product development staff, product development, external consultants, and product development research activities.
   - Customer surveys, program evaluation expenses.

Appendix E – Avoided Cost Assumptions

The following sections summarize the avoided cost assumptions Public Service has made in order to perform the cost-effectiveness tests for electric and gas programs, and for which the Company is asking for approval of for use in the status reports and incentives calculations for 2024-2026 achievements.

Electric Programs

In order to determine the cost-effectiveness of its electric energy efficiency, beneficial electrification and load management programs, Public Service must first calculate the avoided generation, transmission, distribution, and marginal energy costs these programs avoid. Below are the avoided cost assumptions used in this plan.

1. **Estimated Annual Avoided Generation Capacity Costs (*Source:* Public Service Resource Planning)**

   The capacity costs reflect the lowest cost generation capacity option identified (which was a combustion turbine ("CT")) in the modeling, that was not actually selected in Phase II of the Company's pending 2021 Electric Resource and Clean Energy Plan ("2021 ERP & CEP"). To calculate the avoided electric capacity costs, a load forecast with a constant 50 MW of incremental load was used in Encompass modeling in compliance with paragraph 87 of Decision No. C23-0413.

	CT		CT
Year	**Gen Capacity $/kW-mo**	**Year**	**Gen Capacity $/kW-mo**
2024	$14.41	**2039**	$19.39
2024	$14.70	**2040**	$19.78
2025	$14.99	**2041**	$20.18
2026	$15.29	**2042**	$20.58
2027	$15.60	**2043**	$20.99
2028	$15.91	**2044**	$21.41
2029	$16.23	**2045**	$21.84
2030	$16.55	**2046**	$22.28
2031	$16.88	**2047**	$22.72
2032	$17.22	**2048**	$23.18
2033	$17.57	**2049**	$23.64
2034	$17.92	**2050**	$24.11
2035	$18.28	**2051**	$24.60
2036	$18.64	**2052**	$25.09
2037	$19.01	**2053**	$25.59
2038	$19.39	**2054**	$26.10
2039	$19.78	**2055**	$26.62

2. **Estimated Annual Avoided Transmission and Distribution (T&D) Capacity Costs (*Source:* Public Service Resource Planning)**
Paragraph 97 in Decision C14-0731 (Proceeding No. 13A-0686EG) required the Company to "…study the avoided transmission and distribution capacity costs and propose values in its DSM Biennial Plan for 2015 through 2016." Consistent with the Commission's decision in C15-0735, the Company undertook a study, specific to its own territory, utilizing the system planning approach to estimate T&D costs. The study is included as attachment SMW-6 to the Direct Testimony of Shawn M. White in Proceeding No. 16A-0512EG and affirmed in Proceeding No. 17A-0462EG.[106] The results of this study represent the best estimates available and will be used for analysis of the 2024-2026 achievements.

	Avoided Capacity $/kW-yr				Avoided Capacity $/kW-yr		
Year	**Transmission**	**Distribution**	**T&D**	**Year**	**Transmission**	**Distribution**	**T&D**
2024	$9.62	$2.62	$12.23	**2040**	$13.20	$3.59	$16.79
2025	$9.81	$2.67	$12.48	**2041**	$13.47	$3.66	$17.13
2026	$10.01	$2.72	$12.73	**2042**	$13.74	$3.73	$17.47
2027	$10.21	$2.78	$12.98	**2043**	$14.01	$3.81	$17.82
2028	$10.41	$2.83	$13.24	**2044**	$14.29	$3.89	$18.18
2029	$10.62	$2.89	$13.51	**2045**	$14.58	$3.97	$18.54
2030	$10.83	$2.95	$13.78	**2046**	$14.87	$4.05	$18.91
2031	$11.05	$3.01	$14.06	**2047**	$15.17	$4.13	$19.29
2032	$11.27	$3.07	$14.33	**2048**	$15.47	$4.21	$19.68
2033	$11.49	$3.13	$14.62	**2049**	$15.78	$4.30	$20.07
2034	$11.72	$3.19	$14.91	**2050**	$16.10	$4.38	$20.47
2035	$11.96	$3.25	$15.21	**2051**	$16.42	$4.47	$20.88
2036	$12.20	$3.32	$15.51	**2052**	$16.75	$4.56	$21.30
2037	$12.44	$3.38	$15.82	**2053**	$17.08	$4.65	$21.72
2038	$12.69	$3.45	$16.14	**2054**	$17.42	$4.75	$22.16
2039	$12.94	$3.52	$16.46	**2055**	$17.77	$4.84	$22.60

3. **Estimated Annual Avoided Energy Costs (*Source:* Public Service Resource Planning)**
In order to determine avoided energy costs, the Company's Resource Planning group produced an EnCompass run to produce hourly marginal energy estimates. These runs follow the provisions stated in the settlement agreement in Proceeding No. 17A-0462EG. For each individual measure in the Plan, an hourly load shape is assigned, as documented in Appendix G. The estimated annual avoided energy resulting from the product of hourly marginal energy estimates and the hourly load shape is used to determine the estimate annual avoided energy costs for each measure.

[106] Decision No. C18-0417, at Ordering ¶104.

4. **Estimated Annual Avoided Emissions Costs (includes CO_2 and CH_4) (***Source:* Interagency Working Group on Social Cost of Greenhouse Gases)
   The Company has used the Social Cost of Carbon and Methane pursuant to the language in Senate Bill 19-236, codified at §40-3.2-106(c)(4), C.R.S., and HB 21-1238, codified at § 40-3.2-107, C.R.S, respectively, to value avoided emissions in the cost-benefit analysis at the product and portfolio level, as documented in the direct testimony of Jeremy Petersen.

Gas Programs

In order to determine the cost-effectiveness of its gas programs, Public Service must calculate the avoided commodity cost of gas, avoided capacity costs and any avoided variable O&M costs associated with the gas energy efficiency savings. Below are the avoided cost assumptions used in this Plan.

1. **Estimated Commodity Cost of Gas (*Source:* Public Service Gas Resource Planning)**
   The gas price forecast reflects a market snapshot for short-term prices and a quantitative average of projections from well-known forecasting services for the long-term forecast prices as of June 2023. Distinct costs are identified for Business and Residential customers with these values being applied to Business and Residential gas programs respectively.

	$/Dth			$/Dth	
Year	**Residential**	**Business**	**Year**	**Residential**	**Business**
2024	$3.75	$3.72	**2040**	$5.55	$5.53
2025	$3.95	$3.94	**2041**	$5.76	$5.75
2026	$3.68	$3.66	**2042**	$5.90	$5.88
2027	$4.06	$4.05	**2043**	$6.11	$6.09
2028	$4.36	$4.34	**2044**	$6.45	$6.44
2029	$4.22	$4.20	**2045**	$6.72	$6.70
2030	$4.27	$4.25	**2046**	$6.85	$6.83
2031	$4.31	$4.29	**2047**	$7.02	$7.01
2032	$4.38	$4.36	**2048**	$7.12	$7.10
2033	$4.45	$4.44	**2049**	$7.42	$7.40
2034	$4.64	$4.63	**2050**	$7.73	$7.72
2035	$4.73	$4.72	**2051**	$7.88	$7.87
2036	$4.82	$4.80	**2052**	$8.10	$8.08
2037	$4.98	$4.97	**2053**	$8.31	$8.30
2038	$5.11	$5.09	**2054**	$8.53	$8.51
2039	$5.23	$5.21	**2055**	$8.74	$8.72

2. **Estimated Avoided Variable O&M Costs (*Source:* Public Service Pricing and Planning)**
   The company used the following value provided by the Company's Pricing and Planning department to determine variable O&M costs avoided with a reduction in gas usage.

Year	$/Dth
2024-2055	$0.05

3. **Estimated Annual Avoided Reservation Costs (used to estimate bulk system capacity savings – Peak Day Dth savings estimated as 1% of annual Dth savings) (*Source:* Public Service Gas Resource Planning)**
   The following annual avoided reservation costs was used to determine the cost of service to transport incremental gas supplies to the metropolitan Denver area. The Company uses the CIG firm transportation rate to estimate this cost.

Year	$/Dth
2024-2055	$75.572

4. **Estimated Annual Avoided Distribution Capacity Costs (used to estimate targeted area capacity savings – Peak Hour Dth/hr savings vary by measure) (*Source:* Public Service Gas Resource Planning)**
   The company used the following values provided by the Company's Integrated System Planning department to estimate gas distribution capacity costs avoided with a reduction in peak hourly gas usage in Targeted Demand Areas. Not all measures have peak hourly savings. Of measures with peak hour savings, it was assumed for planning purposes that 7 percent of measure installations will occur in Targeted Demand Areas. In Annual Reports, the avoided distribution capacity costs will only be applied to measures installed in Targeted Demand Areas.

Year	$/Peak Day Dth/hr	Year	$/Peak Day Dth/hr
2024	$6,877	**2040**	$9,120
2025	$6,999	**2041**	$9,282
2026	$7,124	**2042**	$9,447
2027	$7,250	**2043**	$9,615
2028	$7,379	**2044**	$9,786
2029	$7,511	**2045**	$9,961
2030	$7,644	**2046**	$10,138
2031	$7,781	**2047**	$10,318
2032	$7,919	**2048**	$10,502
2033	$8,060	**2049**	$10,689
2034	$8,203	**2050**	$10,879
2035	$8,349	**2051**	$11,073
2036	$8,498	**2052**	$11,270
2037	$8,649	**2053**	$11,471
2038	$8,803	**2054**	$11,675
2039	$8,960	**2055**	$11,882

Appendix F – Natural Gas DSM $/Dekatherm and ALR Methodology

The Company received Commission approval in the 2022 Strategic Issues proceeding to utilize the Acknowledgement of Lost Revenues ("ALR") fixed cost gas service recovery mechanism for the attribution of energy efficiency savings.[107] In accordance with this directive, the Company proposes the following dollar per dekatherm value applicable to natural gas DSM programs provided to its sales customers:

Dollar per Dekatherm = $3.08

The methodology for calculating the dollar per dekatherm values set forth above is as follows: Non-Service & Facility base rate revenue for sales customers is divided by the non-Service and Facility volumes for sales customers to compute an average dekatherm rate for all customer classes.

The dollar per dekatherm value will be used to calculate the lost revenues sought to be recovered through the Gas-Demand Side Management Cost Adjustment ("G-DSMCA") filed on April 1, and to be effective July 1 for each program year covered in this Plan. The dollar per dekatherms rate will be multiplied by the annual gas Energy Efficiency goal to calculate an annual Acknowledgement of Lost Revenue.

[107] Decision No. C23-0413 at 111, ¶ 268 (mailed June 22, 2023).

Appendix G – Electric Load Shape Documentation

The following section documents the load shapes applied to electric DSM & BE measures in this plan. These load shapes are scaled to the annual energy savings for each measure, and then applied to the hourly marginal energy price estimates to determine the avoided marginal energy benefit for each measure. See the Direct Testimony of Jeremy A. Petersen for more details.

Load Shape	Description	Measures Applied To
CO-BUS-COMPAIR	Operation of compressed air in business sites	Various compressed air measures
CO-Bus-Cool with Economizer	Operation of cooling equipment with economizers in business sites	Various cooling measures in the Cooling Efficiency product with economizers
CO-BUS-COOL_OUT	Operation of cooling equipment in business sites	Various cooling measures in the Cooling Efficiency product without economizers
CO-Bus-Cooling Thermal Storage	Operation of thermal storage for cooling in business sites	Thermal Energy Storage* in Cooling Efficiency program and Recommissioning Load Shifting* measure.
CO-BUS-CUSTOM_	Operation of measures in past custom projects	Various miscellaneous measures across a few products (aerators/sprayers in business products, TV timer turning off peripherals) and custom measures* within the Custom product.
CO-Bus-Data Center Blend	Blend of the load shapes of the technologies included in past data center projects	Data center prescriptive measures
CO-Bus-ECM	Hourly savings of electrically-commutated motor (ECM) fans in business installations	Various EMS measures in Heating Efficiency product
CO-BUS-EDA_CHNG	Change in load from Energy Design Assistance projects	Projects in Energy Design Assistance and Energy Efficiency Buildings products
CO-Bus-EIS Load Shift	Houlry savings and load increases from load shifting measures from Energy Information Systems	Energy Management System load shifting measures.*
CO-BUS-EMS_OFFP	Energy Management System loads shifted to off-peak	Various measures in the Energy Management System product
CO-BUS-FLAT	Flat load shape	Various measures in the Business program that run flat throughout the year
CO-BUS-GROW_LIGHTING	Operation of grow lighting technologies for indoor agriculture	Indoor Agriculture Lighting Measures
CO-BUS-Light	Operation of general lighting technologies in business sites	Computer Efficiency Virtualization
CO-BUS-Light All	Blend of lighting loadshape across all building types	Custom Lighting* and bulbs purchased through Residential Home Lighting program installed at businesses
CO-BUS-Light Flat	Flat load shape	Exit signs, stairwell fixtures and parking garage lighting
CO-BUS-Light High Bay†	Blend of lighting loadshape across all building types weighted on installation of high bay lamps and fixtures	High Bay lamps and fixtures
CO-BUS-Light Refrigerated†	Blend of lighting loadshape across all building types weighted on installation of lighting in refrigeration applications	LED Refrigerator and Freezer Cases
CO-BUS-Light Screw In†	Blend of lighting loadshape across all building types weighted on installation of screw-in bulbs	LED Midstream Interior Lamps
CO-BUS-Light Troffer†	Blend of lighting loadshape across all building types weighted on installation of lighting troffers	LED troffer fixtures and lamps
CO-BUS-Light Tube†	Blend of lighting loadshape across all building types weighted on installation of lighting tubes	LED tube lamps
Load Shape	**Description**	**Measures Applied To**
CO-BUS-LIGHTING	Operation of general lighting technologies in business sites	Misc. lighting measures in a couple products and measures that operate in lighted area and will be operated at the same time as the lighting (aerators, dishwashers)
CO-BUS-Light-Network-Controls	Hourly savings of lighting under network control at a business site	Networked lighting controls
CO-BUS-Light-Sensor	Hourly savings of lighting under sensor control at a business site	Standalone Controls

CO-BUS-MTRS_OUT	Operation of motors in business sites	Variable frequency drives (VFDs) and upgraded motors in the Motors product
CO-BUS-PEAK_CNT	Hourly savings and load increases from a peak control product	Measures in demand response programs including Saver's Switch, Smart Thermostats and Battery Demand Response
CO-BUS-RECM_OUT	Hourly savings of recommissioning projects at a business site	Impact of recommissioning studies and area lighting measures that have the same usage pattern as recommissioning hourly savings
CO-BUS-SBL High Bay†	Blend of lighting loadshape across all building types weighted on installation of high bay lamps and fixtures through Small Business Lighting program	High Bay lamps and fixtures
CO-BUS-SBL Refrigerated†	Blend of lighting loadshape across all building types weighted on installation of lighting in refrigeration applications through Small Business Lighting program	LED Refrigerator and Freezer Cases
CO-BUS-SBL Screw In†	Blend of lighting loadshape across all building types weighted on installation of screw-in bulbs through Small Business Lighting program	LED Midstream Interior Lamps
CO-BUS-SBL Troffer†	Blend of lighting loadshape across all building types weighted on installation of lighting troffers through Small Business Lighting program	LED troffer fixtures and lamps
CO-BUS-SBL Tube†	Blend of lighting loadshape across all building types weighted on installation of lighting tubes through Small Business Lighting program	LED tube lamps
CO-BUS-FLHP_Controls	Floating head pressure controls for a commercial refrigeration system	Floating Head Pressure Controls
CO-BUS-BE-DFRTU	Operation of cooling and electric heating at business sites	Business customers with electric cooling and heating using a dual-fuel rooftop heat pump
CO-BUS-BE-HPWH	Operation of heat pump water heaters at business sites	Heat pump water heating equipment in various products
CO-Res_Cooling_DX	Operation of cooling at residential sites	Envelope measures for residential customers with electric cooling and electric cooling equipment and installation measures
CO-Res_Cooling_DX_Heating_DX	Operation of cooling and electric heating at residential sites	Envelope measures for residential customers with electric cooling and heating using heat pump equipment
CO-Res_Cooling_DX_Heating_Elec	Operation of cooling and electric heating at residential sites	Envelope measures for residential customers with electric cooling and heating using electric baseboard heat
CO-Res_Heating_Elec	Operation of electric heating at residential sites	Envelope measures for residential customers with electric heating and without electric cooling
CO-Res_Lighting	Operation of lighting at residential sites	LED bulbs at residential sites
CO-RES-EVAPBASE	Hourly savings of evaporative cooling replacing air conditioning at a residential site	Evaporative cooling measures replacing air-conditioning
CO-RES-FLAT	Flat load shape	Various measures that operate throughout the year
CO-RES-MFLIT	Operation of lighting at multi-family residential sites	Multi-family buildings direct install LED bulbs
CO-RES-RECM_OUT	Operation of nightlights at residential sites	LED nightlights
Load Shape	**Description**	**Measures Applied To**
CO-RES-SFLIT	Operation of lighting at single-family residential sites	Various LED bulb measures and clothes washer measures
CO-RES-SFMFLOW	Operation of aerators and showerheads at residential sites	Showerheads and aerators in the Multi-family buildings
CO-RES-SFRF1	Operation of refrigerators at residential sites	Refrigerators and electrically-commutated motor (ECM) fan measures in various products
CO-RES-SFWHT	Operation of electric water heaters at residential sites	Showerhead and aerator measures as well as electric water heating equipment in various products
CO-RES-PEAK_CNT	Hourly savings and load increases from a peak control product	Measures in demand response programs including Residential Demand Response
CO-RES-HMEFF	Operation of cooling and heating at residential site	Envelope measures for Energy Star New Home customers
CO-SMART_CHARGE_1	Electric Vehicle load shifting from Level 1 charger	Electric Vehicle Optimization load shifting measures

CO-SMART_CHARGE_2	Electric Vehicle load shifting from Level 2 charger	Electric Vehicle Optimization load shifting measures
CO-SMART_CHARGE_TOU	Load Shifting from electric vehicle charging and time of use rate	Electric Vehicle Optimization load shifting measures
CO-RES_HPWH_DR_LOAD_SHIFT	Operation of gird-enabled residential heat pump water heaters	Heat Pump Water Heaters in Residential Demand Response Load Shifting measure
CO-RES-BE-ASHP	Operation of cooling and electric heating at residential sites	Residential customers with electric cooling and heating using an air-source heat pump
CO-RES-BE-ccASHP	Operation of cooling and electric heating at residential sites	Residential customers with electric cooling and heating using a cold climate air-source heat pump
CO-RES-BE-GSHP	Operation of cooling and electric heating at residential sites	Residential customers with electric cooling and heating using a ground source heat pump
CO-RES-BE-HPWH	Operation of heat pump water heaters at residential sites	Heat pump water heating equipment in various products

*Projects including measures using this shape will be run through a custom analysis during which hourly load shapes will be determined.

†Load shapes in Plan based on historical achievement among different building types. Actual load shape used in status reports will be based on actual achievement among building types in the report year.

Appendix H – Technical Reference Manual

The Technical Reference Manual ("TRM") section contains the deemed savings technical assumptions and forecasts for the direct savings products in the DSM & BE portfolio. The deemed savings technical assumptions describe the calculation methodology and assumptions that will be used to determine actual savings, costs, and other values for each product rebate. These calculation methodologies and assumptions are then applied to the population and the number of participants anticipated for each product, to produce an electric and gas forecast of impacts. The forecast is utilized to conduct the cost-benefit analysis of this Plan.

The following algorithms are consistent in their applicability across all deemed savings technical assumptions and therefore are shown here and not repeated within each product's individual deemed savings sheet:

Electrical Energy Savings (Gross Generator kWh) = Customer kWh / (1-TDLF)
Electrical Demand Savings (Gross Generator kW) = Customer kW x CF / (1-TDLF)
Electrical Energy Savings (Net Generator kWh) = Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW) = Gross Generator kW x NTG
Net Dth = Gross Dth x NTG

Where, Net-to-Gross ("NTG") is the ratio equal to the net impact divided by the gross impact. This factor is applied to gross savings to determine each product's net impact.

The following constants are consistent in their applicability across all deemed savings technical assumptions and therefore are shown here and not repeated within each product's individual deemed savings sheet:

Business TDLF = 5.33%
Residential TDLF = 6.38%

Where,

- Transmission/Distribution Loss Factor ("TDLF") is the percentage loss of electricity as it flows from the power plant to the customer.
- Business TDLF is applicable to measures installed at premises on a business rate schedule.
- Residential TDLF is applicable to measures installed at premises on a residential rate schedule.

1.1 Dishwasher

Algorithms

$$Customer\ kW = Savings\ kW$$

$$Customer\ kWh = Savings\ kW\ \times Hours$$

$$PCkW = Savings\ kW\ \times CF$$

$$Customer\ Dth = Savings\ Dth$$

$$Customer\ Dth/hr = Savings\ Dth/Hours$$

Variables

Savings kW	See Table 1.1.1	Kilowatt savings per unit installed
Savings Dth	See Table 1.1.1	Decatherm savings per unit installed
CF	See Table 1.1.2	Coincidence Factor
Hours	6570	Annual Hours of Operation
Incremental costs	See Table 1.1.2	Difference in cost between the standard equipment and the more efficient equipment
Measure Life	See Table 1.1.2	
O&M savings	See Table 1.1.2	

Customer Inputs	**M&V Verified**
Primary water heatin$_{g\ fuel}$	Yes
Secondary water heating (booster water heating) fuel	Yes
Model Name	Yes
Model Number	Yes
Quantity	Yes
Size	Yes

Table 1.1.1 Pre and Post Retrofit Dishwasher (Gas Ref 8)

Post-retrofit Technology	Type	Dishwasher Dth/yr Savings	Savings kW
Dishwashers - Primary Fuel: Elec; Secondary Fuel: Elec	Door Type		1.806
	Under Counter		0.483
Dishwashers - Primary Fuel: Elec; Secondary Fuel: None	Door Type		2.459
	Under Counter		0.387
Dishwashers - Primary Fuel: Elec; Secondary Fuel: Gas	Door Type	16.78	1.195
	Under Counter	2.58	0.389
Dishwashers - Primary Fuel: Gas; Secondary Fuel: Elec	Door Type	29.36	0.737
	Under Counter	4.52	0.318
Dishwashers - Primary Fuel: Gas; Secondary Fuel: Gas	Door Type	46.14	
	Under Counter	7.11	
Dishwashers - Primary Fuel: Gas; Secondary Fuel: None	Door Type	67.53	
	Under Counter	10.62	

Table 1.1.2 Deemed Equipment Information (Gas Ref 3)

	Incremental Cost	Measure Life (yrs)	Non-Energy O&M Savings	Coincidence Factor (Ref 6 & 7)
Dishwashers - Primary Fuel: Elec; Secondary Fuel: Elec				
Commercial Dishwashers (Door - Electric w/ Electric Booster)	$770	15	$340.53	85.58%
Commercial Dishwashers (Under Counter - Electric w/ Electric Booster)	$120	10	$52.45	85.58%
Dishwashers - Primary Fuel: Elec; Secondary Fuel: None				
Commercial Dishwashers (Door - Electric No Booster)	$0	15	$783.22	85.58%
Commercial Dishwashers (Under Counter - Electric - No Booster)	$50	10	$123.14	85.58%
Dishwashers - Primary Fuel: Elec; Secondary Fuel: Gas				
Commercial Dishwashers (Door - Electric w/ Gas Booster)	$770	15	$340.53	85.58%
Commercial Dishwashers (Under Counter - Electric w/ Gas Booster)	$120	10	$52.45	85.58%
Dishwashers - Primary Fuel: Gas; Secondary Fuel: Elec				
Commercial Dishwashers (Door - Gas w/ Electric Booster)	$770	15	$340.53	85.58%
Commercial Dishwashers (Under Counter - Gas w/ Electric Booster)	$120	10	$52.45	85.58%
Dishwashers - Primary Fuel: Gas; Secondary Fuel: Gas				
Commercial Dishwashers (Door - Gas w/ Gas Booster)	$770	15	$340.53	
Commercial Dishwashers (Under Counter - Gas w/ Gas Booster)	$120	10	$52.45	
Dishwashers - Primary Fuel: Gas; Secondary Fuel: None				
Commercial Dishwashers (Door - Gas No Booster)	$0	15	$783.22	
Commercial Dishwashers (Under Counter - Gas No Booster)	$50	10	$123.14	

References:

3. ENERGY STAR https://www.energystar.gov/sites/default/files/asset/document/commercial_kitchen_equipment_calculator.xlsx
6. Custom DCV Projects, 2010-2011
7. MN Lighting Efficiency Tech Assumption , Tab "Forecast Market Segment"

Changes from Recent Filing:

1.2 Food Service

Algorithms

$$Customer\ kW = Savings\ kW$$

$$Customer\ kWh = Savings\ kW\ \times Hours$$

$$PCkW = Savings\ kW\ \times CF$$

$$Customer\ Dth = (BTU\ Savings\ Factor \times Input\ Capacity)/1000000$$

$$Customer\ Dth/hr = \frac{BTU\ Savings\ Factor \times Input\ Capacity}{1000000}/Hours$$

$$Hours = \frac{Operating\ Hours}{day}\ x\ \frac{Days}{year}$$

Variables

BTU Savings Factor	See Table 1.2.1	Annual BTU savings per Btuh input of cooking appliance
Operating Hours/day	See Table 1.2.2	Operating Hours per day of operation
Days/year		
Incremental costs	See Table 1.2.2	Difference in cost between the standard equipment and the more efficient equipment
Measure Life	See Table 1.2.2	

Customer Inputs	**M&V Verified**
Model Name	Yes
Model Number	Yes
Quantity	Yes
Size	Yes
Input Capacity BTUH	Yes

Table 1.2.1 Pre and Post Retrofit Equipment,[1,3,4]

Post-retrofit technology	**Pre-retrofit technology**	**$BTU_{Cooking_Appliance}$ Savings Factor (Btu per Btuh_In per year)**
Convection Oven	Deck Oven	1,892
Conveyor Oven	Pizza Deck oven	1,542
Combi-Oven	Steamer	1,183
Fryer	Standard Fryer	328
Pasta Cooker	Range	1,689
Charbroiler	Standard Charbroiler	1,078
Rotating Rack Oven	Deck Oven	948

Table 1.2.2 Deemed Equipment Information [3,4]

	Measure Life (years) 2	**Incremental Cost Per Name Plate Input Btuh ($/Btuh_In) [4,5]**	**Operating Hours/Day[2]**
Convection Oven	12	$0.0375	8
Conveyor Oven	12	$0.0590	10
Combi-Oven	12	$0.0356	8
Fryer	12	$0.0156	14
Pasta Cooker	12	$0.0295	12
Charbroiler	12	$0.0310	9
Rotating Rack Oven	12	$0.0165	8

Table 1.2.3 Operation Days by Building Type [2]

	Days per Year
Large Office	250
Fast Food Restaurant	365
Sit-down Restaurant	365
Grocery	365
Elementary School	200
Jr. High/HighSchool/College	200
Health	365
Hotel	365
Other Commercial	250

References:

1. Savings per installed BTU derived from the Arkansas Food Service Deemed Savings table
2. Minnesota TRM 3.0
3. ENERGY STAR
4. MN DER, 2012 Deemed Savings
5. Incremental costs confirmed using "Commercial Cooking Appliance Technology Assessment, FSTC Report #5011.02.2, Food Service Technology Center, 2002" and product manufacturer Web sites

Changes from Previous Filing:

Added conveyer ovens and fryers

1.3 Ozone Laundry

Algorithms

$$Customer\ Dth = \left(\frac{HW_e}{WH_{eff}}\right) \times W_{utiliz} \times W_{hotusage} \times \%HotWaterSavings/10$$

$$Customer\ Water\ Savings = W_{usage} \times W_{utiliz} \times \%Water\ Savings$$

$$O\&M\ Savings = (Water\ Savings \times (Water\ Rate + Sewer\ Rate) \div 1000) - (O\&M\ Cost \times Lb\ Capacity)$$

$$CustomerDth/hr = (Customer\ Dth)/Hours\ )$$

Variables

% Hot_Water_Savings	0.81	How much more efficient is an ozone injection machine as a rate of hot water reduction (Ref 2)
W_{usage} (gal/lb of laundry)	2.03	How efficiently a typical conventional washing machine uses hot and cold water per unit of clothes washed (Ref 2)
% Water_Savings	25%	How much more efficient an ozone injection washing machine is compared to a typical conventional washing machine as a rate of hot and cold water reduction (Ref 2)
$W_{hotusage}$ (gallons/lbs laundry)	1.19	Hot water used by a typical conventional washing machine (Ref 2)
HW_e(Therms/gal)	0.007193	Energy required to make 140F hot water from 51.9F ground water
Water Rate ($/1000 gal)	3.64	Ref 3
Sewer Rate ($/1000 gal)	4.69	Ref 4
Water Heater Thermal Efficiency (WH_{Eff})	See Table 1.3.1	
O&M Cost ($ per lb capacity of washing machine)	$0.79	Ref 3
$Therm_{baseline}$ / Lb capacity of washing machine	37.9	Ref 3
Hours	800	Ref 2
Incremental costs	See Table 1.3.2	Difference in cost between the standard equipment and the more efficient equipment.
Measure Life	See Table 1.3.2	

Customer Inputs	**M&V Verified**	
W_{utiliz} (lbs laundry/yr)	Yes	Annual pounds of clothes washed per year.
Water Heater Type	Yes	Standard Gas Storage WH, Condensing Gas WH, Tankless Gas WH or Plant Gas Boiler with Storage Tank
Lb capacity of washing machine	Yes	Lb capacity of washing machine served by ozone generator

Table 1.3.1 Water Heater Efficiencies for Ozone Laundry

Water Heater Type	Thermal Eff (%)
Gas Non-Condensing Storage	80%
Gas Condensiing Storage	90%
Gas Tankless	96%
Gas Storage with Side-Arm Boiler	80%

Table 1.3.2 Measure Life and Incremental Costs (Ref 1, 2)

	Measure Life (Years)	Incremental Cost
Ozone Washing Machine <=100lbs	10	$8,750.00
Ozone Washing Machine >100lbs<500lbs	10	$15,500.00
Ozone Washing Machine =>500lbs	10	$27,500.00

References:

1. Custom rebates and conversations with Distributors (Tim Stoklosa, Clean Energy Designs in Lakewood CO)
2. Illinois 2017 TRM ; http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_6/Final/IL-TRM_Effective_010118_v6.0_Vol_2_C_and_I_020817_Final.pdf
3. Denver Water rate: https://www.denverwater.org/business/billing-and-rates/2019-rates
4. Denver Sewer rate: https://www.denvergov.org/content/denvergov/en/wastewater-management/billing-and-rates/wastewater-rates.html

Changes from Recent Filing:

Changed water heater efficiencies to allign with Boiler measures

1.4 Steam Cookers

Algorithms

$$Customer\ Dth = Quantity \times (Therm\ Savings)/10$$

$$O\&M\ Savings = Quantity \times Water\ Savings \times Water\ Rate$$

$$Customer\ Dth/hr = Quantity \times \frac{Therm\ Savings}{10}/Hours$$

$$Hours = Operating\ Hours/day \times Days/year$$

Variables

Therm Savings	See Table 1.4.1	Therms saved by ENERGY STAR Steam Cooker (Ref 2)
Water Savings	See Table 1.4.1	Gallons of water saved by ENERGY STAR Steam Cooker (Ref 2)
Water Rate	$8.33	Water and Sewer rate per 1000 Gallons (Ref 5 and 6)
Operating Hours/day	12	(Ref 6)
Days/year	See Table 1.4.3	Operating hours per year
Incremental costs	See Table 1.4.2	Difference in cost between the standard equipment and the more efficient equipment (Ref 2)
Measure Life	See Table 1.4.2	Ref 3

Customer Inputs	**M&V Verified**
Facility Description	Yes
Number of Pans	Yes
Quantity	Yes

Table 1.4.1 Steam Cooker Savings Ref 2

	Number of Pans	Therm Savings	Gallons of Water Saved
Fast Food 6am-Midnight	3	1,043	72,000
	4	1,201	96,000
	5	1,362	120,000
	6+	1,520	144,000
Fast Food 24 Hr	3	1,299	90,000
	4	1,498	120,000
	5	1,699	150,000
	6+	1,898	180,000
Casual Dining 3pm-11pm	3	348	23,500
	4	398	31,200
	5	449	39,000
	6+	499	46,800
Casual Dining 11am-11pm	3	570	39,000
	4	655	52,000
	5	724	65,000
	6+	827	78,000
Casual Dining 24 Hr	3	1,299	90,000
	4	1,498	120,000
	5	1,699	150,000
	6+	1,898	180,000
Institutional	3	537	36,500
	4	616	48,667
	5	696	60,833
	6+	776	73,000
School	3	137	9,000
	4	156	12,000
	5	175	15,000
	6+	194	18,000

Table 1.4.2 Deemed Equipment Information (Ref 4 Gas)

	Measure Life (Years)	Incremental Cost
Steam Cooker	12	$2,270.00

Table 1.4.3 Operation Days by Building Type [6]

	Days per Year
Large Office	250
Fast Food Restaurant	365
Sit-down Restaurant	365
Grocery	365
Elementary School	200
Jr. High/HighSchool/College	200
Health	365
Hotel	365
Other Commercial	250

References:

1. Department of Energy. ENERGY STAR Commercial Steam Cooker Key Product Criteria, August 2003
2. Department of Energy. Savings Calculator for ENERGY STAR Certified Commercial Kitchen Equipment, October 2016
3. California Public Utilities Commission, Database for Energy Efficiency Resources (DEER). Spreadsheet: "DEER2014 EUL table update" February 2014
4. CleaResult Work Paper - Energy Star Steam Cooker
5. Denver Water rate: https://www.denverwater.org/business/billing-and-rates/2019-rates
6. MN TRM Version 4, Commercial Food Service - Energy Star Gas Steamer

Changes from Recent Filing:

1.5 Advanced Power Strips

Algorithms

Tier 1 Advanced Power Strip

$$Customer\ kW = \frac{Tier\ 1\ Customer\ kWh_{\ 7\ Plug\ Unit}}{Hours\ of\ Use}$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

Tier 2 Advanced Power Strip

$$Customer\ kWh = Tier\ 2\ Baseline\ kWh\ 7_{\ Plug\ Unit,\ Infrared\ and\ Occupancy\ Sensors} \times ERP$$

$$Customer\ kW = \frac{Customer\ kWh}{Hours\ of\ Use}$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

Variables

Tier 1 Customer kWh $_{7\ Plug\ Unit}$	103 kWh	Annual average consumption of baseline power strip searving residential audio-visial home entertainment systems (References 1, 2)
Tier 1 Baseline kWh $_{7\ Plug\ Unit,\ Infrared\ and\ Occupancy\ Sensors}$	466 kWh	Average of baseline energy (References 1, 3)
ERP	25%	Energy Reduction Percentage (ERP) with Product Type Infrared and Occupancy Sensor (References 1, 4, 5)
Hours of Use	Table 1.5.1	Annual Hours of Use (References 1, 6, 7)
Coincidence Factor	80%	Peak Coincidence Factor (References 1, 8)
Lifetime	7	Measure Lifetime (Reference 1)
Incremental Costs	Table 1.5.1	Difference in cost between the efficient and the baseline technologies (Reference 9)

Provided by Product Vendor	**M&V Verified**
Quantity and Type of Advanced Power Strips Installed	Yes

Table 1.5.1 Incremental Costs and Lifetime

Program	**Advanced Power Strip Tier and Type**	**Hours of Use**	**Incremental Costs**
School Education Kits - CO	Tier 1 - 7 Plug Unit	7129	$20.50
	Tier 2 - 7 Plug Unit, Infrared and Occupancy Sensors	4380	$70.00
Home Energy Squad - CO	Tier 1 - 7 Plug Unit	7129	$10.00
	Tier 2 - 7 Plug Unit, Infrared and Occupancy Sensors	4380	$70.00
Energy Saving Kits - CO	Tier 1 - 7 Plug Unit	7129	$13.99
	Tier 2 - 7 Plug Unit, Infrared and Occupancy Sensors	4380	$70.00
Home Lighting - CO	Tier 1 - 7 Plug Unit	7129	$13.99
	Tier 2 - 7 Plug Unit, Infrared and Occupancy Sensors	4380	$70.00

Costs are provided by the vendor and are re-evaluated throughout the year to account for the rapidly evolving market.

References

1. Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 10.0, Volume 3. September 24, 2021
2. NYSERDA Measure Charaterization for Advanced Power Strips. Study based on review of: Smart Strip Electrical Savings and Usability, Power Smart Engineering, October 27 2008. Final field Research Report, Ecos Consulting, October 31,2006.
3. Average of baseline energy in Regional Technical Form survey of Tier 2 APS pre-post methodology studies
4. AESC-Valmiki, MM., Corradini, Antonio, PE., Feb 2016. Energy Savings of Tier 2 Advanced Power Strips in Residential AV systems. (Simulated 27% pre/post 25%)
5. NMR Group Inc., RLPNC 17-3: Advanced Power Strip Metering Study, Revised March 18, 2019, submitted to Massachusetts Program Administratoes and EEAC. (Pre/post with regression 37%, Pre/post only 11%)
6. NYSERDA Measure Characterization for Tier 1 Advanced Power Strips
7. This is an estimate based on assumption that approximately half of savings for Tier 2 Advanced Power Strips are during active hours (supported by AESC study) (assumed to be 5.3 hours/day, 1936 per year (NYSERDA 2011 "Advanced Power Strip Reserarch Report")) and half during standby hours (8760 - 1936 = 6824 hours). The Weighted average is 4380.
8. Efficiency Vermont 2016 TRM coincident factor for advanced power strip measure - in the absense of empirical data, this was based on assumptions of the typical runpattern for televisions and computers in homes.
9. Program Vendors

Notes:

1. All Advanced Power Strips in the School Education Kits and Home Energy Squad Programs are 7 Plug Advanced Power Strips unless otherwise noted.
2. All Tier 2 Advanced Power Strips in the School Education Kits and Home Energy Squad Programs have both Infrared and Occupancy Sensors unless otherwise noted.

Changes from Recent Filing:

Reflective of the methodology outlined in the Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 10.0

1.6 ENERGY STAR Clothes Dryer

Algorithms

$$Customer\ kWh = Load\ \times \left(\frac{1}{CEF_{Base}} - \frac{1}{CEF_{Eff}}\right) \times N_{Cycles}\ \times (\%Electric\ /\ ADJ_{CEF})$$

$$Customer\ Coincident\ kW = \frac{Customer\ kWh}{Hours}\ \times Coincidence\ Factor$$

$$Customer\ Dth = Load\ \times \left(\frac{1}{CEF_{Base}} - \frac{1}{CEF_{Eff}}\right) \times NCycles\ \times (\%Gas/ADJCEF)\ \times 0.003412$$

$$Customer\ Dth/hr = Customer\ Dth/8760$$

Beneficial Electrification

$$Customer\ Dth = Load\ \times \left(\frac{1}{CEF_{Base}}\right) \times NCycles\ \times (\%Gas/ADJCEF)\ \times 0.003412$$

$$Customer\ kWh\ Penalty = Load\ \times ((\frac{1}{CEF_{Base}} \times NCycles\ \times (\%BE\ ElectricBase\ /\ ADJ_{CEF})) - (\frac{1}{CEF_{Eff}}\ \times NCycles\ \times (\%BE\ ElectricEff\ /\ ADJ_{CEF}))$$

Variables

Load	Customer Input	Average of total weight (lbs) of clothes per drying cycle (References 1, 2)
CEF_{Base}	Table 1.6.1	Combined energy factor (lbs/kwh) of baseline unit (References 1,3)
CEF_{Eff}	Table 1.6.1	Combined energy factor (lbs/kwh) of efficient unit (References 1,4)
N_{Cycles}	283	Number of dryer cycles per year (References 1,5)
%Electric	Table 1.6.1	Percent of energy savings from electricity (References 1, 6)
%Gas	Table 1.6.1	Percent of energy savings from gas (References 1, 7)
$\%BE\ Electric_{Base}$	Table 1.6.2	Percent of electric energy usage for gas baseline equipment for Beneficial Electrification
$\%BE\ Electric_{Eff}$	Table 1.6.2	Percent of electric energy usage for efficient hybrid heat pump for Beneficial Electrification
ADJ_{CEF}	0.7	CEF adjustment factor, 0.7 for standard dryers (Reference 11)
Coincidence Factor	3.8%	Coincidence Factor (References 1, 8)
Hours	234	Annual Hours of Use (References 1, 9)
Lifetime	16	Measure Lifetime (References 1, 10)
Incremental Cost	$75.00	Difference in cost between the standard equipment and the more efficient equipment (Reference 11).

Provided by Product Vendor	**M&V Verified**	
Load	Yes	8.45 lbs if unknown
Quantity of ENERGY STAR Clothes Dryers Installed	Yes	
ENERGY STAR Dryer Product Class Installed	Yes	"Electric, Vented or Ventless" if unknown

Table 1.6.1 Loads and CEF Values Across Dryer Types

Dryer Product Class	**CEF_{Base}**	**CEF_{Eff}**	**%Electric**	**%Gas**
Electric, Vented or Ventless	3.11	3.93	100%	0%
Gas (Dual fuel), Vented	2.84	3.48	16%	84%
Hybrid Heat Pump - Electric Baseline	3.11	5.20	100%	0%

Table 1.6.2 Loads and CEF Values for Beneficial Electrification

Dryer Product Class	**CEF_{Base}**	**CEF_{Eff}**	**$\%BE\ Electric_{Base}$**	**$\%BE\ Electric_{Eff}$**
Hybrid Heat Pump - Beneficial Electrification	2.84	5.20	16%	100%

References:

1. Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 10.0, Volume 3. September 24, 2021
2. Based on ENERGY STAR Test Procedures
3. Combined energy factor (CEF) (lbs/kWh) is based on existing federal standards energy factor and adjusted to CEF as performed in the ENERGY STAR analysis ENERGY STAR Draft 2 Version 1.0 Clothes Dryers Data and Analysis
4. ENERGY STAR Clothes Dryers Key Product Criteria
5. Appendix D to Subpart B of Part 430 - Uuniform Test Method for measuring the Energy Consumption of Dryers
6.%Electric accounts for the fact that some of the savings on gas dryers comes from electricity (motors, controls, etc.). 16% was determined using a ratio of the electric to total savings from gas dryers given by ENERGY STAR Draft 2 Version 1.0 Clothes Dryers Data and Analysis.
7.%Gas accounts for the fact that some of the savings on gas dryers comes from electricity (motors, controls, etc.). 84% was determined using a ratio of the gas to total savings from gas dryers given by ENERGY STAR Draft 2 Version 1.0 Clothes Dryers Data and Analysis.
8. Based on coincidence factor of 3.8% for Clothes Washers
9. ENERGY STAR qualified dryers have a maximum test cycle time of 80 minutes. Assume one hour per dryer cycle.
10. Based on DOE Rulemaking Technical Support Document, LCC Chapter, 2011, "ComEd Effective Useful Life Research Report", May 2018
11. State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs Version 4.0 January 20, 2020
12. Program Vendors

Notes:

1. Clothes Dryers in the Multifamily Buildings, Energy Star New Homes and Whole Home Efficiency Programs are Standard Sized (≥4.4ft^3) unless otherwise noted.

Changes from Recent Filing:

Updated energy savings calculations to match MN TRM 4.0, Added deemed savings values for hybrid heat pump dryers, added gas Dth/Hr savings

1.7 ENERGY STAR Clothes Washer

Algorithms

$$Customer\ kWh = \left(\left(\frac{Cap \times N}{IMEF_{Base}}\right) \times \left(CW_{Base} + \frac{DHW_{Base} \times \%\ ElectricDHW}{R_{Eff}} + (DryBase\ x\ \%ElecDry)\ \right)\right) - \left(\left(\frac{Cap \times N}{IMEF_{EE}}\right) \times \left(CW_{EE} + \frac{DHW_{EE} \times \%\ ElectricDHW}{R_{Eff}} + (DryEE\ x\ \%ElecDry)\ \right)\right)$$

$$Customer\ Coincident\ kW = \frac{Customer\ kWh}{Hours} \times Coincidence\ Factor$$

$$Customer\ Dth = \left(\left(\frac{Cap \times N}{IMEF_{Base}}\right) \times \left(\frac{(DHW_{Base\ \times (1\ -\ \%}ElectricDHW)}{R_{Eff}} + DryBase\ x\ (1\ -\ \%ElecDry)\ \right)\right) - \left(\left(\frac{Cap \times N}{IMEF_{EE}}\right) \times \left(\frac{(DHW_{EE\ \times (1\ -\ \%}ElectricDHW)}{R_{Eff}} + DryEE\ x\ (1\ -\ \%ElecDry)\right)\right) \times 0.003412$$

$$Customer\ Dth/hr = Customer\ Dth/8760$$

$$Non\text{-}Energy\ O\&M = Cap \times N \times (IWFBase - IWFEE) \times Water\text{-}Sewer\text{-}Rate$$

Variables

Cap	3.45	Clothes washer drum capacity (ft^3). If unknown, assume 3.45ft^3 (Reference 1)
$IMEF_{Base}$	Table 1.7.1	Integrated Modified Energy Factor for Federal Minimum equipment (ft^3/kWh/cycle) (Reference 1)
$IMEF_{EE}$	Table 1.7.1	Difference in cost between the standard equipment and the more efficient equipment
N	258	Annual number of loads (Reference 1)
CW_{Base}	7%	Percentage of total energy consumption for clothes washer operation for baseline equipment (Reference 1)
CW_{EE}	6%	Percentage of total energy consumption for clothes washer operation for EnergyStar equipment (Reference 1)
DHW_{Base}	33%	Percentage of total energy consumption for water heating for baseline equipment (Reference 1)
DHW_{EE}	31%	Percentage of total energy consumption for water heating for EnergyStar equipment (Reference 1)
$\%Electric_{DHW}$	Table 1.7.2	Percent of domestic hot water savings assumed to be electric (Reference 1)
DryBase	59%	Percent of total energy consumption for dryer operation in baseline case.
DryEE	62%	Percent of total energy consumption for dryer operation in efficient case.
%ElecDry	Table 1.7.2	Percent of dryer operation assumed to be electric.
IWF_{Base}	Table 1.7.1	Baseline Integrated Water Factor (Gal / cycle / cu.ft.) for a standard clothes washer with a capacity of 1.6 cu.ft. or greater
IWF_{EE}	Table 1.7.1	EnergyStar Integrated Water Factor (Gal / cycle / cu.ft.) for a clothes washer with a capacity of 1.6 cu.ft. or greater
Water-Sewer-Rate	$0.008797	Water rate + Sewer rate per saved gallon of water.
Conversion Factor	0.0034120	Convert kWh to Dtherms (factor is Dth/kWh)
R_{Eff}	Table 1.7.2	Recovery efficiency (Reference 1)
Coincidence Factor	3.8%	Coincidence Factor (Reference 1)
Hours	258	Annual Hours of Use (Reference1)
Lifetime	11	Measure Lifetime (Reference 1)
Incremental Cost	Table 1.7.1	Difference in cost between the standard equipment and the more efficient equipment (References 1, 18)

Provided by Product Vendor or Customer	M&V Verified	
Quantity of ENERGY STAR Clothes Washers Installed	Yes	
ENERGY STAR Clothes Washer Water Heater Fuel Type	Yes	Provide the Water Heater fuel type for the clothes washer's hot water: electric or gas
Clothes Dryer Fuel Type	Yes	Provide the Clothes Dryer's fuel type: electric or dual fuel

Table 1.7.1 Clothes Washer Efficiency, Operational Information and Incremental Costs

Unit Type	$IMEF_{Base}$	$IMEF_{EE}$	IWF_{Base}	IWF_{EE}	Incremental Cost
Top Loading	1.84	2.76	6.5	4.3	$50.00
Front Loading	1.57	2.06	4.7	3.7	$190.00

Costs are provided by the vendor and are re-evaluated throughout the year to account for the rapidly evolving market.

Table 1.7.2 Washer Fuel Type by Factor

Fuel Type	$\%Electric_{DHW}$	R_{Eff}	%ElecDry
Electric	100%	98%	100%
Dual Fuel	0%	78%	0%

References:

1. State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs Version 4.0 January 20, 2020
2. 2008 Database for Energy Efficient Resources, Version 2008.2.05, EUL/RUL Values, October 10, 2008.
3. Weighted average of 258 clothes washer cycles per year (based on 2015 Residential Energy Consumption Survey (RECS) national sample survey of housing appliances section, West North
4. 10 CFR Parts 429 and 430 [Docket Number EERE-2008—BT—STD— 0019] RIN 1904—AB90 Energy Conservation Program: Energy Conservation Standards for Residential Clothes Washers. http://www.regulations.gov/MdocumentDetail;D=EERE-2008-BT-STD-0019-0041.
5. The percentage of total energy consumption that is used for the machine, heating the hot water or by the dryer is different depending on the efficiency of the unit. Values are based on a sales
6. The percentage of total (gas and electric fuel types) water heating units that are electric calculated from 2015 Residential Energy Consumption Survey (RECS) data.
7. The percentage of total (gas and electric fuel types) dryer units that are electric calculated from 2015 Residential Energy Consumption Survey (RECS) data. https://www.eia.gov/consumption/residential/data/2015/hc/php/hc3.7.php
8. To account for the different efficiency of electric and Natural Gas hot water heaters (gas water heater): recovery efficiencies ranging from 0.74 to 0.85 (0.78 used), and electric water heater
9. Calculated from Itron eShapes, 8,760 hourly data by end-use for Missouri, as provided by Ameren. Reference is from Illinois Technical Reference Manual June 1, 2012. Page 303.
10.Clothes Washer Program Requirements Version 7.0. https://www.energystar.govicertified-products/sites/products/uploads/files/ENERGY%2OSTAR%20Final%20Version%207 0%20Clothes
11. Clothes Washer Program Requirements Version 8.0.
12.ENERGY STAR Calculator. https://www.energystar.gov/sites/default/files/asset/document/appliance calculator.xlsx
13. Based on the average clothes washer volume of all units that pass the new Federal Standard on the California Energy Commission (CEC) database of Clothes Washer products accessed on
14. Department of Energy. Energy Efficiiency Program for certain commercial and industrial equipment
15. Department of Energy: Energy Savings Potential and RD&D Opportunities for Commercial Building Appliances Report. 2009.
16. 2015 Residential Energy Consumption Survey (RECS) Data
17. California Public Utilities District. Res Retro HIM Evaluation Report. Weighted by quantity of each efficiency level from MESP SPECTRUM. Reference it from WIFOE Techincal Reference
18. Program Vendors

Changes from Recent Filing:

Added gas Dth/Hr savings

1.8 ENERGY STAR Radon Fans

Algorithms

$$Customer\ kWh = (1 - \%EE\ Fans\ Installed) \times (kW_{Baseline} - kWENERGYSTAR) \times Hours\ of\ Use$$

$$Customer\ \ kW = \frac{Customer\ kWh}{Hours\ of\ Use}$$

$$Customer\ Coincident\ kW = \ Customer\ kW \times Coincidence\ Factor$$

Variables

$kW_{Baseline}$	0.054	Annual energy consumption of the baseline efficiency unit (Reference 2)
$kW_{EnergyStar}$	0.017	Annual energy consumption of the ENERGY STAR unit (Reference 2)
Coincidence Factor	100%	Peak Coincidence Factor (Reference 2)
Hours of Use	8760	Annual Hours of Use
% EE Fans Installed	15%	Assumed percentage of Energy Star Radon Fans being sized correctly and installed currently based on contractor feedback (Reference 2)
Lifetime	10	Measure Lifetime (Reference 2)
Incremental Cost	-$4.00	Incremental cost of RP140 as compared to RP145 (Reference 3)

Provided by Product Vendor	**M&V Verified**
Equipment Quantity	Yes

References:

1. http://wpb-radon.com/radon_fan_performance.html33:5032:50A33:50
2. Information from manufacturer and contractors (Radonaway)
3. https://www.radonaway.com/products/radon-fans/rp140-pro.php

Changes from Recent Filing:

No changes

1.9 Refrigerator Replacement

Algorithms

$$Customer\ kWh = (kWh_{Baseline} - kWh_{ENERGYSTAR})$$

$$Customer\ kW = \frac{Customer\ kWh}{Hours\ of\ Use}$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

Variables

$kWh_{Baseline}$	1.9.1	Deemed energy consumption based on the age of the equipment (Reference 14)
$kWh_{ENERGYSTAR}$	1.9.1	Deemed annual energy consumption of the ENERGYSTAR unit;Top-Mounted freezer or refrigerator only (automatic defrost) (Reference 13)
Coincidence Factor	64%	Probability of equipment operating during peak time (Reference 4, Table 4)
Hours of Use	8,760	Annual hours of use in a year (Reference 13)
Lifetime	14	Measured Lifetime (Reference 13)
Incremental Cost	$1,200.00	Difference in cost between the standard equipment and the more efficient equipment (Reference 12). Costs are provided by the vendor and are re-evaluated throughout the year to account for the rapidly evolving market.

Provided by Product Vendor	**M&V Verified**
Existing Equipment Quantity	Yes
Product Type and Class of ENERGYSTAR Refrigerators Installed	Yes

Table 1.9.1

Equipment	$kWh_{Baseline}$	$kWh_{ENERGYSTAR}$
Refrigerator	746	320

References:

1. Baseline kWh and Average to peak kW ratio from 1995 and 2012 versions of Residential Energy Data Sourcebook for the U.S. Residential Sector.
2. Data on expected life for savings on secondary refrigerators, 9th year Persistence Study for Southern California Edison, KEMA-XENERGY, 2004
3. Estimate for annual energy use for freezers as percent of refrigerator use. See Table Final Estimates on page 6-15 of report by KEMA-XENERGY
4. Data to support CF from "Domestic Refrigerators: Field Studies and Energy Efficiency Improvement", M. Siddhartha Bhatt, CPRI, July 2001.
5. Degradation factor cited in "2006 Refrigerator/Freezer Recycling Program Evaluation", Snohomish County PUD, Kevin L. Smit, February 2007.
6. Shipment Weighted Efficiencies from Residential Energy Databook, Years 1950 - 1995, http://enduse.lbl.gov/Projects/RED.html
7. Refrigerator-Freezer Sizes and Energy Factors (Shipment-Weighted Averages), Residential Energy Databook, Years 1972 - 2010,
8. Appliance Standards Awareness Project: Ref. Association of Home Appliance Manufacturers (AHAM)
9. Actual recent program data on age of recycled units were used to create weighted average energy consumption & remaining useful life of units recycled.
10. Data on Efficiency Standards, "Technical Support Document Refrigerators and Freezers", DOE, 2014.
11. Energy Star Program Requirements for Refrigerators. https://www.energystar.gov/ia/partners/product_specs/program_reqs/refrig_prog_req.pdf
12. Income Qualified Single Family Weatherization Colorado Program Data
13. State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs Version 3.1 January 20, 2020
14. Refrigerator Recycling Colorado Program Data

Changes from Recent Filing:

Increased Incremental Cost to $1,200

1.10 Refrigerator Recycling

Algorithms

$$Customer\ kWh = Base\ kWh \times Refrigerator\ Factor$$

$$Customer\ kW = \frac{Customer\ kWh}{Hours\ of\ Use}$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

Variables

Refrigerator Factor	Table 1.10.1	Deemed adjustment between refrigerators and freezers (Reference 3)
Base kWh	1.10.2	Deemed energy usage based on the age of the equipment (References 1,5,6,7,8,9,10,11)
Coincidence Factor	64%	Probability of equipment operating during peak time (Reference 4)
Hours of Use	8,760	Annual Hours of Use
Lifetime	Table 1.10.1	Deemed remaining service lifetime of removed equipment (Reference 2, 9)
Incremental Cost	$0.00	Difference in cost between the standard equipment and the more efficient equipment. Customer does not pay for recycling cost.

Provided by Product Vendor	**M&V Verified**	
Existing Equipment Quantity	Yes	
Year of Equipment Manufacture	Yes	
Product Type of Removed and Recycled Equipment	Yes	Primary units, secondary units and standalone freezers

Table 1.10.1

Equipment	**Refrigerator Factor**	**Lifetime**
Freezer	0.85	7
Primary Refrigerator	1.00	8
Secondary Refrigerator	1.00	8

Table 1.10.2

Year of equipment manufacture	Base kWh
1970 and Earlier	2,372
1971	2,358
1972	2,344
1973	2,269
1974	2,231
1975	2,144
1976	2,020
1977	1,951
1978	1,902
1979	1,769
1980	1,656
1981	1,531
1982	1,523
1983	1,475
1984	1,440
1985	1,328
1986	1,340
1987	1,209
1988	1,190
1989	1,146
1990	1,143
1991	1,137
1992	1,130
1993	806
1994	802
1995	797
1996	800
1997	802
1998	805
1999	807
2000	809
2001	560
2002	556
2003	553
2004	550
2005	547
2006	544
2007	540
2008	537
2009	534
2010	531
2011	528
2012	525
2013	522
2014	434
2015	431
2016	429
2017	426
2018	424
2019	421
2020	419
2021	417

References:

1. Baseline kWh and Average to peak kW ratio from 1995 and 2012 versions of Residential Energy Data Sourcebook for the U.S. Residential Sector. Berkeley, CA: Lawrence Berkeley National Laboratory. LBNL-40297
2. Data on expected life for savings on secondary refrigerators, 9th year Persistence Study for Southern California Edison, KEMA-XENERGY, 2004
3. Estimate for annual energy use for freezers as percent of refrigerator use. See Table Final Estimates on page 6-15 of report by KEMA-XENERGY (2004). "Final Report, Measurment and Evaluation Study of 2002 Statewide Residential Appliance Recycling Program." February 13, 2004
4. Data to support CF from "Domestic Refrigerators: Field Studies and Energy Efficiency Improvement", M. Siddhartha Bhatt, CPRI, July 2001.
5. Degradation factor cited in "2006 Refrigerator/Freezer Recycling Program Evaluation", Snohomish County PUD, Kevin L. Smit, February 2007.
6. Shipment Weighted Efficiencies from Residential Energy Databook, Years 1950 - 1995, http://enduse.lbl.gov/Projects/RED.html
7. Refrigerator-Freezer Sizes and Energy Factors (Shipment-Weighted Averages), Residential Energy Databook, Years 1972 - 2010, http://buildingsdatabook.eren.doe.gov/TableView.aspx?table=5.7.5
8. Appliance Standards Awareness Project: Ref. Association of Home Appliance Manufacturers (AHAM)
9. Actual recent program data on age of recycled units were used to create weighted average energy consumption & remaining useful life of units recycled.
10. Data on Efficiency Standards, "Technical Support Document Refrigerators and Freezers", DOE, 2014.
11. Energy Star Program Requirements for Refrigerators. https://www.energystar.gov/ia/partners/product_specs/program_reqs/refrig_prog_req.pdf

Changes from Recent Filing:

Updated base kWh values to include savings for 2021 models and earlier

1.11 Window/Room Air Conditioner Recycling

Algorithms

$$Customer\ kWh = FLH\ x\ Size\ x\ \left(\frac{1}{EER_{Recycled}}\right) x\ \left(\frac{1}{1000}\right)$$

$$Customer\ kW = \frac{Customer\ kWh}{FLH}$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

Variables

FLH	546	Full Load Hours of Unit (Reference 1)
Size	Customer Input	Size of Retired Unit in BTU/hr
$EER_{Recycled}$	9.80	Efficiency of Recycled Unit (References 2, 3)
Coincidence Factor	30%	Peak Coincidence Factor (References 1,4)
Lifetime	4	Measure Lifetime (References 1,5)
Incremental Costs	$0.00	Difference in cost between the standard equipment and the more efficient equipment. Customer does not pay for recycling cost.

Provided by Product Vendor	**M&V Verified**	
Equipment Size	Yes	10,000 BTU/hr if unknown
Confirmation of Equipment Use and Operation	Yes	

References

1. Deemed Table 18.0.1
2. Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 10.0, Volume 3. September 24, 2021
3. Minimum Federal Standard for most common room AC type (8000-14,999 capacity range with louvered sides) per federal standards from 10/1/2000 to 5/31/2014. Note that this value is the EER value, as CEER was introduced later.
4. Consistant with conicident facttors found in: RLw Report: Final Report Coincident Factor Study Residential Room Air Conditioners, June 23, 2008
5. 1/3 of the assumed measure life for Window/Room Air Conditioners.

Changes from Recent Filing:

No changes

2.1 Electric Vehicle (EV) Optimization

Algorithms

$$Customer\ Coincident\ kW = EV\ Quantity\ \times\ Customer\ kW \times Coincidence\ Factor$$

Variables

Customer kW	See Table 2.1.1	The load reduction the customer experiences, reflecting the maximum charging rate from an average customer less the charging rate in that same hour after the load shift.
Coincidence Factor	See Table 2.1.1	Percentage of Customer kW savings that will coincide with peak summer kW savings.
EV Quantity	Customer Input	# of participating EV or charging stations the customer has at their home
Customer kWh	0	
Lifetime	1	Lifetime of EV load shifting
Net-to-Gross	100.0%	Net-to-Gross factor for EV Load Shifting
Incremental Cost	$0.00	

Customer Inputs	**M&V Verified**	
EV/charging station Quantity	Yes	

Table 2.1.1: EV load shifting for customers charging their electric vehicle (calculations rely on References 1-20)

Month	**Customer kW**	**Coincidence Factor**	**PCkW**
Level 1 charging rate	0.578	92.0%	0.532
Level 2 charging rate	1.333	63.1%	0.841
Level 1 charging rate and are on a TOU rate	0.574	19.4%	0.112
Level 2 charging rate and are on a TOU rate	1.324	9.9%	0.131

References:

(1) National Oceanic and Atmospheric Administration. (2018). "Statewide Time Series." Retrieved from https://www.ncdc.noaa.gov/cag/statewide/time-series/21/tavg/1/10/1895-2018?base_prd=true&firstbaseyear=1901&lastbaseyear=2018.

(2) Office of Highway Policy Information. (2018). "Travel per Vehicle" for Colorado. Retrieved from Google Public Data site.

(3) Yuksel and Michalek. (2015). Environmental Science and Technology (49), "Effects of Regional Temperature on Electric Vehicle Efficiency, Range, and Emissions in the United States."

(4) The EV Project. (2013). "EV Charging Infrastructure Summary Reports 2013." Retrieved from https://avt.inl.gov/sites/default/files/pdf/EVProj/EVProject%20Infrastructure%20ReportJan13Dec13.pdf.

(5) Idaho National Laboratory. "2013 Nissan Leaf Battery Charge Profiles at Different Temperatures." Retrieved from https://avt.inl.gov/sites/default/files/pdf/fsev/2013NissanLeafElectricChargingReport.pdf.

(6) Mies and Helmus. (2016). "Estimating the charging profile of individual charge sessions of Electric Vehicles in the Netherlands." Retrieved from https://www.researchgate.net/publication/325942518_Estimating_the_Charging_Profile_of_Individual_Charge_Sessions_of_Electric_Vehicles_in_The_Netherlands.

(7) Vermont Energy Investment Corporation. (2013). "An Assessment of Level 1 and Level 2 Electric Vehicle Charging Efficiency." Retrieved from https://www.veic.org/documents/default-source/resources/reports/an-assessment-of-level-1-and-level-2-electric-vehicle-charging-efficiency.pdf.

(8) National Renewable Energy Laboratory. (2017). "National Plug-in Electric Vehicle Infrastructure Analysis." Retrieved from https://www.nrel.gov/docs/fy17osti/69031.pdf.

(9) Clipper Creek. (2019). "How Long Does it Take to Charge an Electric Car." Retrieved from https://www.clippercreek.com/charging-times-chart/.

(10) Xcel Energy Load Forecasting.

(11) Muratori, M. (2018). "Impact of uncoordinated plug-in electric vehicle charging on residential power demand." Nature Energy 3. Data set associated with this article retrieved from https://data.nrel.gov/submissions/69.

(12) Analysis using data from Xcel Energy Minnesota EV Services Pilot.

(13) Coignard, J., MacDougall, P., Stadtmueller, F., and Vrettos, E. (2019). "Will Electric Vehicles Drive Distribution Grid Upgrades." IEEE Electrification Magazine. Retrieved from https://ieeexplore.ieee.org/document/8732007.

(14) Portland General Electric. (2019). PGE's Electric Vehicle Charging Pilot Program Proposals.

(15) Avista Utilities. (2019). "Semi-Annual Report on Electric Vehicle Supply Equipment Pilot Program." Docket UE-160082.

(17) The EV Project. (2013). "EV Charging Summary Infrastructure Reports October-December 2013." Retrieved from https://avt.inl.gov/project-type/data.

(18) The EV Project. (2013). "EV Charging Summary Infrastructure Reports July-September 2013." Retrieved from https://avt.inl.gov/project-type/data.

(19) The EV Project. (2013). "EV Charging Summary Infrastructure Reports April-June 2013." Retrieved from https://avt.inl.gov/project-type/data.

(20) The EV Project. (2013). "EV Charging Summary Infrastructure Reports January-March 2013." Retrieved from https://avt.inl.gov/project-type/data.

Changes from Recent Filing:

Static Load shifting is added in addition to dynamic load shifting

2.2 Renewable Battery Connect

Algorithms

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

Variables

Lifetime	5	Based on the expected program participation length, years
Customer kWh	62	Average annual kWh savings for TOU participants (Reference 6)
Customer kW	0.787	Average discharge kW savings found for TOU participants (Reference 6)
Coincidence Factor	100%	Percentage of Customer_kW savings that will coincide with peak summer kW savings. The Company is responsible for dispatching the battery and will do so during system peak.

Customer Inputs	**M&V Verified**	
Round Trip Efficiency	No	

Assumptions:

Load reduction calculations for export cutomers assume randomized demand response in summer and non-summer months. The total number of calls is 60 per year.

References:

(1) Xcel Energy. Rate book. https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/Regulatory%20Filings/CO%20Recent%20Filings/PSCo_Electric_Entire_Tariff.pdf.
(2) Tesla Powerwall 2.0 Product Specifications;
(2) Xcel Energy, Storage Guidance 1: https://www.xcelenergy.com/staticfiles/xe-responsive/Programs%20and%20Rebates/Residential/CO-solar-residence-Storage-Guidance-1.pdf.
(3) Xcel Energy, Storage Guidance 2: https://www.xcelenergy.com/staticfiles/xe-responsive/Programs%20and%20Rebates/Residential/CO-solar-residents-Storage-Guidance-2.pdf.
(4) Xcel Energy, Storage Guidance 3: https://www.xcelenergy.com/staticfiles/xe-responsive/Programs%20and%20Rebates/Residential/CO-solar-residence-Storage-Guidance-3.pdf.
(5) Calculated using data from five representative PSCo residential solar customers. The calculations use this data to simulate hourly solar, battery, and load conditions and derive kilowatt and kilowatt hour values for demand response events.
(6) Xcel Energy Battery Demand Response Pilot, March 14, 2023

Changes from Recent Filing:

Updated savings calculation. Added energy savings for TOU customers per pilot results.
Removed separation of non-export and export customers.
Program name change from Residential Battery Demand Response to Renewable Battery Connect.

3.1 Behavioral Commercial

Algorithms

$$Customer\ kWh = \left(kWh_{Baseline} - kWh_{Proposed}\right)$$

$$Customer\ Coincident\ kW = PC\ kW_{Baseline}\ - PC\ kW_{Proposed}\ )$$

$$Customer\ therms = \left(therms_{Baseline} - therms_{Proposed}\right)$$

Variables

Lifetime	1

3.2 Energy Feedback

Algorithms

$$kWh\ SavedGross_{Monthly\ Treatment} = (Control\ kWh\ UsagePost_{Treatment} - Group\ Rebate\ Product\ Participation) - (Treatment\ kWh\ UsagePost_{Treatment} - Group\ Rebate\ Product\ Participation)$$

$$kWh_{Gross\ Annual} = \Sigma\ kWh\ SavedGross_{Monthly\ Treatment}$$

$$Gross\ Coincident\ kW = Customer\ Daily\ kW \times Treatment\ Percent\ Savings \times Peak\ Factor \times Daily\ Usage\ at\ Peak \times Coincidence\ Factor$$

$$Dth\ Saved_{Gross\ Monthly\ Treatment} = (Control\ Dth\ UsagePost_{Treatment} - Group\ Rebate\ Product\ Participation) - (Treatment\ Dth\ UsagePost_{Treatment} - Group\ Rebate\ Product\ Participation)$$

$$Dth_{Gross\ Annual} = \Sigma\ Dth\ SavedGross_{Monthly\ Treatment}$$

$$Net\ Saved\ kWh = kWhGross_{Annual} + (Behavior\ Adjustment \times kWhGross_{Annual})$$

$$Net\ Saved\ Coincident\ kW = Gross\ Coincident\ kW + (Behavior\ Adjustment \times Gross\ Coincident\ kW)$$

$$Net\ Saved\ Dth = DthGross_{Annual} + (Behavior\ Adjustment \times DthGross_{Annual})$$

Variables

$Treatment_{Print}$		Group of electric and gas customers receiving periodic paper reports providing feedback on their energy use.
$Treatment_{Email}$		Group of electric and gas customers receiving internet delivered reports that provide feedback on their energy use.
$Treatment_{Online}$		Group electric and gas customers (unknown size) who choose to opt-in to a web feedback portal that provides feedback on their energy use.
~~ControlPrint~~		~~Group of electric and gas customers who are similar in structure (demographics, life stage, house size, geography) to the participant Group, but receive no contact from Xcel or its contractors.~~
~~ControlEmail~~		~~Group of electric and gas customers who are similar in structure (demographics, life stage, house size, geography) to the participant Group, but receive no contact from Xcel or its contractors.~~
$Control_{Online}$		Energy savings generated by participation in Xcel's rebate products for both Treatment and Control groups, kWh ~~and Dth~~. Rebated product participation from other products, (e.g. new furnace), are
Treatment kWh $Usage_{Post\ Treatment}$		This adjustment is applied to reduce the first year savings to 1/3rd of the actual savingsin compliance with ordered treatment. Applies to Gross kWh, ~~Gross Dth,~~ Gross Coincident kW
Control kWh $Usage_{Post\ Treatment}$		Electrical energy use of the Control Group after the treatment as determined through multi-variate regression analysis.
Treatment Dth $Usage_{Post\ Treatment}$		Natural gas energy use of the Treatment Group after the treatment as determined through multi-variate regression analysis.
Control Dth $Usage_{Post\ Treatment}$		Natural gas energy use of the Control Group after the treatment as determined through multi-variate regression analysis.
~~Group Rebate Product Participation~~		~~Energy savings generated by participation in Xcel's rebate products for both Treatment and Control groups, kWh and Dth. Rebated product participation from other products, (e.g. new furnace), are~~
Behavioral Adjustment	-2/3	This adjustment is applied to reduce the first year savings to 1/3rd of the actual savingsin compliance with ordered treatment. Applies to Gross kWh, Gross Dth, Gross Coincident kW
kWh $Saved_{Gross\ Monthly\ Treatment}$	Provided by Vendor	Monthly electric consumption savings for all homes in the treatment group.
Peak Monthly Customer kW	Provided by Vendor	Average electric demand savings per household achieved in the hour that contained the peak demand on Xcel Energy's system. Actual value is calculated each year.
Max Customer kW	Provided by Vendor	Maximum of the peak electric demand savings per household achieved in the months of June, July August or September of each year. Actual value is calculated each year.
Dth $Saved_{Gross\ Monthly\ Treatment}$	Provided by Vendor	Monthly natural gas consumption savings for all homes in the treatment group.
Peak Factor	Provided by Vendor	The ratio of energy usage in the peak hour to average hourly energy use. Actual value is calculated each year.
Daily Usage at Peak	Provided by Vendor	Percentage of energy usage in peak hour to daily total energy use. Actual value is calculated each year.
Coincident Factor	83%	
Lifetime	1	Assumed to be 1 year as the program induces behavior change and there is no equipment purchased.
Incremental Cost	$0.00	Assumed to be $0.00 as the program induces behavior change with no incurred capital costs.
Operation & Maintenance (O&M) Savings	$0.00	Assumed to be 0.
NTG	100%	

References:

1. Energy Feedback Program Data 2011-2023

Changes from Recent Filing:

3.3 High Bill Alerts

Algorithms

$$Customer\ kWh = kWh\ per\ Day\ \times Days\ per\ year$$

$$Customer\ Coincident\ kW = 0$$

$$Customer\ Dth = Dth\ per\ Day\ \times\ \ Days\ per\ year$$

$$Net\ Customer\ kWh = Gross\ Customer\ kWh\ + (Behavioral\ Adjustment\ \times\ Gross\ Customer\ kWh\ )$$

$$Net\ Customer\ Dth\ = Gross\ Customer\ Dth\ +\ \ (Behavioral\ Adjustment\ \times\ Gross\ Customer\ Dth)$$

Variables

kWh per Day	0.077	Average over all customers (Reference 1)
Dth per Day	0.00097	Average over all customers (Reference 1)
Days per Year	365	Qty of days per year
Behavioral Adjustment	-2/3	This adjustment is applied to reduce the first year Gross Savings to 1/3rd of the actual savings in compliance with ordered treatment. Applies to Gross kWh, Gross Dth, Gross Coincident kW
Lifetime	1	Behavioral measures have a lifetime of 1 year (Reference 1)
kW Saved	0	Behavioral programs assumed to not save peak demand (Reference 1)
Incremental Cost	$0.00	

Assumptions

1. Savings values are the average for all customers in the program regardless of if they ever actually receive a report.
2. Behavioral measures do not have any demand savings.
3. The Cadmus analysis showed more savings after the customers stopped receiving High Bill Alerts. We did not collect the necessary information to explain why that happens so it has not been included in this product at the moment. We will continue to monitor this during measure implementation.

References:

1. Cadmus report on High Bill Alert Pilot Program

~~Changes from Recent Filing:~~

~~None~~

3.4 Systemic O&M

Algorithms

$$Customer\ kWh = \left(kWh_{Baseline} - kWh_{Proposed}\right)$$

$$Customer\ Coincident\ kW = PC\ kW_{Baseline}\ - PC\ kW_{Proposed}\ )$$

$$Customer\ therms = \left(therms_{Baseline} - therms_{Proposed}\right)$$

Variables

Years 1 and 2 Lifetime	1
Final Year Lifetime	3

3.5 Conservation Messaging

Algorithms

$$Customer\ Peak\frac{Dth}{Hour} = Peak\frac{Dth}{Hour}Savings\ per\ Year * Compliance\ Factor + (Peak\ \frac{Dth}{hour}Savings\ per\ Year\ * Compliance\ Factor\ * Behavioral\ Adjustment\ Factor)$$

Variables

Dth/Hour Savings per Year	Provided by vendor	Peak energy savings for every event in a year
Behavioral Adjustment Factor	- 2/3	This adjustment is applied to reduce the first year savings to 1/3rd of the actual savings in compliance with ordered treatment. Applies to Gross kWh, Gross Dth, Gross Coincident kW
Lifetime	1 year	Behavioral lifetimes are assumed to be 1 year
Compliance factor	2%	Expected percentage of gas savings during a peak hour

Assumptions

1. The Dth/Hour per year is calculated through statistical usage analysis

Changes from Recent Filing:

Created measure

3.6 Behavioral Demand Response

Algorithms

$$Net\ pckW = Gross\ pckW\ savings + (Gross\ pckW\ savings * Behavioral\ Adjustment\ Factor)$$

Variables

pckW Savings per Year	Provided by vendor	Peak energy savings for every event in a year [1]
Behavioral Adjustment Factor	- 2/3	This adjustment is applied to reduce the first year savings to 1/3rd of the actual savingsin compliance with ordered treatment. Applies to Gross kWh, Gross Dth, Gross Coincident kW
Lifetime	1 year	Behavioral lifetimes are assumed to be 1 year

Assumptions

1. pckW savings per participant in 2024 will be assumed to be the average pckW savings per participant in the 2023 Minnesota Behavioral Demand Response program [1]
2. Savings for 2025-2026 will be statistically calculated by the implementor with customer data from the 2024 year

References:

1. Oracle Minnesota 2023 BDR Results

Changes from Recent Filing:

Created measure

3.7 My Energy Connection

Algorithms

$$kWh\ SavedGross_{Monthly\ Treatment} = (Control\ kWh\ UsagePost_{Treatment} - Group\ Rebate\ Product\ Participation) - (Treatment\ kWh\ UsagePost_{Treatment} - Group\ Rebate\ Product\ Participation)$$

$$kWh_{Gross\ Annual} = \Sigma\ kWh\ SavedGross_{Monthly\ Treatment}$$

$$Gross\ Coincident\ kW = Customer\ Daily\ kW \times Treatment\ Percent\ Savings \times Peak\ Factor \times Daily\ Usage\ at\ Peak \times Coincidence\ Factor$$

~~$Dth\ SavedGross\ Monthly\ Treatment = (Control\ Dth\ UsagePost\ Treatment - Group\ Rebate\ Product\ Participation) - (Treatment\ Dth\ UsagePost\ Treatment - Group\ Rebate\ Product\ Participation)$~~

~~$DthGross\ Annual = \Sigma\ Dth\ SavedGross\ Monthly\ Treatment$~~

$$Net\ Saved\ kWh = kWhGross_{Annual} + (Behavior\ Adjustment \times kWhGross_{Annual})$$

$$Net\ Saved\ Coincident\ kW = Gross\ Coincident\ kW + (Behavior\ Adjustment \times Gross\ Coincident\ kW)$$

~~$Net\ Saved\ Dth = DthGross\ Annual + (Behavior\ Adjustment \times DthGross\ Annual)$~~

Variables

Treatment		Group of electric and gas customers using the MEC app
Control		Group of electric and gas customers who are similar in structure (demographics, life stage, house size, geography) to the participant Group, but receive no contact from Xcel or its contractors.
Treatment kWh Usage$_{Post\ Treatment}$		Electrical energy use of the Treatment Group after the treatment as determined through multi-variate regression analysis.
Control kWh Usage$_{Post\ Treatment}$		Electrical energy use of the Control Group after the treatment as determined through multi-variate regression analysis.
~~Treatment Dth UsagePost Treatment~~		~~Natural gas energy use of the Treatment Group after the treatment as determined through multi-variate regression analysis.~~
~~Control Dth UsagePost Treatment~~		~~Natural gas energy use of the Control Group after the treatment as determined through multi-variate regression analysis.~~
Group Rebate Product Participation		Energy savings generated by participation in Xcel's rebate products for both Treatment and Control groups, kWh ~~and Dth~~. Rebated product participation from other products, (e.g. new furnace), are savings that will be included in the regression analysis and deducted from the EFP results if statistically significant.
Behavioral Adjustment	-2/3	This adjustment is applied to reduce the first year savings to 1/3rd of the actual savingsin compliance with ordered treatment. Applies to Gross kWh, ~~Gross Dth,~~ Gross Coincident kW
kWh Saved$_{Gross\ Monthly\ Treatment}$	Provided by Vendor	Monthly electric consumption savings for all homes in the treatment group.
Peak Monthly Customer kW	Provided by Vendor	Average electric demand savings per household achieved in the hour that contained the peak demand on Xcel Energy's system. Actual value is calculated each year.
Max Customer kW	Provided by Vendor	Maximum of the peak electric demand savings per household achieved in the months of June, July August or September of each year. Actual value is calculated each year.
~~Dth SavedGross Monthly Treatment~~	~~Provided by Vendor~~	~~Monthly natural gas consumption savings for all homes in the treatment group.~~
Peak Factor	Provided by Vendor	The ratio of energy usage in the peak hour to average hourly energy use. Actual value is calculated each year.
Daily Usage at Peak	Provided by Vendor	Percentage of energy usage in peak hour to daily total energy use. Actual value is calculated each year.
Lifetime	1	Assumed to be 1 year as the program induces behavior change and there is no equipment purchased.

References:

Changes from Recent Filing:

Created measure

4.1 All EDA Measures

Algorithms

$$Customer\ KW\ = kW_{Baseline}\ -\ kW_{Proposed}$$

$$Customer\ kWh = kWh_{Baseline} - kWh_{Proposed}$$

$$Customer\ Coincident\ (PC)kW = Customer\ kW \times Coincidence\ Factor$$

$$Customer\ Dth = Dth_{Baseline}\ - Dth_{Proposed}$$

Variables

Baseline_kW	Calculated	Energy simulation output corresponding with the peak baseline building electrical load coincident with summer cooling design conditions.
Proposed_kW	Calculated	Energy simulation output corresponding with the peak proposed building electrical load coincident with summer cooling design conditions.
CF	Calculated	Energy simulation output corresponding with the peak proposed building electrical load coincident with summer cooling design conditions.
Baseline_kWh	Calculated	Energy simulation output corresponding with the annual baseline building electrical consumption.
Proposed_kWh	Calculated	Energy simulation output corresponding with the annual proposed building electrical consumption.
Baseline_Dth	Calculated	Energy simulation output corresponding with the annual baseline building natural gas consumption.
Proposed_Dth	Calculated	Energy simulation output corresponding with the annual proposed building natural gas consumption.

Customer Inputs	**M&V Verified**	
	Yes	Building Characteristics for the proposed building are defined by building design team, which includes mechanical engineers, electrical engineers, and architects.
	Yes	Characteristics for the baseline building are defined by the energy consultant, utilizing methodology described by ASHRAE 90.1 Standard Appendix G and supplemented by Xcel Energy where required to accommodate regulatory requirements.

References:

Changes from Recent Filing:

4.2 All EEB Measures

Description

Energy Efficient Buildings (EEB) is a holistic program including electric and gas measures. Third-party consultants work with customer design teams to identify prescriptive measures from all utility programs for new commercial buildings or retrofits of existing commercial buildings. Custom measures are used for energy savings opportunities not currently available in the prescriptive programs.

Algorithms

N/A

Variables

N/A	N/A	N/A

Customer Inputs	**M&V Verified**	
		Building Characteristics for the proposed building are defined by building design team, which includes engineers, contractors, and architects.

References:

Changes from Recent Filing:

None

4.3 Lighting NC LPD

Description

A lighting efficiency measure based upon the 2021 IECC energy code lighting allowances. Installed lighting power density must be lower than the Baseline LPD to claim credit.

Algorithms

$$Customer\ kW = \frac{(LPD_{Baseline} - LPD_{Proposed}) * Square\ Footage}{1000}$$

$$PC\ kW = Customer\ kW\ * CF\ * kW\ Factor$$

$$Customer\ kWh = Customer\ kW\ * Hours\ * kWh\ Factor$$

$$Heating\ Penalty = Customer\ kW\ * Hours * \ Heating\ Factor\ * O\&M\ Factor$$

$$Incremental\ Cost = Customer\ kWh\ * Cost\ Factor$$

Variables

$LPD_{Baseline}$	Table 4.3.1	Code maximum allowable LPD based on space type
Hours	Table 4.3.1	Average Operating hours based on space type
CF	Table 4.3.1	Coincidence factor based on the space type
kW Factor	Table 4.3.2	kW secondary impacts of HVAC system
kWh Factor	Table 4.3.2	kWh secondary impacts of the HVAC system
Heating Factor	Table 4.3.2	Decatherm impacts of the HVAC system
O&M Factor	$ 5.24	Cost per Dth of gas[1]
Cost Factor	$ 0.30	Incremental cost per kWh saved[2]

Customer Inputs	**M&V Verified**	
$LPD_{Proposed}$	Yes	Lighting power density of the space
Space Type	Yes	Space type based on IECC 2018
HVAC System	No	What kind of HVAC system is installed
Square Footage	Yes	Square footage of the evaluated space

Table 4.3.1 Baseline LPD, Hours, and Coincidence factor of each space type

Space Type	**Baseline LPD[3]**	**Operation Hours[4]**	**CF[4]**
Automotive facility	0.75	3068	94%
Convention center	0.64	4156	94%
Court House	0.79	2278	96%
Dining: bar lounge/leisure	0.8	5571	68%
Dining: cafeteria/fast food	0.76	5571	68%
Dining: family	0.71	5571	68%
Dormitory	0.53	1924	25%
Dwelling Units	0.9	986	13%
Exercise center	0.72	8234	94%
Fire Station	0.56	2697	51%
Gymnasium	0.76	2080	73%
Health care-clinic	0.81	3890	65%
Hospital	0.96	7616	76%
Hotel	0.56	3140	37%
Library	0.83	5010	71%
Manufacturing facility	0.82	4618	81%
Motel	0.56	3140	37%
Motion picture theater	0.44	3506	53%
Multi-Family	0.45	1924	25%
Museum	0.55	3068	94%
Office	0.64	2884	54%
Parking garage	0.18	6084	96%
Penitentiary	0.69	2697	51%
Performing Arts Theatre	0.84	2278	96%
Police Station	0.66	2697	51%
Post office	0.65	3435	78%
Religious building	0.67	2085	48%
Retail	0.84	4786	83%
School/University	0.72	3395	63%
Sports arena	0.76	2278	96%
Town hall	0.69	3435	78%
Transportation	0.5	5913	96%
Warehouse	0.45	5242	68%
Workshop	0.91	4618	81%

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

HVAC Type	kWh Factor	kW Factor	heating Factor
No Heating or cooling	1	1	0
Heating only	1	1	-0.000508
Heating and cooling	1.13	1.33	-0.000508

References:

1. Xcel energy cost of gas
2. Based on past Xcel Energy lighting efficiency projects
3. 2021 IECC
4. Adapted from the Illinois TRM

Changes from Recent Filing:

None

4.4 Commercial Code Compliance

Algorithms

$$Program\ Net\ Annual\ Therms = (Program\ Gross\ Potential\ Annual\ Therms * Construction\ Adjustment\ Factor) * Compliance\ Rate * Annual\ Utility\ Attribution$$

$$Program\ Net\ Annual\ KWh = (Program\ Gross\ Potential\ Annual\ KWh * Construction\ Adjustment\ Factor) * Compliance\ Rate * Annual\ Utility\ Attribution\ *Conversion\ Factor$$

$$Program\ Net\ PC\ kW = \frac{Program\ Net\ Annual\ kWh}{8760}$$

Variables

Program Gross Potential Annual MWh	Calculated Value	Calculated value for annual electric savings for each program year (see Description 4.4.1).
Program Gross Potential Annual Therms	Calculated Value	Calculated vale for annual gas savings for each program year (see Descrption 4.4.1)
Construction Adjustment Factor	See Description 4.4.1	Xcel Energy included an adjustment factor applied to the program gross potential annual kWh to account for differences in assumed construction volume and actual construction volume in prospective states and are leaving this adjustment factor in for retrospective states, but recognize that it will be up to the evaluator to determine if it's use is appropriate.
Compliance Rate	Table 4.4.2	Assumed compliance rate for each year after a new code is adopted. (See Description 4.4.2)
Annual Utility Attribtion	Calculated Value	Assumed 68% for construction affected by 2024 program activities, and 76% for 2025-2029 program activities. (See Description 4.4.3)
Conversion Factor	0.001	1000kWh per MWh

Customer Inputs	**M&V Verified**
None	N/A

Table 4.4.1 Gross Annual Commercial Electric Savings

Program Year	Gross Potential Savings (MWh)
2024	0
2025	13,089,853
2026	52,807,129
Total	**65,896,982**

Table 4.4.2 Gross Annual Commercial Gas Savings

Program Year	Gross Potential Savings (Dth)
2024	0
2025	109,820
2026	1,908,322
Total	**2,018,142**

Table 4.4.3 Compliance Rates By Year Since Code Adopted (Program Year)

Program Year	Commercial Compliance Rate
PY1 (2024)	80%
PY2 (2025)	85%
PY3 (2026)	70%

Table 4.4.4 Assumed Code Adoption Schedule By County Group

Sector	PY0 Baseline	PY1 2024	PY2 2025	PY3 2026
Commercial	IECC2016	IECC2019	IECC2019	IECC2019

Table 4.4.5 Code Compliance Activities in Colorado & Utilities' Proportion

Activity	Department of Labor & Industry	U of MN	AMBO	Utilities PY1 (2024)	Attributable to Utilities PY1 (2024)	Utilities PY2-3 (2025-26)	Attributable to Utilities PY2-3 (2025-
Trainings	$7,600	$3,000	$800	$24,975	68%	$50,950	81%
Circuit Rider	$144,000	$0	$0	$240,000	63%	$360,000	71%
Technical Tools	$0	$0	$0	$64,688	100%	$73,063	100%
Utility Attribution					68%		76%

Descriptions

4.3.1 Program Gross Potential Annual kWh

Gross potential savings was calculated by comparing the difference between a building's energy use intensity (EUI) that just meets a jurisdictions current energy code and a building's EUI that just meets the previous code. The gross potential savings caluclation assumes that all buildings are 100% compliant with code and that there is no over- or under-performance of buildings relative to code, which prevents double counting of savings relative to new construction programs. EUI data was obtained from the Pacific Northwest National Laboratory (PNNL) Commercial Prototype Building Models (https://www.energycodes.gov/development/commercial/prototype_models) for office and bank buildings, government service buildings, stores, schools/educational, hospitals and health, hotels and motels, warehouses, restaurants, and high-rise multifamly buildings in ASHRAE climate zones 5B and 6B for for 2006 IECC, 2009 IECC, 2012 IEC, and 2015 IECC. For the purposes of this analysis, Xcel Energy assumed a 10% improvement for commercial 2018 IECC (2018 commercial prototype models were not yet released) and a conservative assumption of 8% improvement for commercial 2021 IECC. Appendix E page E-4 discusses the data sources for these assumptions in detail.

As Colorado is a home rule state where each jurisdiction can adopt its own code, Xcel Energy utilized Arizona's approach of calculating gross potential savings at the jurisdiction level (Navigant Consulting. “APS MER Verification Report: Program Year 2013.” February 28, 2014). For the purposes of this analysis, Xcel Energy performed the analysis for all counties within Xcel Energy’s Colorado territory, aggregated into 15 groups. The savings calculated for each group was adjusted to account for the energy supply mix (e.g., gas only, electricity only, or gas and electricity) in each group, as defined in Xcel Energy’s 2019 list of communities served (https://www.xcelenergy.com/staticfiles/xe-responsive/Energy%20Portfolio/Colorado-Communities-Served-Information-Sheet.pdf). The methodology for how the groups were determined, as well as additional details on the energy supply mix in each, is explained in detail in Appendix E pages E-1 through E-3 and the end result is shown in Table 2. Definition of County Groups (Appendix E page E-2) and Table 3. Energy Supply Mix by County Group (Appendix E page E-3).

Xcel Energy created a code adoption schedule for each jurisdiction for each year of the program, as show in Table 1.4 Assumed Code Adoption Schedule By County Group (See Appendix E PAGE E-7 OF REPORT APPENDICES) of this workbook. This was created through investigating the code adoption schedule of the jurisdictions within Xcel Energy’s service territory and with stakeholder feedback received in the interviews and discussed in Chapter 4.2 of the report page 39. The details supporting the assumptions are discussed in Appendix E pages E-5 and E-6.

Savings were calculated for each year of the program using the EUI for each building type within each county group and the code adoption schedule. For example, in Program Year 1, for Group 1, the previous code EUI was derived from 2006 IECC, and the current code EUI used 2009 IECC. For Program Year 2, the previous code EUI was derived from 2009 IECC, and the current code EUI used 2015 IECC. For these calculations, Xcel Energy assumed that codes are effective at the start of the calendar year. To calculate savings the EUI is multiplied by the total square footage of commercial new construction in a jurisdiction. Xcel Energy obtained historical construction square footage from the Dodge database for the commercial sector. Detailed information, data sources, and assumptions for construction data is discussed in the gross potential savings section of the report (Chapter 4.2 pages 40-41) and Appendix E pages E-7 through E-11.

4.3.2 Compliance Rate

The gross potential savings assumes buildings are 100% compliant with code. However, in practice, not all buildings are 100% compliant with code. Xcel Energy attempted to find compliance rates specific to Colorado. While compliance snapshots have been conducted in Colorado in the past, these did not provide an estimate of broad compliance rates. The city of Ft. Collins conducted a compliance study through City Energy Project, Institute for Market Transformation, and Natural Resources Defense Council for projects permitted to the 2015 IECC code. While the report was not publicly available, a presentation by the city indicated compliance ranged from 64%–75% (https://www.energycodes.gov/sites/default/files/documents/NECC2018_07_Smith.pdf). Since compliance data specific to Colorado was not found, estimates of compliance from other regions at various points throughout a code cycle were used to estimate compliance for Xcel Energy’s Colorado territory. Given the range of compliance values found in other states (Table 10. Compliance Rate Estimates and Sources in Appendix E page E-14), the fact that other utilities’ programs are well established, the Ft. Collins study found compliance rates of 64%–75%, and the other home rule state (AZ) assumes a low initial compliance rate of 50%, Xcel Energy assumed the compliance rates outlined in Table 1.3 Compliance Rates By Number of Years Since Code Adoption (See CHAPTER 4.3 AND PAGE 42 OF REPORT) of this workbook. The program design includes a compliance study in year 1 to determine actual compliance rates specific to Xcel Energy's service territory.

4.3.3 Annual Utility Attribution

Attribution refers to the portion of code savings that can be credited to the utility's program efforts for increasing code compliance or assisting with the adoption of codes and standards (Cadmus. "California Statewide Codes and Standards Program Impact Evaluation Phase Two Volume Two: 2013 T24." June 23, 2017). Xcel Energy already supports the code compliance market in Colorado through trainings, lunch and learns, webinars, videos, and training materials. To capture the influence of these activities, Xcel Energy gathered detailed information on activities performed by Xcel Energy and other key market actors within the state, namely the Colorado Energy Office and SWEEP, as shown in Table 1.5 Code Compliance Activities in Colorado & Xcel Energy Proportion (See CHAPTER 4.3 PAGE 44 OF REPORT) in this workbook. Additional details regarding the information collected is available in the section "Attribution & Claimable Savings" of the report page 42-44. Xcel Energy then determined the proportion of each activity Xcel Energy was responsible for relative to other actors, and took an unweighted average of these activities to determine the total proportion of code activities for which Xcel Energy is currently responsible, which is shown in Table 1.5 Code Compliance Activities in Colorado & Xcel Energy Proportion (See CHAPTER 4.3 PAGE 44 OF REPORT) in this workbook. Due to the construction lag discussed in Chapter 4.2 page 40, the activities conducted now will result in savings in 2021 and 2022 for the commercial program. Thus, the attribution of 19% was used in the analysis for the 2021 and 2022 program years.

The program activities were designed specifically to meet current market gaps and complement and build upon existing support activities.

References:

1. Minnesota Code Program Development Report, January 2023, Prepared by TRC

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

NOT USED

N/A	N/A

5.1 Peak Day Partners

Algorithms

$$Customer\ kWh = kW\ Commitment \text{ x } Control\ Hours$$

$$Customer\ Coincident\ kW = kW\ Commitment \times Coincidence\ Factor$$

$$Customer\ kW = kW\ Commitment$$

Variables:

kW Commitment	Customer Input	Customer's average electrical load reduction during summer months
Coincidence Factor	100%	Percentage of Customer_kW savings that will coincide with peak summer kW savings
Control Hours	23	Estimated number of control hours called per year
Lifetime	1	Average contract duration

Customer Inputs:	**M&V Verified:**	
kW Commitment	Yes	
Control Hours	Yes	

References:

Based on the average number of ISOC control events in recent years.

Changes from Recent Filing:

No Changes

5.2 Peak Partner Rewards

Algorithms

$$Customer\ kWh = kW\ Commitment \text{ x } Control\ Hours$$

$$Customer\ Coincident\ kW = kW\ Commitment \times Coincidence\ Factor$$

$$Customer\ kW = kW\ Commitment$$

Variables:

kW Commitment	Customer Input	Customer's average electrical load reduction during summer months
Coincidence Factor	100%	Percentage of Customer_kW savings that will coincide with peak summer kW savings
Control Hours	17	Estimated number of control hours called per year
Lifetime	2	Average contract duration

Customer Inputs:	**M&V Verified:**	
kW Commitment	Yes	
Control Hours	Yes	

References:

Control hours based on CO event history 2017-2021
Participation & kW commitment based on present enrollment through 2021

Changes from Recent Filing:

No Changes

5.3 Critical Peak Pricing

Algorithms

$$Customer\ kWh = kW\ Reduction \text{ x } Control\ Hours$$

$$Customer\ Coincident\ kW = kW\ Reduction \times Coincidence\ Factor$$

$$Customer\ kW = kW\ Reduction$$

Variables:

kW Reduction	Customer Input	Customer's average electrical load reduction during critical peak periods
Coincidence Factor	100%	Percentage of Customer_kW savings that will coincide with peak summer kW savings
Control Hours	44	Average number of control hours called per year
Lifetime	1	Average contract duration

Customer Inputs:	**M&V Verified:**	
kW Reduction	Yes	
Control Hours	Yes	

References:

Control hours based on 2017-2021 CO CPP event history
Participation & kW commitment still based on participation in CO CPP pilot values from Summer 2018, due to data available

Changes from Recent Filing:

Updated average Control Hours with recent event history

5.4 Smart Thermostat

Algorithms

$$STDR\ Customer\ kWh = ST_Tons\ \times\ kWh_Savings_STDR$$

$$STDR\ Customer\ Coincident\ kW = ST_Tons\ \times\ kW_Savings_STDR \times STDR_CF$$

$$STDR\ Customer\ kW = \ ST_Tons\ \times\ kW_Savings_STDR$$

$$STEE\ Customer\ kWh = Cooling\ kW\ Annual\ \times (ES_Reduction_Cooling) \times Cooling\ Hours$$

$$STEE\ CustomerGas\ Dth = Baseline\ Dth\ \times\ (ES_Reduction_Heating)$$

$$STEE\ CustomerGas\ Dth/Hour = Baseline\ Dth\ \times\ (ES_Reduction_Heating)/(Heating\ Hours)$$

$$STEE\ Electric\ Heat\ kWh = \ Cooling\ kW\ Annual \times (ES_Reduction_Cooling) \times\ Cooling\ Hours$$
$$+\ Heating\ kW\ \times (ES_Reduction_Heating) \times\ Heating\ Hours$$

$$STEE\ Customer\ Coincident\ kW = Cooling\ kW \times (ES_Reduction_Cooling) \times EnergyStar_CF$$

Variables

ST_Tons	Customer Input	Quantity of Controlled Tons
kW_Savings_STDR	0.364	Peak coincident kW savings per average commercial AC unit ton with a smart thermostat (Reference 3)
kWh_Savings_STDR	1.185	kWh savings per year per average commercial AC Unit ton with a smart thermostat (Reference 3).
ES_Reduction_Heating	6%	Energy Star Connected Thermostat criteria for annual heating equipment runtime reduction (Reference 3)
ES_Reduction_Cooling	9%	Energy Star Connected Thermostat criteria for annual cooling equipment runtime reduction (Reference 3)
STDR_CF	100%	Coincidence factor of demand response events
Cooling_kW	6.531	Average kW for cooling at full load
Cooling_kW_Annual	5.779	Average kW for cooling using seasonal efficiency
Cooling Hours	765	Annual cooling hours
Heating kW	5.339	Average kW for electric heating
Heating Hours	950	Annual heating hours
Baseline Dth	74.1	Baseline heating load per thermostat in Dth
EnergyStar_CF	0%	coincidence factor for ES Thermostats (Reference 4)
STDR Measure Life	5	Measure life for demand response DR
ES Measure Life	10	Measure life for Energy Star thermostat (Reference 4)
Incremental Cost	Table 5.4.1	Material and Install Labor Costs (varies by program & split between demand response and energy efficiency measures)

Table 5.4.1	**Current Costs***
Commercial Programs	$175.00
DR Programs	$300.00

* Costs are provided by the vendor and re-evaluated throughout the year to account for the evolving market.

Customer Inputs	**M&V Verified**	
AC unit tons	Yes	
Air conditioner single-stage or multi-stage	Yes	
Stage 1 and stage 2 tons (Multi-stage units only)	Yes	

References:

1. Xcel Energy, January 2016. Typical MN Business Single Stage Smart Switch Load Relief 2011-2015.
2. Xcel Energy, January 2016. Typical MN Business Dual Stage Smart Switch Load Relief 2011-2015.
3. Xcel Energy, October 2019. Commercial Smart Thermostat Demand Response Study
4. Minnesota Technical Resource Manual ver 3.0

Changes from Recent Filing:

No Changes

5.5 Electric Vehicle Critical Peak Pricing

Algorithms

$$Customer\ kW = EV\ Load \times CPP\ Factor$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

Variables	Value	Description
EV Load	Customer Input	Total EV charging load in kW
CPP Factor	See Table 5.5.1	The amount of discretionary load that the customer will shed during peak events.
Control Hours	52	Average annual event hours (Ref. 2)
Customer kWh	0	Assumed that EV loads reduced during CPP periods will be shifted to alternate time periods, hence 0 kWh savings.
Coincidence Factor	100%	Percentage of Customer kW savings that will coincide with peak summer kW savings
Lifetime	1	Average contract duration

Customer Inputs:	M&V Verified:	
EV Load	Yes	

Assumptions:

EV charging loads will be seprately metered as required by Tariff.
Fleet EV charging facilities will be more sensitive to pricing signals than Public EV customers, therefore assumed a higher
After initial enrollment, customers will automatically enroll in subsequent years as long as they remain on the S-EV Rate.

Table 5.5.1	CPP Factor
Public EV Charging (Reference 3)	9.92%
Fleet EV Charging (Reference 3)	9.92%

References:

1. Nexant, 2016. 2015 Load Impact Evaluation of California's Statewide Nonresidential Critical Peak Pricing Program. Table 1-1.
2. 2020-2022 CO EV CPP Event History
3. 2020-2022 CO EV CPP Participant Performance

Changes from Recent Filing:

Updated average Control Hours with recent event history
Updated CPP Factors for Public & Fleet EV Charging based on participating CO customer performance data

Table 6.0.1 Common Compressed Air Variables for Reference

Average Motor Efficiency	94.0%	Assumed Average Air Compressor Motor Efficiency
System Pressure	100	Typical pressure of compressed air system analyzed that assumptions are based on for various measure usages. (Ref. 10)
SCFM / HP	4.25	Standard rule of thumb assumption for flow reduction on a typical 100 psig system with variable speed control. (Ref. 10)
SCFM / ACFM	0.942	Conversion from Actual to Standard Flow in MN territory
Custom CF	80.3%	Average Coincidence Factor from Custom CO Compressed Air projects
kW / HP	0.746	Standard conversion from HP to kW.

References:

(1) Service factor from Compressed Air & Gas Institute (CAGI) standards comparing Nameplate HP to actual BHP @ 100% Full rated pressure and flow
(2) National Energy Efficiency Best Practices Report (http://www.eebestpractices.com)
(3) Historic compressed air product experience
(4) Analysis of 400+ Compressed Air Supply Side Studies between 2015 - 2022
(5) National Electric Manufacturers Association. Motor efficiency standards from Pre-EPAct 2005 and after.
(6) United States Industrial Electric Motor Systems Market Opportunities Assessment. US DOE, Dec 2002, Appendix B2
(7) Various anonymous retailer and vendor quotes
(8) per page iv of "Tetra Tech, Process and Impact Evaluation of the Compressed Air Efficiency Program — Colorado, January 21 2014"
(9) Massachusetts Technical Reference Manual 2013-2015 Program Years
(10) Compressed Air Challenge (Best Practices Guide): source for baseline compressor curves, % efficiency/psi reduction, SCFM per orifice
(11) Massachusetts Joint Utilities "Measure Life Study". Energy & Resource Solutions. Table 1-1. 2005. Source for NALD Lifetime
(12) ZEKS Mist Eliminator (http://www.zeks.com/PDF/ZEKS%20Mist%20Eliminator.pdf)
(13) Quincy Mist Eliminator (https://www.quincycompressor.com/products/mist-eliminators)
(14) Compressed Air Best Practices (https://www.airbestpractices.com/system-assessments/air-treatmentn2/desiccant-dryers-ten-lessons-learned)
(15) 2023 Illinois Statewide Technical Reference Manual for Energy Efficiency Version 11.0 Volume 2: Commercial and Industrial Measures
(16) MN TRM 4.0
(17) Analysis of MN Compressed Air Demand Study participants 2017 - 2022
(18) forklift.epri.com

6.1 Energy Conservation Opportunity

$$Customer\ kW = kW\ Savings$$

$$Customer\ kWh = kW\ Savings \times Hours$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

Variables

kWh Savings	29,167	Calculated on an individual basis. Estimate based on an average kWh savings from historical participation in the measure.
kW Savings	3.608	Calculated on an individual basis. Estimate based on an average kW savings from historical participation in the measure.
Hours	7,538	Based on average operating hours from historical participation in the measure.
Coincidence Factor	98.6%	Coincidence of energy demand savings to grid peak demand based on participation history in ECOs
Lifetime	5	Standard assumption for compressed air study life.
Incremental Cost	$390	Based on average incremental from historical participation in the measure.

References:

Historical participation in the measure for kW & kWh savings, costs & hours

Changes from Recent Filing:

Updated to recent history

6.2 Supply Side Study

$$\frac{kW}{SCFM} = \left(\frac{SCFM}{HP}\right)^{-1} \times \left(\frac{kW}{HP}\right) \div Motor\ Efficiency$$

$$Customer\ kW = Leak\ SCFM \times \left(\frac{kW}{SCFM}\right)$$

$$Customer\ kWh = Hours\ \times Customer\ kW$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

$$Incremental\ Cost = Cost\ per\ Leak\ Fix \times \#\ of\ Leaks\ Fixed + Study\ Rebate$$

Variables

Leak SCFM	Study Input	Input from Compressed Air Supply Side Study
Motor Efficiency	94.0%	Assumed Average Air Compressor Motor Efficiency
SCFM / HP	4.25	Standard rule of thumb assumption for flow reduction on a typical 100 psig system with variable speed control. Savings claimed is to be later adjusted for in next Custom analysis following study.
kW / HP	0.746	Standard conversion from HP to kW.
kW / SCFM	0.187	
Hours	Study Input	Input from Compressed Air Supply Side Study
Lifetime	5	Standard assumption for compressed air study lifetime, and lifetime of a typical individual compressed air leak fix.
Coincidence Factor	100%	Savings is from flow reduction during all operating hours of the compressed air system, so is assumed to be coincident with the grid peak.
Cost per Leak Fix	$75	Standard assumption for all leak studies
# of Leaks Fixed	Study Input	Input from Compressed Air Supply Side Study

References:

(4) Analysis of Compressed Air Study participants 2017 - 2022
(7) Various anonymous retailer and vendor quotes

(10) Compressed Air Challenge (Best Practices Guide): source for baseline compressor curves, % efficiency/psi reduction, SCFM per orifice

Changes from Recent Filing:

No Changes

6.3 Cycling Dryers

Algorithms

$$Customer\ kWh = Quantity \times kWh\ Savings$$

$$Customer\ kW = Quantity \times kW\ Savings$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

$$Incremental\ Cost = Quantity \times Unit\ Incremental\ Cost$$

Variables

kWh Savings	See Table 6.3.1	kWh savings based on Cycling Dryer rated CFM
kW Savings	See Table 6.3.1	kW savings based on Cycling Dryer rated CFM
Hours	See Table 6.3.1	Based on average operating hours from historical participation in compressed air studies.
Lifetime	20	Typical assumption for new industrial equipment
Coincidence Factor	80.3%	Coincidence of energy demand savings to grid peak demand based on Custom Compressed Air project history.
Incremental Cost	See Table 6.3.1	Incremental Cost of energy efficient equipment compared to less-efficient equipment option

Customer Inputs	**M&V Verified**	
Quantity of Cycling Dryers	Yes	
CFM of Cycling Dryer	Yes	

Table 6.3.1 Energy Savings and Costs For Cycling Dryers (Reference 4 & 7)

Dryer CFM	kW Savings	kWh Savings	Hours	Incremental Cost
75 CFM to 99 CFM Cycling Dryer	0.406	2,808	6,921	$1,554
100 CFM to 124 CFM Cycling Dryer	0.632	4,382	6,938	$1,686
125 CFM to 149 CFM Cycling Dryer	0.756	5,259	6,955	$1,818
150 CFM to 199 CFM Cycling Dryer	0.874	6,097	6,976	$1,950
200 CFM to 249 CFM Cycling Dryer	0.936	6,561	7,010	$2,214
250 CFM to 299 CFM Cycling Dryer	1.307	9,211	7,048	$2,478
300 CFM to 399 CFM Cycling Dryer	1.534	10,863	7,081	$2,742
400 CFM to 499 CFM Cycling Dryer	1.997	14,281	7,151	$3,271
500 CFM to 599 CFM Cycling Dryer	2.271	16,397	7,219	$3,799
600 CFM to 699 CFM Cycling Dryer	2.621	19,095	7,285	$4,327
700 CFM to 799 CFM Cycling Dryer	3.394	24,949	7,350	$4,855
800 CFM to 999 CFM Cycling Dryer	3.611	26,761	7,411	$5,384
1000 CFM to 1199 CFM Cycling Dryer	4.599	34,664	7,537	$6,440
1200 CFM to 1599 CFM Cycling Dryer	5.760	44,072	7,652	$7,497
1600 CFM to 1999 CFM Cycling Dryer	7.134	56,152	7,871	$9,610
2000 CFM to 2399 CFM Cycling Dryer	8.139	65,657	8,067	$11,723
2400 CFM to 2799 CFM Cycling Dryer	10.544	86,858	8,238	$13,837

References:

(4) Analysis of 400+ Compressed Air Supply Side Studies between 2015 - 2022
(7) Various anonymous retailer and vendor quotes

Changes from Recent Filing:

kW & kWh Savings updated with recent compressed air study history for all sizes
Incremental Costs updated to current market prices

6.4 Dryer Purge Demand Controls

Algorithms

$$Customer\ kWh = Quantity \times kWh\ Savings$$

$$Customer\ kW = Quantity \times kW\ Savings$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

$$Incremental\ Cost = Quantity \times Unit\ Incremental\ Cost$$

Heatless Desiccant Dryer Variables

kWh Savings	See Table 6.4.1	Annual kWh savings based on Heatless Desiccant Dryer rated CFM and the associated compressed air system.
kW Savings	See Table 6.4.1	Average kW savings based on Heatless Desiccant Dryer rated CFM and the associated compressed air system.
Incremental Cost	See Table 6.4.1	Incremental Cost of Purge/Dewpoint Controlled Heatless Desiccant Dryer compared to Uncontrolled Heatless Desiccant Dryer.

Heated Desiccant Dryer Variables

kWh Savings	See Table 6.4.2	Annual kWh savings based on Heated Desiccant Dryer rated CFM and the associated compressed air system.
kW Savings	See Table 6.4.2	Average kW savings based on Heated Desiccant Dryer rated CFM and the associated compressed air system.
Incremental Cost	See Table 6.4.2	Incremental Cost of Purge/Dewpoint Controlled Heated Desiccant Dryer compared to Uncontrolled Heatless Desiccant Dryer.

Blower Purge Desiccant Dryer Variables

kWh Savings	See Table 6.4.3	Annual kWh savings based on Blower Purge Desiccant Dryer rated CFM and the associated compressed air system.
kW Savings	See Table 6.4.3	Average kW savings based on Blower Purge Desiccant Dryer rated CFM and the associated compressed air system.
Incremental Cost	See Table 6.4.3	Incremental Cost of Purge/Dewpoint Controlled Blower Purge Desiccant Dryer compared to Uncontrolled Heatless Desiccant Dryer.

Variables

Lifetime	20	Typical assumption for new industrial equipment
Coincidence Factor	80.3%	Coincidence of energy demand savings to grid peak demand based on Custom Compressed Air project history.

Customer Inputs	**M&V Verified**	
Quantity of Desiccant Dryers with Demand Controls	Yes	
SCFM Rating of Dryers	Yes	
Desiccant Dryer Type	Yes	Heatless, Heated, or Blower Purge

Table 6.4.1 Heatless Desiccant Dryers w/ Purge/Dewpoint Demand Control (Reference 4 & 7)

Heatless Desiccant Dryer CFM	**kW Savings**	**kWh Savings**	**Hours**	**Incremental Cost**
90 CFM to 119 CFM Heatless Demand Control	3.845	26,652	6,931	$4,880.00
120 CFM to 159 CFM Heatless Demand Control	5.117	35,576	6,952	$4,894.00
160 CFM to 199 CFM Heatless Demand Control	6.784	47,370	6,983	$4,911.00
200 CFM to 249 CFM Heatless Demand Control	8.406	58,924	7,010	$5,064.00
250 CFM to 299 CFM Heatless Demand Control	10.343	72,855	7,044	$4,949.00
300 CFM to 399 CFM Heatless Demand Control	12.338	87,328	7,078	$4,974.00
400 CFM to 499 CFM Heatless Demand Control	15.996	114,323	7,147	$4,994.00
500 CFM to 599 CFM Heatless Demand Control	19.608	141,416	7,212	$5,025.00
600 CFM to 799 CFM Heatless Demand Control	22.976	167,239	7,279	$5,025.00
800 CFM to 999 CFM Heatless Demand Control	29.331	217,106	7,402	$5,042.00
1000 CFM to 1249 CFM Heatless Demand Control	35.091	263,881	7,520	$5,235.00
1250 CFM to 1499 CFM Heatless Demand Control	41.716	319,461	7,658	$5,145.00
1500 CFM to 1999 CFM Heatless Demand Control	47.545	370,136	7,785	$5,169.00
2000 CFM to 2499 CFM Heatless Demand Control	57.309	459,329	8,015	$5,237.00

Table 6.4.2 Heated Desiccant Dryers w/ Purge/Dewpoint Demand Control (Reference 4 & 7)

Heated Desiccant Dryer CFM	kW Savings	kWh Savings	Hours	Incremental Cost
90 CFM to 119 CFM Heated Demand Control	4.497	31,168	6,931	$10,369.00
120 CFM to 159 CFM Heated Demand Control	5.971	41,511	6,952	$10,499.00
160 CFM to 199 CFM Heated Demand Control	7.914	55,261	6,983	$10,672.00
200 CFM to 249 CFM Heated Demand Control	9.802	68,715	7,010	$10,846.00
250 CFM to 299 CFM Heated Demand Control	12.101	85,236	7,044	$11,062.00
300 CFM to 399 CFM Heated Demand Control	14.431	102,144	7,078	$11,279.00
400 CFM to 499 CFM Heated Demand Control	18.761	134,085	7,147	$11,712.00
500 CFM to 599 CFM Heated Demand Control	23.033	166,113	7,212	$12,198.00
600 CFM to 799 CFM Heated Demand Control	27.037	196,804	7,279	$13,976.00
800 CFM to 999 CFM Heated Demand Control	34.606	256,154	7,402	$16,188.00
1000 CFM to 1249 CFM Heated Demand Control	41.561	312,540	7,520	$16,923.00
1250 CFM to 1499 CFM Heated Demand Control	49.623	380,010	7,658	$17,842.00
1500 CFM to 1999 CFM Heated Demand Control	56.782	442,049	7,785	$19,976.00
2000 CFM to 2499 CFM Heated Demand Control	68.987	552,933	8,015	$24,244.00

Table 6.4.3 Blower Purge Desiccant Dryers w/ Purge/Dewpoint Demand Control (Reference 4 & 7)

Blower Purge Desiccant Dryer CFM	kW Savings	kWh Savings	Hours	Incremental Cost
90 CFM to 119 CFM Blower Demand Control	4.750	32,925	6,931	$18,027.00
120 CFM to 159 CFM Blower Demand Control	6.302	43,812	6,952	$18,528.00
160 CFM to 199 CFM Blower Demand Control	8.350	58,309	6,983	$19,194.00
200 CFM to 249 CFM Blower Demand Control	10.339	72,476	7,010	$19,861.00
250 CFM to 299 CFM Blower Demand Control	12.772	89,965	7,044	$20,695.00
300 CFM to 399 CFM Blower Demand Control	15.228	107,780	7,078	$21,528.00
400 CFM to 499 CFM Blower Demand Control	19.798	141,495	7,147	$23,195.00
500 CFM to 599 CFM Blower Demand Control	24.303	175,272	7,212	$24,862.00
600 CFM to 799 CFM Blower Demand Control	28.523	207,619	7,279	$26,529.00
800 CFM to 999 CFM Blower Demand Control	36.483	270,045	7,402	$29,863.00
1000 CFM to 1249 CFM Blower Demand Control	43.798	329,363	7,520	$33,197.00
1250 CFM to 1499 CFM Blower Demand Control	52.261	400,213	7,658	$37,365.00
1500 CFM to 1999 CFM Blower Demand Control	59.741	465,080	7,785	$41,532.00
2000 CFM to 2499 CFM Blower Demand Control	72.394	580,240	8,015	$49,867.00

References:

(4) Analysis of 400+ Compressed Air Supply Side Studies between 2015 - 2022
(7) Various anonymous retailer and vendor quotes
(14) Compressed Air Best Practices (https://www.airbestpractices.com/system-assessments/air-treatmentn2/desiccant-dryers-ten-lessons-learned)

Changes from Recent Filing:

Added Purge/Dewpoint Controlled Heated Desiccant Dryers & Controlled Blower Purge Desiccant Dryers
kW & kWh Savings updated with recent compressed air study history for all sizes
Incremental Costs updated to current market prices

6.5 Mist Eliminators

Algorithms

$$Customer\ kWh = Quantity \times kWh\ Savings$$

$$Customer\ kW = Quantity \times kW\ Savings$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

$$Incremental\ Cost = Quantity \times Unit\ Incremental\ Cost$$

$$O\&M\ Savings = Quantity \times Unit\ O\&M\ Savings$$

Variables

kWh Savings	See Table 6.5.1	kWh savings based on Cycling Dryer rated CFM
kW Savings	See Table 6.5.1	kW savings based on Cycling Dryer rated CFM
Hours	See Table 6.5.1	Based on average operating hours from historical participation in compressed air studies.
Lifetime	11	Assumption based on various manufacturer's rated life, also the filter element life for mist eliminators (Ref 12 & 13)
Coincidence Factor	100.0%	Coincidence of energy demand savings to grid peak demand based on Custom Compressed Air project history.
Incremental Cost	See Table 6.5.1	Incremental Cost of energy efficient equipment compared to less-efficient equipment option
O&M Savings	See Table 6.5.1	O&M cost difference of filter replacements over the lifetime.

Customer Inputs	**M&V Verified**	
Quantity of Mist Eliminators	Yes	
CFM of Dryer Mist Eliminators	Yes	

Table 6.5.1: Energy Savings and Costs for Mist Eliminator Filters (Reference 1 & 2)

Filter CFM	kW Savings	kWh Savings	Hours	Incremental Cost	O&M Savings
125 CFM to 249 CFM Mist Eliminator Filter	0.230	1,603	6,973	$5,341	$91
250 CFM to 499 CFM Mist Eliminator Filter	0.453	3,208	7,078	$5,611	$170
500 CFM to 799 CFM Mist Eliminator Filter	0.894	6,505	7,276	$6,149	$327
800 CFM to 1099 CFM Mist Eliminator Filter	1.404	10,517	7,491	$6,795	$515
1100 CFM to 1499 CFM Mist Eliminator Filter	1.895	14,564	7,687	$7,440	$703
1500 CFM to 1899 CFM Mist Eliminator Filter	2.530	20,036	7,919	$8,302	$954
1900 CFM to 2399 CFM Mist Eliminator Filter	3.138	25,484	8,121	$9,163	$1,206
2400 CFM to 2999 CFM Mist Eliminator Filter	3.889	32,389	8,329	$10,239	$1,519
3000 CFM to 4499 CFM Mist Eliminator Filter	4.799	40,901	8,523	$11,531	$1,896
4500 CFM to 5999 CFM Mist Eliminator Filter	7.160	62,724	8,760	$14,760	$2,838

References:

(4) Analysis of 400+ Compressed Air Supply Side Studies between 2015 - 2022
(7) Various anonymous retailer and vendor quotes
(12) ZEKS Mist Eliminator (http://www.zeks.com/PDF/ZEKS%20Mist%20Eliminator.pdf)
(13) Quincy Mist Eliminator (https://www.quincycompressor.com/products/mist-eliminators)

Changes from Recent Filing:

Added larger sizes up to 5999 CFM
kW & kWh Savings updated with recent compressed air study history for all sizes
Incremental Costs updated to current market prices

6.6 No Air Loss Drain

Algorithms

$$\frac{kW}{SCFM} = \left(\frac{SCFM}{HP}\right)^{-1} \times \left(\frac{kW}{HP}\right) \div Motor\ Efficiency$$

$$Customer\ kW = Quantity \times Average\ SCFM \times \left(\frac{kW}{SCFM}\right)$$

$$Customer\ kWh = Hours\ \times Customer\ kW$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

$$Incremental\ Cost = Quantity \times Unit\ Incremental\ Cost$$

Variables

Average SCFM	2.739	Based on assumed time open and cycle interval of timed drain being replaced.
Motor Efficiency	94.0%	Assumed Average Air Compressor Motor Efficiency
SCFM / HP	4.25	Standard rule of thumb assumption for flow reduction on a typical 100 psig system with variable speed control.
kW / HP	0.746	Standard conversion from HP to kW.
kW / SCFM	0.187	
kW Savings	0.511	Estimated energy savings per No Air Loss Drain from compressed air flow reduction.
Hours	7,410	Average compressed air system operating hours from participation history in program.
kWh Savings	3,790	Based on an average annual operating hours of custom compressed air projects and estimated energy savings from flow reduction.
Coincidence Factor	100.0%	Savings is from flow reduction during all operating hours of the compressed air system, so is assumed to be coincident with the grid peak.
Lifetime	13	Reference 3
Unit Incremental Cost	$323.00	Incremental Cost of energy efficient equipment compared to less-efficient equipment option

Customer Inputs	**M&V Verified**	
Quantity of No Air Loss Drains	Yes	

References:

(3) Historic compressed air product experience
(11) Massachusetts Joint Utilities "Measure Life Study". Energy & Resource Solutions. Table 1-1. 2005. Source for NALD Lifetime

Changes from Recent Filing:

Updated Operating Hours with results from Compressed Air Studies

6.7 VFD Compressor

Algorithms

$$Customer\ kW = Horsepower \times Service\ Factor \times 0.746 \times \left[\left(\frac{Baseline\ Load}{Motor\ Efficiency}\right) - \left(\frac{Proposed\ Load}{Motor\ Efficiency}\right)\right] \times Quantity$$

$$Customer\ kWh = Customer\ kW \times Hours$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

$$Incremental\ Cost = Quantity \times Unit\ Incremental\ Cost$$

Variables

Coincidence Factor	80.3%	Coincidence of energy demand savings to grid peak demand based on Custom Compressed Air project history.
Motor Efficiency	See Table 6.7.1	Efficiency of new compressor motor as determined by customer provided Compressor HP (Reference 5)
Baseline Load	87.43%	Average percent loading for new fixed speed compressors
Horsepower	Customer Input	Nominal horsepower of new compressor
Proposed Load	59.79%	Average percent loading for new VFD compressors
Hours	See Table 6.7.1	Operating hours of new compressors (Reference 6)
Service Factor	1.15	Service factor of an air compressor motor (Reference 1)
Lifetime	20	Typical assumption for new industrial equipment
Unit Incremental Cost	See Table 6.7.2	Incremental cost of efficient measures compared less-efficient option

Customer Inputs	**M&V Verified**	
Compressor HP	Yes	
Compressor Quantity	Yes	

Table 6.7.1: Motor Efficiencies & Operating Hours (Reference 4, 5, & 6)

Compressor HP	Motor Description	Motor Efficiency	Operating Hours
10	10 HP 1800 RPM ODP	91.7%	6,928
15	15 HP 1800 RPM ODP	93.0%	6,945
20	20 HP 1800 RPM ODP	93.0%	6,962
25	25 HP 1800 RPM ODP	93.6%	6,980
30	30 HP 1800 RPM ODP	94.1%	6,997
40	40 HP 1800 RPM ODP	94.1%	7,031
50	50 HP 1800 RPM ODP	94.5%	7,064
75	75 HP 1800 RPM ODP	95.0%	7,147
100	100 HP 1800 RPM ODP	95.4%	7,228
125	125 HP 1800 RPM ODP	95.4%	7,307

Table 6.7.2: Incremental Costs for Efficient Measures (Reference 15)

Measure	Incremental Cost
10 HP VFD Compressor	$3,368.00
15 HP VFD Compressor	$4,155.00
20 HP VFD Compressor	$4,943.00
25 HP VFD Compressor	$5,730.00
30 HP VFD Compressor	$6,517.00
40 HP VFD Compressor	$8,092.00
50 HP VFD Compressor	$9,667.00
75 HP VFD Compressor	$13,604.00
100 HP VFD Compressor	$17,541.00
125 HP VFD Compressor	$21,478.00

References:

(1) Service factor from Compressed Air & Gas Institute (CAGI) standards comparing Nameplate HP to actual BHP @ 100% Full rated pressure and flow

(5) National Electric Manufacturers Association. Motor efficiency standards from Pre-EPAct 2005 and after.
(6) United States Industrial Electric Motor Systems Market Opportunities Assessment, EERE, US DOE, Dec 2002 - Source for operating hours for industrial motors
(7) Various anonymous retailer and vendor quotes
(10) Compressed Air Challenge (Best Practices Guide): source for baseline compressor curves, % efficiency/psi reduction, SCFM per orifice
(15) 2023 Illinois Statewide Technical Reference Manual for Energy Efficiency Version 11.0 Volume 2: Commercial and Industrial Measures
(4) Analysis of 400+ Compressed Air Supply Side Studies between 2015 - 2022

Changes from Recent Filing:

Increasing VSD compressor range with 50, 75, 100, & 125 HP
Updated Operating Hours with results from Compressed Air Studies
Updated Incremental Costs to current market prices

6.8 Demand Side Study

Variables

kWh Savings	0	Demand Side Studies have no direct energy savings claimed, typically.
kW Savings	0.00	Demand Side Studies have no direct energy savings claimed, typically.
Hours	7,410	Average compressed air system operating hours from participation history in program. (Ref. 4)
Lifetime	5	Standard assumption for compressed air study life.
Coincidence Factor	80.3%	Coincidence of energy demand savings to grid peak demand based on Custom Compressed Air project history.
Incremental Cost	$6,627.00	Based on average demand side study cost from historical participation. (Ref. 17)

References:

(4) Analysis of 400+ Compressed Air Supply Side Studies between 2015 - 2022
(17) Analysis of MN Compressed Air Demand Study participants 2017 - 2022

Changes from Recent Filing:

New compressed air study offering focused on the end uses, or demand side, of a compressed air system or vacuum system, each with a custom pre-approved scope.

6.9 Pressure Flow Controller

$$Customer\ kW = Operating\ HP \times Savings\ Factor \times Load\ Factor \times \left(\frac{kW}{HP}\right) \div Motor\ Efficiency$$

$$Customer\ kWh = Annual\ Hours\ \times Customer\ kW$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

$$Incremental\ Cost = Cost\ per\ HP \times Added\ Gallons$$

Variables

Operating HP	Customer Input	Input for compressed air system rated HP running.
Savings Factor (Ref. 16)	2.5%	Average 5 psi pressure reduction from installing pressure/flow controller with 0.5 %power reduction per decrease in psi.
Load Factor (Ref. 16)	75%	Average load factor of an air compressor related to nominal HP.
Motor Efficiency	94.0%	Assumed Average Air Compressor Motor Efficiency
SCFM / HP	4.25	Standard rule of thumb assumption for flow reduction on a typical 100 psig system with variable speed control.
kW / HP	0.746	Standard conversion from HP to kW.
Annual Hours (Ref. 4)	7,410	Average annual operating hours of a compressed air system (Ref. 4)
Lifetime	15	Standard assumption for new industrial controls.
Coincidence Factor	80.3%	Coincidence Factor from Custom Compressed Air projects
Cost per HP	$27.15	Average cost per operating HP of compressed air system (Ref. 16)

Customer Inputs	**M&V Verified**	
Operating HP	Yes	
PSI Reduction	No	

References:

(4) Analysis of 400+ Compressed Air Supply Side Studies between 2015 - 2022
(16) MN TRM 4.0: Industrial Compressed Air – Storage Tank

Changes from Recent Filing:

New Product Measure

6.10 Storage Tanks

$$\frac{Gallons}{SCFM} = Added\ Gallons \div \left(\frac{SCFM}{HP} \times Operating\ HP\right)$$

$$Customer\ kW = Operating\ HP \times \frac{Gallons}{SCFM} \times Savings\ Factor \times Percent\ Power \times \left(\frac{kW}{HP}\right) \div Motor\ Efficiency$$

$$Customer\ kWh = Annual\ Hours\ \times Customer\ kW$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

$$Incremental\ Cost = Cost\ per\ Gallon \times Added\ Gallons$$

Variables

Added Gallons	Customer Input	Input for gallons of compressed air storage tanks added.
Operating HP	Customer Input	Input for compressed air system rated HP running.
Savings Factor (Ref. 16)	2.2%	Average Savings Factor per increase in Gallons/SCFM between 1 to 10 Gal/SCFM.
Percent Power (Ref. 16)	75.3%	Average Percent Power Draw for 50% Load between 1 to 10 Gal/SCFM.
Motor Efficiency	94.0%	Assumed Average Air Compressor Motor Efficiency
SCFM / HP	4.25	Standard rule of thumb assumption for flow reduction on a typical 100 psig system with variable speed control.
kW / HP	0.746	Standard conversion from HP to kW.
Annual Hours (Ref. 4)	7,410	Average annual operating hours of a compressed air system (Ref. 4)
Lifetime	20	Standard assumption for new industrial equipment.
Coincidence Factor	80.3%	Coincidence Factor from Custom Compressed Air projects
Cost per Gallon	$4.00	Average cost of a new air tank (Ref. 16)

Customer Inputs	**M&V Verified**	
Added Gallons	Yes	
Operating HP	Yes	
Compressor Make & Model	No	

References:

(4) Analysis of 400+ Compressed Air Supply Side Studies between 2015 - 2022
(16) MN TRM 4.0: Industrial Compressed Air – Storage Tank

Changes from Recent Filing:

New Product Measure

6.11 Compressed Air Leak Fixes

$$Customer\ kW = \#\ of\ Leaks\ Fixed \times SCFM\ per\ Leak \times \left(\frac{kW}{SCFM}\right)$$

$$Customer\ kWh = Hours\ \times Customer\ kW$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

$$Incremental\ Cost = Cost\ per\ Leak\ Fix \times \#\ of\ Leaks\ Fixed$$

Variables

# of Leaks Fixed	Customer Input	Input for quantity of leaks identified and fixed in the compressed air system.
SCFM per Leak	1.54	Average leak SCFM flow identified in compressed air studies. (Ref. 4)
kW / SCFM	See Table 6.11.1	System kW power reduction per SCFM flow reduction based on air compressor type (Ref. 15)
Annual Hours	7,410	Average annual operating hours of studied compressed air systems. (Ref. 4)
Lifetime	5	Standard assumption from compressed air study for lifetime of a typical individual compressed air leak fix.
Coincidence Factor	100%	Savings is from flow reduction during all operating hours of the compressed air system, so is assumed to be coincident with the grid peak.
Cost per Leak Fix	$75	Standard assumption for all leak studies.

Customer Inputs	**M&V Verified**	
# of Leaks Fixed	Yes	
Total Leak SCFM Fixed	No	
Air Pressure	No	

Table 6.11.1: System kW Power Reduction Per SCFM Flow Reduction (Ref. 15)

Air Compressor Type	**kW/SCFM**
Reciprocating - On/off Control	0.18
Reciprocating - Load/Unload	0.14
Screw - Load/Unload	0.15
Screw - Variable Displacement	0.15
Screw - VFD	0.18

References:

(4) Analysis of 400+ Compressed Air Supply Side Studies between 2015 - 2022
(10) Compressed Air Challenge (Best Practices Guide)
(15) 2023 Illinois Statewide Technical Reference Manual for Energy Efficiency Version 11.0 Volume 2: Commercial and Industrial Measures

Changes from Recent Filing:

New Product Measure

6.12 High Frequency Battery Chargers

Algorithms

$$Customer\ kWh = Quantity\ \times\ kWh\ Savings$$

$$Customer\ kW = Quantity\ \times kWh\ Savings/(Shift\ Length\ *Workdays)$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

$$Incremental\ Cost = Quantity \times Unit\ Incremental\ Cost$$

Variables

Minimum Efficiency	92%	Minimum High-Frequency charger efficiency.
Unit Incremental Cost	$872.50	Incremental cost per high frequency battery charger (Ref. 16)
Lifetime	20	Lifetime (Ref. 16)
Workdays	250	Workdays per year, assuming 2 weeks of downtime for a weekday-only operation.

Customer Inputs	**M&V Verified**	
Quantity	Yes	
Shifts per Day	Yes	
Existing Charger Type	No	

Table 6.12.1: Deemed kWh Savings (Reference 15 & 16)

Shifts Per Day	Shift Length (hours)	kWh Savings (Ref. 16)	Coincidence Factor (Ref. 15)
1	8	1,460	0.0
2	16	2,688	0.0
3	24	3,639	1.0

References:

(15) 2023 Illinois Statewide Technical Reference Manual for Energy Efficiency Version 11.0 Volume 2: Commercial and Industrial
(16) MN TRM 4.0

Changes from Recent Filing:

New Product Measure

7.1 VDI

Algorithms

$$Customer\ kWh = \left(Baseline\ Computer\ kW - \left(\frac{VDI\ Wattage}{1000} + VDI\ Server\ kW\right)\right) * Quantity\ *\ Cooling\ kWh\ Factor\ *\ Hours$$

$$Customer\ Coincident\ kW = \left(Baseline\ Computer\ kW - \left(\frac{VDI\ Wattage}{1000} + VDI\ Server\ kW\right)\right) *\ Quantity\ *\ Cooling\ kW\ Factor\ *\ Coincidence\ Factor$$

$$O\&M\ Savings = \left(Baseline\ Computer\ kW - \left(\frac{VDI\ Wattage}{1000} + VDI\ Server\ kW\right)\right) *\ Quantity\ *Hours\ *Heating\ Penalty\ Factor\ *Gas\ Cost + (O\&M\ Labor\ Savings\ - O\&M\ License\ Cost)\ *Quantity$$

Variables

Baseline Computer kW	0.0213	Aggregated power demand of a baseline desktop computer (References 1-4, 11, 26)
VDI Server kW	0.0040	Average server power used to support a virtualized server (Reference 8)
Cooling kW Factor	1.33	Average annual demand of the cooling system that has to remove the heat gain caused by a desktop computer
Cooling kWh Factor	1.13	Average annual energy consumption of the cooling system that has to remove the heat gain caused by a desktop computer
Hours	8760	Number of hours that a desktop computer is connected to a virtualized server and available to operate
Coincidence Factor	100%	Probability that the calculated Customer kW will coincide with the period of peak generator operation
Heating Penalty Factor	-0.000508	Average annual energy consumption of the heating system that has to compensate for the negative heat gain associated with the more efficient desktop computer (Dth/kWh).
Gas Cost	$5.99	Forecasted natural gas rate for businesses ($/Dth)
O&M Labor Savings	$42.50	Annual labor savings per desktop (Reference 12)
O&M License Cost	$12.00	Annual software license fee per desktop (Reference 12)
NTG	80%	Net to Gross (Reference 30)
Lifetime	10	Life of a VDI, "thin client", in years (Reference 9)
Incremental Cost	$117.00	Cost of high efficiency model over baseline model (Reference 6)

Customer Inputs	**M&V Verified**	
Quantity	Yes	Number of VDI, "thin client", devices installed instead of a desktop PC computer
VDI Wattage	Yes	Rated wattage of the VDI, "thin client", device installed

References:

1. Koomey, J., M. Cramer, M.A. Piette and J. Eto. 1995. "Efficiency Improvements in U.S. Office Equipment: Expected Policy Impacts and Uncertainties." Lawrence Berkeley Laboratory. LBL-37383. December. Table 3.
2. Energy Star Calculator Tool; LBNL 2007 or Energy Star Specification
3. Hours of operation for desktop computers from office desktops/laptops and office monitors from Piette, M. A., M. Cramer, J. Eto and J. Koomey. 1995. "Office Technology Energy Use and Savings Potential in New York." Prepared for the NY State Energy R&D Authority and Con-Ed by LBNL. Lawrence Berkeley Laboratory. LBL-36752. January 1995. p. 4-2
4. LBNL Estimate based on Reference 3
5. Ecova Consulting information from manufacturers
6. Vendor data
7. Baseline desktop PC cost assumed at $600; info from the internet indicates a PC with keyboard averages between $300-$1,000 or $650; assumed the keyboard is $50 of that (Ref 6)
8. Server Wattages from Custom Efficiency program participant; average wattage of 42 models (273W per Server / 68 Virtual Machines per Server). Wattages last confirmed in 2014.
9. 10-year life for thin-client and zero-client based on conversation with MN vendor Nowmicro
10. Not used
11. Ecos Consulting (now Ecova), 2009
12. Various Equipment Vendors
13. Measured Energy Savings and Performance of Power-Managed Personal Computers and Monitors, 1996, Lawrence Berkeley National Laboratory
14. PC and Monitor Night Status: Power Management Enabling and Manual Turn-off, 1998, Lawrence Berkeley National Laboratory
15. ENERGY STAR, 2012
16. Xcel Energy Custom Efficiency projects
17. 2014 Michaels Energy (independent 3rd party) NTG review.
18. Koomey, J., M. Cramer, M.A. Piette and J. Eto. 1995. "Efficiency Improvements in U.S. Office Equipment: Expected Policy Impacts and Uncertainties." Lawrence Berkeley Laboratory. LBL-37383. December. Table 3.
19. Cooling Plant Optimization (http://academic.udayton.edu/kissock/http/EEB/LecturesAndHomework/23-CoolingPlantOptimization/CoolingPlantOptimization.docx)
20. Georgia Tech Student Thesis (http://www-old.me.gatech.edu/energy/students/liuthesis.pdf)
21. Condenser Water Energy Savings (http://web.stanford.edu/group/narratives/classes/08-09/CEE215/ReferenceLibrary/Chillers/York%20Engineering%20Updates/Reduced%20condenser-water%20flow%20rate_energy-saving%20miracle%20or%20mirage.pdf)
22. Server Power Supplies Data Points_PMO.XLS supplied by Ecova on 9/1/14
23. 80 Plus Servers Calculator_Xcel14Aug2014.xlsx file provided by Ecova on 9/1/14
24. Internal adjustment by Xcel energy to distribute power supply cost in a commensurate with wattage served. Values will be reviewed over time as additional information becomes available.
25. Not used
26. Energy Star Office Equipment Calculator, accessed 12/21/15 from: http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/save-energy/purchase-energy-saving-products
27. Energy Star 5.0 Product Database, downloaded on 12/21/15 from historical archive
28. ECOVA - Sales market share analysis, Feb. 2016.
29. 2013 EPA Study for Energy Usage of Average Computer Sold
30. 2016 Computer Efficiency Program Evaluation

Changes from Recent Filing:

1. None

7.2 High Efficiency Server

Algorithms

$$Customer\ kWh = \left(\frac{Rated\ Power\ Supply\ Wattage}{1000} * Power\ Supplies\ per\ Server * Power\ Supply\ Load\ Factor * \left(\frac{1}{Baseline\ Server\ Power\ Supply\ Efficiency} - \frac{1}{Proposed\ Server\ Power\ Supply\ Efficiency}\right)\right) * \left(Hours + \left(\frac{3412}{12000} * Secondary\ Cooling\ Energy\ Factor\right)\right) * Quantity$$

$$Customer\ Coincident\ kW = \left(\frac{Rated\ Power\ Supply\ Wattage}{1000} * Power\ Supplies\ per\ Server * Power\ Supply\ Load\ Factor * \left(\frac{1}{Baseline\ Server\ Power\ Supply\ Efficiency} - \frac{1}{Proposed\ Server\ Power\ Supply\ Efficiency}\right)\right) * \left(1 + \left(\frac{3412}{12000} * Secondary\ Cooling\ Demand\ Factor\right)\right) * Quantity * Coincidence\ Factor$$

Variables

Baseline Server Power Supply Efficiency	89.10%	Power supply efficiency of an 80 PLUS Platinum rated server (Reference 23)
Proposed Server Power Supply Efficiency	92.82%	Power supply efficiency of an 80 PLUS Titanium rated server (Reference 23)
Power Supplies per Server	2	Each server contains two power supplies for 100% redundancy (Reference 23)
Power Supply Load Factor	11.58%	Power supply load factor (Reference 22)
Secondary Cooling Demand Factor	1.025	Aggregate kW/ton of the cooling system types that have to remove the heat gain caused by a server
Secondary Cooling Energy Factor	6,611.78	Aggregate kWh/ton of the cooling system types that have to remove the heat gain caused by a server
Hours	8760	Number of hours that a server is connected and available to operate
Coincidence Factor	100%	Probability that the calculated Customer kW will coincide with the period of peak generator operation
NTG	80%	Net to Gross (Reference 30)
Lifetime	5	Lifetime of a server in years (Reference 18)
Incremental Cost	See Table 7.2.1	Additional cost required to purchase a server with a high efficiency power supply over the baseline server (Reference 24)

Customer Inputs	**M&V Verified**	
Quantity	Yes	Number of servers installed with a high efficiency power supply
Rated Power Supply Wattage	Yes	Rated wattage of the server's power supply

Table 7.2.1

80 PLUS Titanium Rated Server	**Incremental Cost**
401 - 600 Rated Watts	$32.38
601 - 1000 Rated Watts	$37.63
>1000 Rated Watts	$42.88

References:

1. Koomey, J., M. Cramer, M.A. Piette and J. Eto. 1995. "Efficiency Improvements in U.S. Office Equipment: Expected Policy Impacts and Uncertainties." Lawrence Berkeley Laboratory. LBL-37383. December. Table 3.
2. Energy Star Calculator Tool; LBNL 2007 or Energy Star Specification
3. Hours of operation for desktop computers from office desktops/laptops and office monitors from Piette, M. A., M. Cramer, J. Eto and J. Koomey. 1995. "Office Technology Energy Use and Savings Potential in New York." Prepared for the NY State Energy R&D Authority and Con-Ed by LBNL. Lawrence Berkeley Laboratory. LBL-36752. January 1995. p. 4-2
4. LBNL Estimate based on Reference 3
5. Ecova Consulting information from manufacturers
6. Vendor data
7. Baseline desktop PC cost assumed at $600; info from the internet indicates a PC with keyboard averages between $300-$1,000 or $650; assumed the keyboard is $50 of that (Ref 6)
8. Server Wattages from Custom Efficiency program participant; average wattage of 42 models (273W per Server / 68 Virtual Machines per Server). Wattages last confirmed in 2014.
9. 10-year life for thin-client and zero-client based on conversation with MN vendor Nowmicro
10. Not used
11. Ecos Consulting (now Ecova), 2009
12. Various Equipment Vendors
13. Measured Energy Savings and Performance of Power-Managed Personal Computers and Monitors, 1996, Lawrence Berkeley National Laboratory
14. PC and Monitor Night Status: Power Management Enabling and Manual Turn-off, 1998, Lawrence Berkeley National Laboratory
15. ENERGY STAR, 2012
16. Xcel Energy Custom Efficiency projects
17. 2014 Michaels Energy (independent 3rd party) NTG review.
18. Koomey, J., M. Cramer, M.A. Piette and J. Eto. 1995. "Efficiency Improvements in U.S. Office Equipment: Expected Policy Impacts and Uncertainties." Lawrence Berkeley Laboratory. LBL-37383. December. Table 3.
19. Cooling Plant Optimization (http://academic.udayton.edu/kissock/http/EEB/LecturesAndHomework/23-CoolingPlantOptimization/CoolingPlantOptimization.docx)
20. Georgia Tech Student Thesis (http://www-old.me.gatech.edu/energy/students/liuthesis.pdf)
21. Condenser Water Energy Savings (http://web.stanford.edu/group/narratives/classes/08-09/CEE215/ReferenceLibrary/Chillers/York%20Engineering%20Updates/Reduced%20condenser-water%20flow%20rate_energy-saving%20miracle%20or%20mirage.pdf)
22. Server Power Supplies Data Points_PMO.XLS supplied by Ecova on 9/1/14
23. 80 Plus Servers Calculator_Xcel14Aug2014.xlsx file provided by Ecova on 9/1/14
24. Internal adjustment by Xcel energy to distribute power supply cost in a commensurate with wattage served. Values will be reviewed over time as additional information becomes available.
25. Not used
26. Energy Star Office Equipment Calculator, accessed 12/21/15 from: http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/save-energy/purchase-energy-saving-products
27. Energy Star 5.0 Product Database, downloaded on 12/21/15 from historical archive
28. ECOVA - Sales market share analysis, Feb. 2016.
29. 2013 EPA Study for Energy Usage of Average Computer Sold
30. 2016 Computer Efficiency Program Evaluation

Changes from Recent Filing:

1. None

8.1 Custom

Algorithms

Customer may apply for rebate under the Custom Efficiency Program for electric or gas projects not listed under prescriptive rebate programs. Each Custom Efficiency project will be analyzed individually by Xcel Energy. Technical variables required for the analysis will be obtained from the customer or vendor. Analysis will be based on standard engineering methodologies.

Electrical energy savings and electrical demand savings will be calculated based on the project specific details. Each project will undergo an engineering review in accordance with standard engineering practices. The review will be in accordance with the calculation methodologies detailed in the prescriptive programs where applicable.

Variables

Lifetime	Product Life will be evaluated for each project, lifetimes for end use technologies will be in accordance with prescriptive programs where applicable
Coincidence Factor	Coincidence factor will be evaluated for each project.
O&M Savings	Operation and Maintenance Savings will be evaluated for each project.
Energy and Demand Savings	Energy and demand savings will be evaluated for each project.

21.1 Pneumatic to DDC

Algorithms

$$Customer\ kWh\ Savings = Customer\ kWh\ Cooling\ Savings + Customer\ kWh\ Heating\ Savings$$

$$Customer\ kWh\ Cooling\ Savings = (kWh\ Savings\ per\ square\ foot) * Square\ Feet$$

$$Customer\ Peak\ Coincident\ kW = 0$$

$$O\&M\ Savings = 0$$

If electric heat: $Customer\ kWh\ Heating\ Savings = (Therms\ Savings\ per\ square\ foot) * \frac{29.3}{0.8} * Square\ Feet$

If gas heat: $Customer\ Dth = (Therms\ Savings\ per\ square\ foot/10) * Square\ Feet$

$$Customer\ Dth/hr = 0$$

$$Incremental\ Cost = (Incremental\ Cost\ per\ square\ foot) * Square\ Feet$$

Variables

Therms Savings per square foot	See Table 21.1.1	Small office
	See Table 21.1.1	Medium office
	See Table 21.1.1	Large Office
kWh Savings per square foot	See Table 21.1.1	Small office
	See Table 21.1.1	Medium office
	See Table 21.1.1	Large Office
Incremental cost per square foot	$1.10	Average value to be used for all office sizes. (Ref. 5)
Electric heating savings per square foot (kWh)	See Table 21.1.1	Small office
	See Table 21.1.1	Medium office
	See Table 21.1.1	Large Office
Conversion Factor	10	Therms to Decatherms
Conversion Factor	29.3	Conversion from therms per sq. ft. to kWh per sq. ft.
Heating System Efficiency	0.8	Efficiency of heating equipment. (Ref. 3)
Square foot per thermostat	900	sq.ft./thermostat (national average, Ref. 1, page 23)
O&M Labor Savings	$0.00	
O&M License Cost	$0.00	
Lifetime	8	Years (Ref. 4)

Customer Inputs	**M&V Verified**	
Office size	Yes	Small (0-10,000 sq. ft.), Medium (10,001-300,000 sq. ft.), Large (300,001+ sq. ft.)
Square Feet	Yes	Area served by the new thermostats (sq. ft.)
Number of Thermostats (qty.)	Yes	
Thermostat controls equipment providing heating and cooling to the space	Yes	Yes or No
Heating and Cooling setback of at least 8° F	Yes	Yes or No
Heating Fuel	Yes	Natural Gas or Electric
Quantity	Yes	Number of new thermostats

Table 21.1.1 Table of Savings (Ref. 1, Table 6A)

Location	Office Building Size	Model SF	Model Natural Gas Savings (kbtu) with setback heating at 62F (69F baseline)	Therm Savings per square foot	Model Electricity Savings (kWh) with setback cooling at 83F (75F baseline)	kWh Savings per square foot	Cost per square foot ($/sf)
Boulder, CO.	Small	5,500	58,412	0.106	4,672	0.849	$1.20
	Medium	53,630	507,275	0.095	10,778	0.201	$1.10
	Large	498,500	4,569,352	0.092	93,652	0.188	$0.90

References:

1. The calculations, cost and tables used to determine Energy and Cost Savings were obtained from the report: Wireless Pneumatic Thermostat Evaluation Ronald Reagan Building and International Trade Center Washington D.C. (https://www.gsa.gov/cdnstatic/GPG_WPT_Report-508.pdf)

2. ComEd prescriptive rebate calculator.

3. State of Minnesota Technical Reference Manual, Version 4.0. Numerous measures where heating system efficiency is referenced.

4. State of Minnesota Technical Reference Manual, Version 4.0. Commercial HVAC - Adjustment of Programmable Thermostats for Small Commercial Buildings

5. 2018 CBECS. Table B1. Summary table: total and means of floorspace, number of workers, and hours of operation, 2018.
Mean square feet per building for Office category: 17,200 square foot per building.

Changes from Recent Filing:

1. New measure added based on the 2022 Xcel Energy Management Systems Evaluation.

21.2 Guest Room Energy Management

Algorithms

$$Customer\ kWh\ Cooling\ Savings = (Cooling_{Size}/1{,}000) * Quantity\ *\ EFLH_{cool}\ * \left(\frac{1}{Cooling_{Eff}}\right) * GREM_{Savings}$$

$$Customer\ Coincident\ kW = (Cooling_{Size}/1{,}000) * Quantity\ * \left(\frac{1}{Cooling_{Eff}}\right) * GREM_{Savings} * CF$$

If electric heat: $Customer\ kWh\ Heating\ Savings = (Heating_{Size}/3{,}412) * Quantity\ * \left(\frac{1}{Heating_{Eff}}\right) * EFLH_{heat}\ * GREM_{Savings}$

If gas heat: $Customer\ Dth = (Heating_{Size}/1{,}000{,}000) * Quantity\ * \left(\frac{1}{Heating_{Eff}}\right) * EFLH_{heat}\ * GREM_{Savings}$

$$Customer\ Dth/hr = 0$$

$$Incremental\ Cost = Quantity * Incremental\ Cost_{per\ unit}$$

Variables

EFLH_cool	See table 21.1.2	Cooling equivalent full load hours
EFLH_heat	See table 21.2.2	Heating equivalent full load hours
Cooling_Eff	See table 21.3.2	Cooling efficiency of the HVAC system in units of EER
Heating_Eff	See table 21.4.2	Heating efficiency of the HVAC system in units of COP
GREM_savings	18.40%	Savings fraction for using GREM controls
CF	0.90	Deemed coincidence factor
Lifetime	15	Life of a new unit, in year
Incremental Cost (per unit)	$260.00	Per unit, from MN TRM. (per room HVAC controller, which is the cost difference between a non-programmable thermostat and a GREM.)

Customer Inputs	**M&V Verified**	
Quantity Proposed Equipment (Qty.)	Yes	Quantity of HVAC units is usually the same as number of hotel/motel rooms.
County/Zone	Yes	
Cooling type	Yes	PTAC, PTHP, or chilled water fan coil unit
Cooling size	Yes	Nominal cooling capacity of the cooling system in BTU/hr
Heating type	Yes	PTAC/electric resistance, PTAC/hot water, PTHP, hot water fan coil unit
Heating size	Yes	Nominal heating capacity of the cooling system in BTU/hr

Table 21.1.2 EFLH_Cooling (Ref. 2)

Building Type	**CO1**	**CO2**	**CO3**
	Front Range EFLH w/out economizer	**Western Slope EFLH w/out Economizer**	**Mountain EFLH w/out economizer**
Lodging	720	688	462

Table 21.2.2 EFLH_Heating (Ref. 3)

Building Type	**Denver**
Lodging	1272

Table 21.3.2 Cooling System EER (Ref. 1)

PTAC, < 7,000 BTU	11.9
PTAC, 7,000-15,000 BTU	14.0 - (0.300 x Cap/1000)
PTAC, > 15,000 BTU	9.5
PTHP, < 7,000 BTU	11.9
PTHP, 7,000-15,000 BTU	14.0 - (0.300 x Cap/1000)
PTHP, > 15,000 BTU	9.5
Chilled Water Fan Coil Unit	12.5

Table 21.4.2 Heating System COP (Ref. 1)

PTAC, All Sizes	1
PTHP, < 7,000 BTU	3.3
PTHP, 7,000-15,000 BTU	3.7 - (0.052 x Cap/1000)
PTHP, > 15,000 BTU	2.9
Hot Water PTAC or Fan Coil Unit	0.8

References:

1. State of Minnesota Technical Reference Manual, Version 4.0. Commercial HVAC - Guest Room Energy Management Controls.
2. CO 21.0 HVAC Cooling file, EFLH Summary Tables tab.
3. CO 23.0 HVAC Heating file, EFLH Calc. tab.

Changes from Recent Filing:

1. New measure added based on the 2022 Xcel Energy Management Systems Evaluation.

21.3 Rooftop DCV

Algorithms

$$Customer\ kWh\ Cooling\ Savings = \left(\left(4.5 * CFM_{pre} * \Delta h\right) * \left(EFLH_{cool} * \frac{1}{EER}\right) * \frac{SF_C}{1000} * \ Quantity\right)$$

$$Customer\ Dth\ Savings = \frac{\frac{1.08\ *\ CFM_{pre}}{\eta} *\ HDD65\ *\ Hours}{1{,}000{,}000} *\ SF_H\ *\ Quantity$$

$$Customer \frac{Dth}{hr} Savings = 0$$

$$Incremental\ Cost = 1.32 * CFM_{pre} * Quantity$$

Variables

CFM_pre	Calculated	Constant outside air flow in CFM.
Δh	See table 21.1.3	Difference in enthalpy (Btu/lbm) between the design day outside air conditions and the return air conditions.
EFLH_cool	See table 21.2.3	Equivalent full load cooling hours based on building type
EER	10.9	Energy efficency ratio of the existing equipment.
HDD65	See table 21.1.3	Heating Degree Days
SF_C	See table 21.2.3	Deemed cooling savings factor based upon building type
SF_H	See table 21.2.3	Deemed heating savings factor based upon building type
η	0.8	Efficiency of heating equipment
Conversion factor	1.08	Conversion factor for flow rate and specific volume of air
Conversion factor	4.5	Conversion factor for BTU, flow rate and specific volume
Conversion factor	1,000,000	Conversion factor for BTU to Dth
Measure Life	15	Life of a new unit, in years
Incremental Cost	See table 21.1.3	$/CFM

Customer Inputs	**M&V Verified**	
Quantity Proposed Equipment (Qty.)	Yes	
Size	Yes	The equipment capacity in tons.
Building Type (Facility Type)	Yes	
County/Zone	Yes	
CRM_pre (CFM)	Yes	Constant outside airflow in CFM
Hours	Yes	Average hours per day of operation
Enthalpy Economizer installed?	Yes	Yes/No. Collected purely for informational purposes.

Table 21.1.3 Enthalpies, heating degree days and incremental costs

Zone	Design Cooling h (Btu/lbm) (Ref. 2)	Cooling Return h (Btu/lbm) (Ref. 1)	HDD65 (deg. F - days) (Ref. 2)	Incremental Cost ($/CFM) (Ref. 1)
Front Range: #1	31.30	28.36	5,667	1.32
Western: #2	31.70	28.36	5,416	1.32
Mountain: #3	28.60	28.36	8,215	1.32

Table 21.2.3 Cooling and Heating Savings Factors and EFLH_cool per zone in MN by building type

Building Type	SF_C	SF_H	EFLH (w/ Economizer) (Ref. 3)		
			Zone 1	Zone 2	Zone 3
Full Service Restaurant	0.34	0.62	1037	1224	502
Hospital	0.34	0.40	1446	1663	813
Large Office	0.15	0.28	1387	1623	726
LargeHotel	0.15	0.18	1005	1132	614
Medium Office	0.15	0.28	688	799	388
Outpatient Healthcare	0.29	0.34	1358	1507	886
Primary School	0.34	0.63	711	837	395
Quick Service Restaurant	0.34	0.62	920	1093	402
Secondary School	0.34	0.63	1390	1570	856
Small Hotel	0.15	0.18	586	656	364
Small Office	0.15	0.28	586	656	364
Stand-alone Retail	0.34	0.62	873	1000	537
Strip Mall	0.34	0.62	763	865	457
Warehouse (non-refrigerated)	0.31	0.36	112	156	58
Other/Miscellaneous	0.30	0.51	919	1056	526

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

References:

1. State of Minnesota Technical Reference Manual, Version 4.0. Commercial HVAC - Demand Control Ventilation
2. 2021 ASHRAE Climatic Design Conditions for Colorado
3. Table 21.0.1 Equivalent Full Load Hours (Cooling) by Building Type

Changes from Recent Filing:

1. New measure added based on the 2022 Xcel Energy Management Systems Evaluation.

9.0 Envelope Deemed Tables

Table 9.0.1	Front Range	Western Slope	Mountain	High Mountain
HDD	6,016	5,580	9,015	10,333
CDD	1,116	1,452	434	90
Heating Hours	1,825	1,971	2,104	2,739
Cooling Hours	590	837	210	2

Table 9.0.2	Front Range	Western Slope	Mountain	High Mountain
LAF	0.0730	0.0736	0.0696	0.0671
ATF	0.891	0.906	0.813	0.753

Table 9.0.3.a N-Winter

Stories	Front Range	Western Slope	Mountain	High Mountain
1	14.328	16.021	15.138	15.049
2	11.282	12.405	11.520	11.458
3	9.713	10.577	9.730	9.680

Table 9.0.3.b N-Summer

Stories	Front Range	Western Slope	Mountain	High Mountain
1	19.313	18.405	18.321	18.619
2	16.449	15.969	14.762	14.485
3	14.932	14.712	12.890	12.383

Table 9.0.4	Gas Heating Eff	Elec Heating Eff
ASHP	N/A	2.26
GSHP	N/A	3.30
Electric Resistance	N/A	1.00
Natural Gas	0.78	N/A

Table 9.0.5	Cooling Eff
AC/ASHP	3.93
GSHP	4.13
Evap/None	0

References:

1. California Measurement Advisory Committee (CALMAC) Protocols, Appendix F (www.calmac.org/events/APX_F.pdf).
2. 2017 ASHRAE Fundamentals, Chapter 26, Table 1 - Thermal resistance values for building and insulating materials
3. 2017 ASHRAE Fundamentals, Chapter 26, Table 3 - Thermal resistance values of plane air spaces
4. 2017 ASHRAE Fundamentals, Chapter 26, Table 10 - Thermal resistance values for surface films
5. 2017 ASHRAE Fundamentals, Chapter 27, Example 3 - Thermal resistance values for 2x4 framing studs
6. 2017 ASHRAE Fundamentals, Chapter 16, Equation (41) - Defining equivalent air leakage area
7. 2017 ASHRAE Fundamentals, Chapter 16, Equation (48) - Defining airflow rate from infiltration.
8. 2017 ASHRAE Fundamentals; Chapter 16, Table 4 - Defining stack coefficient, C_s
9. 2017 ASHRAE Fundamentals; Chapter 16, Table 6 - Defining basic model wind coefficient, C_w
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15. AERC. 2018. Window Attachments: Efficiency Program Brief. https://aercnet.org/wp-content/uploads/2018/03/AERC_Utility_Briefing_Doc_27FEB18.pdf
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17. 2011 Program Evaluation by Cadmus Group. https://www.xcelenergy.com/staticfiles/xe/Regulatory/Regulatory%20PDFs/CO-DSM/2011-CO-Low-Income-Single-Family-Weatherization-Program-Evaluation.pdf
18. Edwards, C. 1999. Modelling of Ventilation and Infiltration Energy Impacts in Mid- and High-Rise Apartment Buildings.
19. MN TRM v4.0, Residential Cellular Shade Window Coverings

9.1 Attic Insulation

Algorithms

$$Customer\ Dth = \left(\frac{1}{R_{struc}+R_{attic,base}} - \frac{1}{R_{struc}+R_{attic,eff}}\right)\left(\frac{A_{attic}*HDD*24}{Gas\ Heating\ Eff*1{,}000{,}000}\right)$$

$$Cooling\ kWh = \left(\frac{1}{R_{struc}+R_{attic,base}} - \frac{1}{R_{struc}+R_{attic,eff}}\right)\left(\frac{A_{attic}*CDD*24}{Cooling\ Eff*3412}\right)$$

$$Heating\ kWh = \left(\frac{1}{R_{struc}+R_{attic,base}} - \frac{1}{R_{struc}+R_{attic,eff}}\right)\left(\frac{A_{attic}*HDD*24}{Elec\ Heating\ Eff*3412}\right)$$

$$Gross\ Annual\ kWh\ Saved\ at\ Customer = Cooling\ kWh + Heating\ kWh$$

$$Customer\ kW\ (Gross\ kW) = \frac{Gross\ Annual\ kWh\ Saved\ at\ Customer}{Cooling\ Hours+Heating\ Hours}$$

$$Customer\ PCkW = \frac{Cooling\ kWh}{Cooling\ Hours}$$

$$Customer\ Dth/Hr = \left(\frac{1}{R_{struc}+R_{attic,base}} - \frac{1}{R_{struc}+R_{attic,eff}}\right)\left(\frac{A_{attic}*HDD*24}{Gas\ Heating\ Eff*1{,}000{,}000}\right)/Heating\ Hours$$

Variables

R_{struc}	3.93	R-Value of the existing attic structure with no insulation (Reference 2,4,5)
	0.00	R-Value of the existing attic hatch structure - assumed no existing structure in place
Dth to BTU Conversion	1,000,000	1 Dth = 1,000,000 BTU
kWh to BTU Conversion	3412	1 kWh = 3412 BTU
Measure Lifetime	20	Deemed lifetime of measure in years (Reference 1)
HDD	See Table 9.0.1	Heating degree days, 65°F base (based on TMY3 data)
CDD	See Table 9.0.1	Cooling degree days, 65°F base (based on TMY3 data)
Heating Hours	See Table 9.0.1	Full load heating hours (from Residential HVAC program)
Cooling Hours	See Table 9.0.1	Full load cooling hours (from Residential HVAC program)
Gas Heating Eff	See Table 9.0.4	Heating efficiency determined based on customer's heating system type
Elec Heating Eff	See Table 9.0.4	Heating efficiency determined based on customer's heating system type
Cooling Eff	See Table 9.0.5	Cooling efficiency determined based on customer's cooling system type

Customer Inputs	**M&V Verified**	
Heating Type	Yes	Heating system type for the residence
Cooling Type	Yes	Cooling system type for the residence
$R_{attic,base}$	No	R-Value for baseline attic insulation
$R_{attic,eff}$	Yes	R-Value for upgraded attic insulation
A_{attic}	Yes	ft^2 of attic insulation added, Assumed 4.5 ft^2 for attic hatch insulation
Climate Zone	No	Climate zone where the customer is located (Front Range, Western Slope, Mountain, High Mountain)
Incremental Cost	No	Incremental cost for attic insulation provided by customer

References:

See *Deemed Tables*

Changes from Recent Filing:

Added Dth/Hr calculation

9.2 Wall Insulation

Algorithms

$$Customer\ Dth = \left(\frac{1}{R_{wall,base}} - \frac{1}{R_{wall,eff}}\right)\left(\frac{A_{wall} * HDD * 24}{Gas\ Heating\ Eff * 1{,}000{,}000}\right)$$

$$Cooling\ kWh = \left(\frac{1}{R_{wall,base}} - \frac{1}{R_{wall,eff}}\right)\left(\frac{A_{wall} * CDD * 24}{Cooling\ Eff * 3412}\right)$$

$$Heating\ kWh = \left(\frac{1}{R_{wall,base}} - \frac{1}{R_{wall,eff}}\right)\left(\frac{A_{wall} * HDD * 24}{Elec\ Heating\ Eff * 3412}\right)$$

$$Gross\ Annual\ kWh\ Saved\ at\ Customer = Cooling\ kWh + Heating\ kWh$$

$$Customer\ kW\ (Gross\ kW) = \frac{Gross\ Annual\ kWh\ Saved\ at\ Customer}{Cooling\ Hours + Heating\ Hours}$$

$$Customer\ PCkW = \frac{Cooling\ kWh}{Cooling\ Hours}$$

$$Customer\ Dth/Hr = \left(\frac{1}{R_{wall,base}} - \frac{1}{R_{wall,eff}}\right)\left(\frac{A_{wall} * HDD * 24}{Gas\ Heating\ Eff * 1{,}000{,}000}\right) / Heating\ Hours$$

Variables

$R_{wall,base}$	4.30	R-Value for baseline wall insulation, calculated assuming no cavity insulation (Reference 2,3,4,5)
$R_{wall,eff}$	14.83	R-Value for upgraded wall insulation, calculated assuming R-14 cavity insulation (Reference 2,3,4,5)
Dth to BTU Conversion	1,000,000	1 Dth = 1,000,000 BTU
kWh to BTU Conversion	3412	1 kWh = 3412 BTU
Measure Lifetime	20	Deemed lifetime of measure in years (Reference 1)
HDD	See Table 9.0.1	Heating degree days, 65°F base (based on TMY3 data)
CDD	See Table 9.0.1	Cooling degree days, 65°F base (based on TMY3 data)
Heating Hours	See Table 9.0.1	Full load heating hours (from Residential HVAC program)
Cooling Hours	See Table 9.0.1	Full load cooling hours (from Residential HVAC program)
Gas Heating Eff	See Table 9.0.4	Heating efficiency determined based on customer's heating system type
Elec Heating Eff	See Table 9.0.4	Heating efficiency determined based on customer's heating system type
Cooling Eff	See Table 9.0.5	Cooling efficiency determined based on customer's cooling system type

Customer Inputs	**M&V Verified**	
Heating Type	Yes	Heating system type for the residence
Cooling Type	Yes	Cooling system type for the residence
A_{wall}	Yes	ft^2 of wall insulation added
Climate Zone	No	Climate zone where the customer is located (Front Range, Western Slope, Mountain, High Mountain)
Incremental Cost	No	Incremental cost for wall insulation provided by customer

References:

See *Deemed Tables*

Changes from Recent Filing:

1. Updating insulation added to empty wall cavity from R11 to R14 based on dense pack blown in fiberglass.
2. Added Dth/Hr calculation

9.3 Crawl Space Wall Insulation

Algorithms

$$Customer\ Dth = \left(\frac{1}{R_{crawl,base}} - \frac{1}{R_{crawl,eff}}\right)\left(\frac{A_{crawl} * HDD * 24}{Gas\ Heating\ Eff * 1{,}000{,}000}\right)$$

$$Cooling\ kWh = \left(\frac{1}{R_{crawl,base}} - \frac{1}{R_{crawl,eff}}\right)\left(\frac{A_{crawl} * CDD * 24}{Cooling\ Eff * 3412}\right)$$

$$Heating\ kWh = \left(\frac{1}{R_{crawl,base}} - \frac{1}{R_{crawl,eff}}\right)\left(\frac{A_{crawl} * HDD * 24}{Elec\ Heating\ Eff * 3412}\right)$$

$$Gross\ Annual\ kWh\ Saved\ at\ Customer = Cooling\ kWh + Heating\ kWh$$

$$Customer\ kW\ (Gross\ kW) = \frac{Gross\ Annual\ kWh\ Saved\ at\ Customer}{Cooling\ Hours + Heating\ Hours}$$

$$Customer\ PCkW = \frac{Cooling\ kWh}{Cooling\ Hours}$$

$$Customer\ Dth/Hr = \left(\frac{1}{R_{crawl,base}} - \frac{1}{R_{crawl,eff}}\right)\left(\frac{A_{crawl} * HDD * 24}{Gas\ Heating\ Eff * 1{,}000{,}000}\right) / Heating\ Hours$$

Variables

$R_{crawl,base}$	4.30	R-Value for baseline crawl space wall insualtion, calculated assuming no cavity insulation (Reference 2,3,4,5)
$R_{crawl,eff}$	18.20	R-Value for upgraded crawl space wall insulation, calculated assuming R-11 cavity insualtion (Reference 2,3,4,5)
Dth to BTU Conversion	1,000,000	1 Dth = 1,000,000 BTU
kWh to BTU Conversion	3412	1 kWh = 3412 BTU
Measure Lifetime	20	Deemed lifetime of measure in years (Reference 1)
HDD	See Table 9.0.1	Heating degree days, 65^{o}F base (based on TMY3 data)
Heating Hours	See Table 9.0.1	Full load heating hours (from Residential HVAC program)
Cooling Hours	See Table 9.0.1	Full load cooling hours (from Residential HVAC program)
Gas Heating Eff	See Table 9.0.4	Heating efficiency determined based on customer's heating system type
Elec Heating Eff	See Table 9.0.4	Heating efficiency determined based on customer's heating system type

Customer Inputs	**M&V Verified**	
Heating Type	Yes	Heating system type for the residence
A_{crawl}	Yes	ft^2 of wall insulation added
Climate Zone	No	Climate zone where the customer is located (Front Range, Western Slope, Mountain, High Mountain)
Incremental Cost	No	Incremental cost for crawl space wall insulation provided by customer

References:

See *Deemed Tables*

Changes from Recent Filing:

Added Dth/Hr calculation

9.4 Air Sealing

Algorithms

$$Customer\ Dth = \frac{(CFM50_{base} - CFM50_{eff}) * ATF * HDD * 24}{N_{winter} * Gas\ Heating\ Eff * 1{,}000{,}000}$$

$$Cooling\ kWh = \frac{(CFM50_{base} - CFM50_{eff}) * ATF * CDD * 24}{N_{summer} * Cooling\ Eff * 3412}$$

$$Heating\ kWh = \frac{(CFM50_{base} - CFM50_{eff}) * ATF * HDD * 24}{N_{winter} * Elec\ Heating\ Eff * 3412}$$

$$Gross\ Annual\ kWh\ Saved\ at\ Customer = Cooling\ kWh + Heating\ kWh$$

$$Customer\ kW\ (Gross\ kW) = \frac{Gross\ Annual\ kWh\ Saved\ at\ Customer}{Cooling\ Hours + Heating\ Hours}$$

$$Customer\ PCkW = \frac{Cooling\ kWh}{Cooling\ Hours}$$

$$Customer\ Dth/Hr = \left(\frac{(CFM50_{base} - CFM50_{eff}) * ATF * HDD * 24}{N_{winter} * Gas\ Heating\ Eff * 1{,}000{,}000}\right) / Heating\ Hours$$

Variables

Dth to BTU Conversion	1,000,000	1 Dth = 1,000,000 BTU
kWh to BTU Conversion	3412	1 kWh = 3412 BTU
Measure Lifetime	10	Deemed lifetime of measure in years (Reference 1)
HDD	See Table 9.0.1	Heating degree days, 65°F base (based on TMY3 data)
CDD	See Table 9.0.1	Cooling degree days, 65°F base (based on TMY3 data)
Heating Hours	See Table 9.0.1	Full load heating hours (from Residential HVAC program)
Cooling Hours	See Table 9.0.1	Full load cooling hours (from Residential HVAC program)
ATF	See Table 9.0.2	Air transfer factor for converting airflow in ft^3/min to BTU/hr
N_{winter}	See Table 9.0.3	Conversion factor for relating measured air leakage rate in ft^3/min at reference pressure of 50 Pa to a natural infiltration in ft^3/min (Reference 6,7)
N_{summer}	See Table 9.0.3	Conversion factor for relating measured air leakage rate in ft^3/min at reference pressure of 50 Pa to a natural infiltration in ft^3/min (Reference 6,7)
Gas Heating Eff	See Table 9.0.4	Heating efficiency determined based on customer's heating system type
Elec Heating Eff	See Table 9.0.4	Heating efficiency determined based on customer's heating system type
Cooling Eff	See Table 9.0.5	Heating efficiency determined based on customer's cooling system type

Customer Inputs	**M&V Verified**	
Heating Type	Yes	Heating system type for the residence
Cooling Type	Yes	Cooling system type for the residence
$CFM50_{base}$	No	Air leakage rate in ft^3/min determined by blower door test at 50 Pa maintained pressure
$CFM50_{eff}$	Yes	Air leakage rate in ft^3/min determined by blower door test at 50 Pa maintained pressure
House Stories	Yes	Number of stories above grade for the home
Conditioned Area	Yes	Home's conditioned floor area
Climate Zone	No	Climate zone where the customer is located (Front Range, Western Slope, Mountain, High Mountain)
Incremental Cost	No	Incremental cost for air sealing provided by customer

References:

See *Deemed Tables*

Changes from Recent Filing:

Updated to add new climate zone CO4 - High Mountain Areas

9.5 Weatherstripping

Algorithms

$$CFM50_{base} = \frac{Gap_{base} * Gap\ Length}{LAF}$$

$$CFM50_{eff} = \frac{Gap_{eff} * Gap\ Length}{LAF}$$

$$Customer\ Dth = \frac{(CFM50_{base} - CFM50_{eff}) * ATF * HDD * 24}{N_{winter} * Gas\ Heating\ Eff * 1{,}000{,}000}$$

$$Cooling\ kWh = \frac{(CFM50_{base} - CFM50_{eff}) * ATF * CDD * 24}{N_{summer} * Cooling\ Eff * 3412}$$

$$Heating\ kWh = \frac{(CFM50_{base} - CFM50_{eff}) * ATF * HDD * 24}{N_{winter} * Elec\ Heating\ Eff * 3412}$$

$$Gross\ Annual\ kWh\ Saved\ at\ Customer = Cooling\ kWh + Heating\ kWh$$

$$Customer\ kW\ (Gross\ kW) = \frac{Gross\ Annual\ kWh\ Saved\ at\ Customer}{Cooling\ Hours + Heating\ Hours}$$

$$Customer\ PCkW = \frac{Cooling\ kWh}{Cooling\ Hours}$$

$$Customer\ Dth/Hr = Customer\ Dth\ /\ Heating\ Hours$$

Variables

Gap_{base}	0.56	Effective air leakage area in in^2 per foot of door gap for door without weatherstripping (Reference 6,7,10)
Gap_{eff}	0.15	Effective air leakage area in in^2 per foot of door gap for door with weatherstripping (Reference 6,7,10)
Dth to BTU Conversion	1,000,000	1 Dth = 1,000,000 BTU
kWh to BTU Conversion	3412	1 kWh = 3412 BTU
Incremental Cost	See Table 9.5.1	Home Energy Squad - Incremental cost to weatherstrip one door
Measure Lifetime	10	Deemed lifetime of measure in years (Reference 1)
HDD	See Table 9.0.1	Heating degree days, 65°F base (based on TMY3 data)
CDD	See Table 9.0.1	Cooling degree days, 65°F base (based on TMY3 data)
Heating Hours	See Table 9.0.1	Full load heating hours (from Residential HVAC program)
Cooling Hours	See Table 9.0.1	Full load cooling hours (from Residential HVAC program)
LAF	See Table 9.0.2	Leakage area factor for calculating CFM50 from a gap area (Reference 6)
ATF	See Table 9.0.2	Air transfer factor for converting airflow in ft^3/min to BTU/hr
N_{winter}	See Table 9.0.3	Conversion factor for relating measured air leakage rate in ft^3/min at reference pressure of 50 Pa to a natural infiltration in ft^3/min (Reference 6,7)
N_{summer}	See Table 9.0.3	Conversion factor for relating measured air leakage rate in ft^3/min at reference pressure of 50 Pa to a natural infiltration in ft^3/min (Reference 6,7)
Gas Heating Eff	See Table 9.0.4	Heating efficiency determined based on customer's heating system type
Elec Heating Eff	See Table 9.0.4	Heating efficiency determined based on customer's heating system type
Cooling Eff	See Table 9.0.5	Heating efficiency determined based on customer's cooling system type
Gap Length	16.33	Length of weatherstripping installed in ft on assumed average door (Energy Savings Kits only)

Customer Inputs	**M&V Verified**	
Heating Type	Yes	Heating system type for the residence
Cooling Type	Yes	Cooling system type for the residence
Gap Length	Yes	Length of weatherstripping installed in ft (Home Energy Squad)
House Stories	Yes	Number of stories above grade for the home
Climate Zone	No	Climate zone where the customer is located (Front Range, Western Slope, Mountain, High Mountain)
Quantity of Doors Treated	Yes	Number of doors to be treated with weatherstripping

Table 9.5.1: Incremental Costs

Program	Incremental Cost
Home Energy Squad	$9.03
Energy Savings Kits	$1.99

References:

See *Deemed Tables*

Changes from Recent Filing:

Adding weatherstripping to Energy Savings Kits program.
Added Dth/Hr calculation

9.6 Cellular Shades

Algorithms

$$Customer\ Dth = A_{window} * \left[(Therms\ per\ ft^2)_{base} - (Therms\ per\ ft^2)_{eff}\right] * \frac{1}{10}$$

$$Gross\ Annual\ kWh\ Saved\ at\ Customer = A_{window} * \left[(kWh\ per\ ft^2)_{base} - (kWh\ per\ ft^2)_{eff}\right]$$

$$Customer\ kW\ (Gross\ kW) = A_{window} * \left[(kW\ per\ ft^2)_{base} - (kW\ per\ ft^2)_{eff}\right]$$

$$Customer\ PCkW = Customer\ kW * CF$$

$$Incremental\ Cost = Incremental\ Cost\ per\ ft^2 * A_{window}$$

$$Customer\ Dth/Hr = Customer\ Dth\ /\ Heating\ Hours$$

Variables

Dth to Therms Conversion	10	1 Dth = 10 Therms
Incremental Cost per ft^2	$1.88	Insulation Rebates - Incremental cost per ft^2 of cellular shades (Reference 15,16)
CF	100%	Percent of customer kW savings that will coincide with peak summer kW savings
Measure Lifetime	13.7	Average measure lifetime based on maufacturing testing protocols
$(Therms\ per\ ft^2)_{base}$	See Table 9.6.1	Therms per ft^2 of roller shades
$(Therms\ per\ ft^2)_{eff}$	See Table 9.6.1	Therms per ft^2 of cellular shades
$(kWh\ per\ ft^2)_{base}$	See Table 9.6.1	kWh per ft^2 of roller shades
$(kWh\ per\ ft^2)_{eff}$	See Table 9.6.1	kWh per ft^2 of cellular shades
$(kW\ per\ ft^2)_{base}$	See Table 9.6.1	kW per ft^2 of roller shades
$(kW\ per\ ft^2)_{eff}$	See Table 9.6.1	kW per ft^2 of cellular shades

Customer Inputs	**M&V Verified**	
Heating Type	Yes	Heating system type for the residence
Cooling Type	Yes	Cooling system type for the residence
A_{window}	Yes	ft^2 of window covered by cellular shades

Table 9.6.1	$(Therms\ per\ ft^2)_{base}$	$(Therms\ per\ ft^2)_{eff}$	$(kWh\ per\ ft^2)_{base}$	$(kWh\ per\ ft^2)_{eff}$	$(kW\ per\ ft^2)_{base}$	$(kW\ per\ ft^2)_{eff}$
Central AC & Gas Heat	1.346	1.319	5.895	5.553	0.0053	0.0050
Central AC & Electric Resistance Heat	N/A	N/A	37.443	36.471	0.0053	0.0050

References:

See *Deemed Tables*

Changes from Recent Filing:

Added Dth/Hr calculation

9.7 Storm Windows

Algorithms

$$Customer\ Dth = Quantity * Storm\ Window\ Gas\ Savings$$

$$Gross\ Annual\ kWh\ Saved\ at\ Customer = Quantity * Storm\ Window\ Electric\ Savings$$

$$Customer\ Dth/Hr = Customer\ Dth / Heating\ Hours$$

Variables

Measure Lifetime	20	Deemed lifetime of measure in years (Reference 1)
CF	0%	Storm window coincidence factor in electrically heated homes
Customer Dth	See Table 9.7.1	Storm window savings in gas heated homes (Reference 17)
Customer kWh	See Table 9.7.1	Storm window savings in electrically heated homes (Reference 17)
Heating Hours	See Table 9.0.1	Full load heating hours (from Residential HVAC program)
Cooling Hours	See Table 9.0.1	Full load cooling hours (from Residential HVAC program)

Customer Inputs	**M&V Verified**	
Heating Type	Yes	Heating system type for the residence
Quantity	Yes	Quantity of storm windows installed
Climate Zone	No	Climate zone where the customer is located (Front Range, Western Slope, Mountain, High Mountain)
Incremental Cost	No	Incremental cost for storm windows provided by customer

Table 9.7.1	**Storm Window Gas Savings / Window (Dth)**	**Storm Window Electric Savings / Window (kWh)**
Storm Windows (Front Range - Denver)	1.7	395
Storm Windows (Western Slope - Grand Junction)	1.5	359
Storm Windows (Mountain - Eagle / Alamosa)	2.4	560
Storm Windows (High Mountain - Dillon / Leadville)	3.3	762

References:

See *Deemed Tables*

Changes from Recent Filing:

Adjusted savings to be per window treated and requested number of treated windows as input.
Added new Climate Zone for High Mountains
Added Dth/Hr calculation

9.5 Weatherstripping

Algorithms

$$CFM50_{base} = \frac{Gap_{base} * Gap\ Length}{LAF}$$

$$CFM50_{eff} = \frac{Gap_{eff} * Gap\ Length}{LAF}$$

$$Customer\ Dth = \Delta Dth_{infiltration} + \Delta Dth_{insulation}$$

$$\Delta Dth_{infiltration} = \frac{(CFM50_{base} - CFM50_{eff}) * ATF * HDD * 24}{N_{winter} * Gas\ Heating\ Eff * 1{,}000{,}000}$$

$$\Delta Dth_{insulation} = \frac{(U_{value,base} - U_{value,prop}) * A_{window} * HDD * 24}{Gas\ Heating\ Eff * 1{,}000{,}000}$$

$$Heating\ kWh = \Delta kWh_{infiltration} + \Delta kWh_{insulation}$$

$$\Delta kWh_{infiltration} = \frac{(CFM50_{base} - CFM50_{eff}) * ATF * HDD * 24}{N_{winter} * Elec\ Heating\ Eff * 3412}$$

$$\Delta kWh_{insulation} = \frac{(U_{value,base} - U_{value,prop}) * A_{window} * HDD * 24}{Elec\ Heating\ Eff * 3412}$$

$$Heating\ kWh = \frac{(CFM50_{base} - CFM50_{eff}) * ATF * HDD * 24}{N_{winter} * Elec\ Heating\ Eff * 3412}$$

$$Customer\ kW = \frac{Heating\ kWh}{Heating\ Hours}$$

$$Customer\ Dth/hr = \frac{Customer\ Dth}{Heating\ Hours}$$

Variables

Gap_{base}	0.033	Effective air leakage area in in^2 per foot of window without air film (Reference 18)
Gap_{eff}	0.001	Effective air leakage area in in^2 per foot of window with air film applied (Reference 18)
$U_{value,base}$	0.472	U-value of existing window without window film (Reference 19)
$U_{value,prop}$	0.346	U-value of window with window film applied (Reference 3); Assuming added air cavity insulation of R-0.77
Dth to BTU Conversion	1,000,000	1 Dth = 1,000,000 BTU
kWh to BTU Conversion	3412	1 kWh = 3412 BTU
Incremental Cost	$1.99	Energy Saving Kits - Incremental cost of window film pack
Measure Lifetime	1	Deemed lifetime of measure in years
HDD	See Table 9.0.1	Heating degree days, 65°F base (based on TMY3 data)
Heating Hours	See Table 9.0.1	Full load heating hours (from Residential HVAC program)
LAF	See Table 9.0.2	Leakage area factor for calculating CFM50 from a gap area (Reference 6)
ATF	See Table 9.0.2	Air transfer factor for converting airflow in ft^3/min to BTU/hr
N_{winter}	See Table 9.0.3	Conversion factor for relating measured air leakage rate in ft^3/min at reference pressure of 50 Pa to a natural infiltration in ft^3/min (Reference 6,7)
Gas Heating Eff	See Table 9.0.4	Heating efficiency determined based on customer's heating system type
Elec Heating Eff	See Table 9.0.4	Heating efficiency determined based on customer's heating system type

Customer Inputs	**M&V Verified**	
Heating Type	Yes	Heating system type for the residence
A_{window}	Yes	Length of weatherstripping installed in ft (Home Energy Squad)
House Stories	Yes	Number of stories above grade for the home
Climate Zone	No	Climate zone where the customer is located (Front Range, Western Slope, Mountain, High Mountain)

References:

See *Deemed Tables*

Changes from Recent Filing:

New measure

9.9 Manufactured Home Belly Insulation

Algorithms

$$Customer\ Dth = \left(\frac{1}{R_{Struc}+R_{Belly,base}} - \frac{1}{R_{Struc}+R_{Belly,eff}}\right)\left(\frac{A_{Belly}*HDD*24}{Gas\ Heating\ Eff*1{,}000{,}000}\right)$$

$$Cooling\ kWh = \left(\frac{1}{R_{Struc}+R_{Belly,base}} - \frac{1}{R_{Struc}+R_{Belly,eff}}\right)\left(\frac{A_{Belly}*CDD*24}{Cooling\ Eff*3412}\right)$$

$$Heating\ kWh = \left(\frac{1}{R_{Struc}+R_{Belly,base}} - \frac{1}{R_{Struc}+R_{Belly,eff}}\right)\left(\frac{A_{Belly}*HDD*24}{Elec\ Heating\ Eff*3412}\right)$$

$$Gross\ Annual\ kWh\ Saved\ at\ Customer = Cooling\ kWh + Heating\ kWh$$

$$Customer\ kW\ (Gross\ kW) = \frac{Gross\ Annual\ kWh\ Saved\ at\ Customer}{Cooling\ Hours+Heating\ Hours}$$

$$Customer\ PCkW = \frac{Cooling\ kWh}{Cooling\ Hours}$$

$$Incremental\ Cost = Belly\ Insul\ Cost\ per\ ft^2 * A_{Floor}$$

$$Customer\ Dth/Hr = \left(\frac{1}{R_{Struc}+R_{Belly,base}} - \frac{1}{R_{Struc}+R_{Belly,eff}}\right)\left(\frac{A_{Belly}*HDD*24}{Gas\ Heating\ Eff*1{,}000{,}000}\right) / Heating\ Hours$$

Variables

R_{Struc}	3.2	R-Value of the existing belly structure with no insulation (References 2,3,5)
Dth to BTU Conversion	1,000,000	1 Dth = 1,000,000 BTU
kWh to BTU Conversion	3,412	1 kWh = 3412 BTU
Measure Lifetime	20	Deemed lifetime of measure in years (Reference 1)
HDD	See Table 9.0.1	Heating degree days, 65oF base (Reference 12)
CDD	See Table 9.0.1	Cooling degree days, 65oF base (Reference 12)
Heating Hours	See Table 9.0.1	Full load heating hours (from Residential HVAC program)
Cooling Hours	See Table 9.0.1	Full load cooling hours (from Residential HVAC program)
Gas Heating Eff	See Table 9.0.4	Heating efficiency determined based on customer's heating system type
Elec Heating Eff	See Table 9.0.4	Heating efficiency determined based on customer's heating system type
Cooling Eff	See Table 9.0.5	Cooling efficiency determined based on customer's cooling system type

Customer Inputs	**M&V Verified**	
Heating Type	Yes	Heating system type for the residence
Cooling Type	Yes	Cooling system type for the residence
$R_{Belly,base}$	Yes	R-Value for baseline belly insulation
$R_{Belly,eff}$	Yes	R-Value for upgraded belly insulation
A_{Belly}	Yes	ft2 of belly insulation added
Landlord Paid Utility?	No	For Home Energy Savings Program - Half of the incremental cost will be rebated if the landlord pays utilities
Belly Insul Cost per ft2	No	For Home Energy Savings Program - Cost per ft2 of wall insulation provided by participating vendors
Incremental Cost	No	Cost of the belly insulation, provided by the customer for Insulation Rebates and Whole Home Efficiency
County	No	Location of the home for determining weather zones
Building Type	No	Single family or multi-family residence

References:

See *Deemed Tables*

Changes from Recent Filing:

New measure in Tiered Geographic Prequalification - CO Program targeting Manufactured Homes.
Added Dth/Hr calculation

10.1 Holistic

Customer may apply for any prescriptive electric or gas rebate while participating as an enrollee in a holistic program. The values shown on Forecast Summary represent the average project characteristics, as defined by past program participation for a given technology. The technical details for a given technology are defined in the technology's Technical Assumptions.

Variables

Lifetime	Based on individual prescriptive product
Coincidence Factor	Based on individual prescriptive product
O&M Savings	Based on individual prescriptive product
Energy and Demand Savings	Based on individual prescriptive product

11.1 Home Lighting

Algorithms

$$kW\ Savings\ per\ Bulb = (Baseline\ Wattage\ - LED\ Wattage)/1000$$

$$Customer\ kWh = Number\ of\ Bulbs \times kW\ Savings\ per\ Bulb \times Hours$$

$$Customer\ kW = Number\ of\ Bulbs \times kW\ Savings\ per\ Bulb$$

$$Peak\ Coincident\ kW = Customer\ kW\ x\ Coincident\ Factor$$

$$Customer\ kWhNightlight = Customer\ kWh\ x\ WHFe$$

$$Customer\ kWNightlight = Customer\ kW\ x\ WHFd$$

$$Peak\ Coincident\ kWNightlight = Customer\ kWNightlight\ x\ Coincident\ Factor$$

$$Baseline\ Wattage = \frac{OutputLumens}{Lumen\ per\ Watt\ Baseline}$$

$$Connected\ Lighting\ Customer\ kWh = Customer\ kWh + (Hours\ x\ SVGe\ x\ LED\ Wattage/1000)$$

$$Holiday\ Lights\ kWh = \frac{Baseline\ Wattage\ - LED\ Wattage}{1000}\ x\ Hours$$

Variables

Number of Bulbs	Vendor Input	Number of bulbs sold.
Baseline Wattage	Tables 11.1.2 - 11.1.7	Baseline wattages are determined using an adjusted ENERGY STAR lumen equivalency rating, adjusted for EISA requirements based on lumen ouptut. Linear lamps based on past participation. [1, 2, 8]
Lumen per Watt Baseline	Tables 11.1.1 and 11.1.8	Lumen per Watt baselines determine baseline wattages if otherwise undefined.
LED Wattage	Manufacturer Provided	Wattage of the LED bulb, provided by each manufacturer.
Output Lumens	Manufacturer Provided	Output Lumens of the LED Bulb, Provided by the Manufacturer
Hours	Table 11.1.13	Annual hours of operation for the bulbs for both residential and non-residential segments. [3, 4, 8]
CF	Table 11.1.11	Probability that peak demand of the bulb will coincide with peak utility system demand. [3, 4, 8]
Lifetime Hours	Table 11.1.14	Lifetime Hours for LEDs.[5]
Measure Life	Table 11.1.12	Measure Life of the average bulb sold, determined by lifetime hours divided by hours of use by segment for all bulbs less Nightlights. The Measure Life for Nightlights is deemed at 8 years.[2]
Incremental Cost of Bulbs	Table 11.1.10 and 11.1.16	Cost difference between baseline and efficient bulb options. [6]
Installation Rate	99%	Future savings for bulbs purchased and put in storage and installed in later years. The net present value of the saving for all bulbs purchased is 100% if all bulbs are installed when purchased. Using 100% for business customers.
O&M savings	$0.00	Operation and maintenance savings are assumed to be zero.
WHFe	1.06	Waste heat factor for energy to account for cooling savings from efficient lighting (listed here for a Single Family Home).[2]
WHFd	1.098	Waste heat factor for demand to account for cooling savings from efficient lighting (listed here for a Single Family Home).[2]
SVGe	Table 11.1.8	Percentage of annual lighting energy saved by lighting control [2]

Provided by product Vendor:	**M&V Verified**
Number and type of bulbs purchased	Yes

Assumptions:

The baseline bulb costs and the LED bulb costs will be reviewed and updated if needed at least semi-annually.
*GSL Bulbs include: A-Line, 3-way, Decorative ST Shape, PAR20, PAR 30, PAR38, R40, BR30, BR40, ER40, Globe with Diameter between 1.5625 and 5 inches, and any other bulbs that fit within the definition defined by the Department of Energy's 10CFR Part 430 Energy Conservation Program [11]
**GSL Specialty Lamps include: G-Shape lamps thet have a first number symbol less than or equal to 12.5, G-shape lamps with diameter of 5 inches or more, MR-shape lamps that have a first symbol equal to 16 and have a lumen output greater than or equal to 800 lumens, Reflector lamps that have a first number symbol less than 16 and do not have E26/E24, E26d, E26/50x39, E29/28, E29/E53x39, E39, E39d, EP39, or EX39 bases and any other bulbs that fit within the definition defined by the Department of Energy's 10CFR Part 430 Energy Conservation Program [11]

If the formula below for the PAR, MR and MRX Lamp baseline equivalent results in a negative or undefined value, the manufacturer recommendation is used.

Table 11.1.1: GSL Bulbs* [2, 11]

Bulb Type	Lumen per Watt Baseline
GSL Bulbs	45

*GSL Bulbs include: A-Line, 3-way, Decorative ST Shape, PAR20, PAR 30, PAR38, R40, BR30, BR40, ER40, Globe with Diameter between 1.5625 and 5 inches, and any other bulbs that fit within the definition defined by the Department of Energy's 10CFR Part 430 Energy Conservation Program [12]

Table 11.1.2: GSL Specialty Bulbs [2, 11]**

Bulb Type	Minimum Lumens	Maximum Lumens	WattsBase
ESIA exempt Globe	150	349	25
ESIA exempt Globe	350	499	40
ESIA exempt Globe	500	574	60
ESIA exempt Globe	575	649	75
ESIA exempt Globe	650	1000	100
ESIA exempt Non S-Shape Decorative w/ Medium and intermediate bases	160	299	25
ESIA exempt Non S-Shape Decorative w/ Medium and intermediate bases	300	499	40
ESIA exempt Non S-Shape Decorative w/ Medium and intermediate bases	500	800	60
ESIA exempt Non S-Shape Decorative w/ candelabra bases	120	159	15
ESIA exempt Non S-Shape Decorative w/ candelabra bases	160	299	25
ESIA exempt Non S-Shape Decorative w/ candelabra bases	300	499	40
ESIA exempt Non S-Shape Decorative w/ candelabra bases	500	650	60
ESIA exempt S-Shape Decorative	50	75	11
ESIA exempt S-Shape Decorative	100	120	15
ESIA exempt S-Shape Decorative	120	340	25
Reflector lamp with medium screw bases	280	374	35
Reflector lamp with medium screw bases	375	600	50
R20	450	524	40
R20	525	750	45

**Non-GSL Specialty Lamps include: G-Shape lamps thet have a first number symbol less than or equal to 12.5, G-shape lamps with diameter of 5 inches or more, MR-shape lamps that have a first symbol equal to 16 and have a lumen output greater than or equal to 800 lumens, Reflector lamps that have a first number symbol less than 16 and do not have E26/E24, E26d, E26/50x39, E29/28, E29/E53x39, E39, E39d, EP39, or EX39 bases and any other bulbs that fit within the definition defined by the Department of Energy's 10CFR Part 430 Energy Conservation Program [11]

PAR, MR, MRX Bulbs [2]

The following equation is used to determine the baseline wattage for these bulbs, result should be rounded down to the nearest wattage in Table X.

$$Wattsbase = 375.1 - 4.355(D) - \sqrt{227{,}800 - 937.9(D) - 0.9903(D^2) - 1479(BA) - 12.02(D * BA) + 14.69(BA^2) - 16{,}720 * ln(CBCP)}$$

D = Bulb Diameter
BA = Beam Angle
CBCP = Center Beam Candle Power

Table 11.1.3: PAR, MR, MRX Bulbs - Energy Star Permitted Wattages [1, 2]

Diameter	Permitted Wattages
16	20, 35, 40, 45, 50, 60, 75
20	50
30S	40, 45, 50, 60, 75
30L	50, 75
38	40, 45, 50, 55, 60, 65, 75, 85, 90, 100, 120, 150, 250

Table 11.1.4: Fixtures [2]

Fixture Category	WattsBase
Indoor	88.5
Downlight Task, and Under Cabinet	45.2
Outdoor	79.6
Downlight/Retrofit Kits	72.8

Table 11.1.5: T-LEDs [8]

Type	WattsBaseline
TLED	32

Table 11.1.6: Holiday Lights [2]

String Type	WattsBase
Mini	0.4
C7	5
C9	7

Table 11.1.7: Nightlights [2]

Nightlight	WattBase
Standard LED Nightlight	7

Table 11.1.8: Connected Lighting [2]

Lighting Type	Lumen per Watt Baseline	SVGe
LED Smart Bulb	45	0.37
Smart Switch	N/A	0.37

Table 11.1.9: Grow Lighting [2, 14]

Nightlight	WattBase
Panel LED Grow Light	132

Table 11.1.10: Incremental Costs If Unknown [6, 8, 12]

Bulb Type	Residential	Buisness
A-Lamps 0-1049 lm	$1.45	$7.37
A-Lamps 1490-5000 lm	$1.45	$10.21
3-Way	$1.52	$1.52
BR30 BR40	$1.65	$9.80
R20	$1.65	$24.68
PAR20, PAR30, PAR38	$1.65	$18.09
MR16	$1.65	$12.51
Decorative and Globe	$1.66	$5.03
Indoor Fixture	$26.00	$21.60
Downlight Task, and Under Cabinet Fixture	$18.00	$21.60
Outdoor Fixture	$26.00	$21.60
Downlight Fixture	$13.00	$21.60
LED Linear Lamps - Type A	$13.00	$4.94
LED Linear Lamps - Type B	$13.00	$13.69
LED Linear Lamps - Type C	$13.00	$22.56
Holiday Lights	$10	N/A
LED Nightlight	$3.35	N/A
LED Smart Bulb	$9.74	N/A
Panel LED Grow Light	$27.00	N/A

Costs are provided by the program implimentor or vendor and are re-evaluated throughout the year to account for the rapidly evolving market.

Table 11.1.11: Coincident Factor [2, 4, 12]

Bulb Type	Residential	Buisness
A-Lamps	12.8%	78%
3-Way	12.8%	78%
GSL Reflectors (PAR20, PAR30, PAR38 R40)	10.9%	78%
Non-GSL Specialty Reflectors (MR16, PAR16 R14 R16)	10.9%	78%
GSL Decorative and Globe	10.9%	78%
Non-GSL Specialty Decorative and Globe	10.9%	78%
Indoor Fixture	11.9%	78%
Downlight Task, and Under Cabinet Fixture	11.9%	78%
Outdoor Fixture	27.3%	78%
Downlight Fixture	11.9%	78%
T-LED	12.8%	78%
Holiday Lights	0.00%	N/A
LED Nightlight	0.00%	N/A
LED Smart Bulb	12.8%	N/A
Grow Lighting	15.7%	15.7%

Table 11.1.12: Measure Life [2, 4, 12]

Bulb Type	Residential	Buisness
A-Lamps	18.37	3.9
3-Way	18.37	3.9
GSL Reflectors (PAR20, PAR30, PAR38 R40)	27.17	3.9
Non-GSL Specialty Reflectors (MR16, PAR16 R14 R16)	27.17	3.9
GSL Decorative and Globe	30	4.9
Non-GSL Specialty Decorative and Globe	30	4.9
Indoor Fixture	30	9.2
Downlight Task, and Under Cabinet Fixture	30	8.8
Outdoor Fixture	18.18	8.8
Downlight Fixture	30	9.2
T-LED	30	9.8
Holiday Lights	30	N/A
LED Nightlight	8	N/A
LED Smart Bulb	18.37	N/A
Panel LED Grow Light	15	N/A

Table 11.1.13: HOU [2, 4, 12]

Bulb Type	Residential	Buisness
A-Lamps	1089	5119
3-Way	1089	5119
GSL Reflectors (PAR20, PAR30, PAR38, R40)	736	5119
Non-GSL Specialty Reflectors (MR16, PAR16 R14 R16)	736	5119
GSL Decorative and Globe	736	5119
Non-GSL Specialty Decorative and Globe	736	5119
Indoor Fixture	926	5119
Downlight Task, and Under Cabinet Fixture	730	5119
Outdoor Fixture	2475	5119
Downlight Fixture	926	5119
T-LED	730	5119
Holiday Lights	210	N/A
LED Nightlight	4380	N/A
LED Smart Bulb	1089	N/A
Panel LED Grow Light	1377	N/A

Table 11.1.14: Lifetime Hours [2, 12]

Bulb Type	Lifetime Hours
A-Lamps	20000
3-Way	20000
GSL Reflectors (PAR20, PAR30, PAR38 R40)	20000
Non-GSL Specialty Reflectors (MR16, PAR16 R14 R16)	20000
GSL Decorative and Globe	25000
Non-GSL Specialty Decorative and Globe	25000
Indoor Fixture	47000
Downlight Task, and Under Cabinet Fixture	45000
Outdoor Fixture	45000
Downlight Fixture	47000
T-LED	50000
Holiday Lights	20000
LED Nightlight	35040
LED Smart Bulb	20000
Panel LED Grow Light	20655

Table 11.1.15: Buisness/Residential Split [7]

Lighting Type	Residential	Buisness
GSL Bulbs	94%	6%
Non-GSL Specialty Bulbs	94%	6%
Fixtures	94%	6%
T-LED	24%	76%
Holiday Lights	100%	0%
Nightlights	100%	0%
Smart Bulbs	100%	0%
Panel LED Grow Light	100%	0%

Table 11.1.16: Average Costs [9]

Type	Incremental Cost
A19 Smart LED Bulb	$12.99
BR30 Smart LED Bulb	$17.99
LED Nightlight	$1.40
School Kits 9W A-line	$3.19
School Kits 11W A-line	$4.81
School Kits 13W A-Line	$5.09
School Kits 15W A-Line	$2.79
School Kits 8W Reflector	$2.65
School Kits 6W Globe	$5.00
School Kits 4W-8W-14W 3-WAY LED	$5.50
School Kits 5W Candle LED	$2.65
Squad 9W A-Line	$5.00
Squad 15W A-Line	$5.00
Squad 10W Flood	$5.00
Squad 6W Globe	$5.00
Squad 5W Candelabra	$5.00
Squad 3-WAY 5W-9W-16W	$5.00
Squad A-Line	$5.00
Squad Specialty	$5.00
HESP 6W Canelabra	$4.90
HESP 6W Globe	$4.90
HESP 10W A-Line	$4.80

Costs are provided by the program implimentor or vendor and are re-evaluated throughout the year to account for the rapidly evolving market.

References:

1. The Uniform Methods Project: Residential Lighting Evaluation Protocol, published April 2017. Page 15.
2. State of Illinois Energy Efficiency Technical Reference Manual Final Technical Version 11.0, effective January 1st, 2023. Vol 3, Pages 310-366.
3. Northeast Residential Lighting Hours-of-Use Study, Pages XVI and 37 and 66.
4. CO Lighting Efficiency (Midstream) deemed savings for business hours and CF.
5. Lifetime hours from Slipstream for bulbs sold in CO 2022 used to calculate weighted lifetime for A-Line and Specialty categories.
6. 2022 CO Home Lighting Product Results compiled by Slipstream (program administrator).
7. 2016 CO Home Lighting and Recycling Evaluation by Cadmus, 2016. Pages 35, 72-73.
8. 2022 CO Lighting Efficiency and Cost data for linear lamps from the buisness lighting program
9. Contracted price with vendors
10. 2015 U.S. Lighting Market Characterization (pg 116)
11. Department of Energy's 10CFR Part 430 Energy Conservation Program
12. Vermont 2023 Technical Reference Manual, Pages 330-332

Changes From Recent Filing:

1. Changed wattage baseline for GSL bulbs to follow the 45 lm/W EISA baseline
2. Broke out A-Line and Specialty categories into GSL, Non-GSL Specialty, and Fixtures
3. Updated HOU, lifetime hours, coincident factors, and incremental costs
4. Added Holiday Lights
5. Added Connected Lighting
6. Updated T-LED baseline wattage
7. Added Nightlights to the Home Lighting program
8. Added Grow Lighting

12.1 DX Units

Algorithms

Customer $kWh = Size \times EFLH \times \left(\frac{12}{SEER_{Baseline}} - \frac{12}{SEER_{Eff}}\right) \times Qty$

Customer kW $= Size \times \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right) \times$ Qty

Customer PC kW $= CF \times Size \times \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right) \times Qty$

$EER = SEER \times 0.85$

$Incremental\ Cost = Size \times Incremental\ Cost\ per\ Ton$

Variables

EFLH	See Table 12.0.2	Equivalent Full Load Hours. The equivalent number of hours that the equipment would be running at full load over the course of the year.
$SEER_{Baseline}$ / $IEER_{Baseline}$	See Table 12.0.1	Deemed Baseline Efficiencies based on IECC 2018
$EER_{Baseline}$	See Table 12.0.1	Deemed Baseline Efficiencies based on IECC 2018
CF	90%	Coincidence Factor (Reference 1)
Incremental Costs Per Ton	See Table 12.0.3	Incremental Costs Per Ton.
NTG_Midstream	92%	Net-to-gross = We will use 92% for all midstream cooling equipment (Reference 4).
SEER to EER conversion factor	0.85	SEER to EER conversion factor
Lifetime, years	20	Reference 11

Customer Inputs	**M&V Verified**	
$SEER_{Eff}$ / $IEER_{Eff}$	Yes	Seasonal (or Integrated) Energy Efficiency Ratio in Btu/W-hr of high efficiency equipment that the customer will install.
EER_{Eff}	Yes	EER of high efficiency equipment that the customer will install.
Size	Yes	The equipment capacity in tons.
Building Type / Market Segment	Yes	
County/Zone	Yes	
System Type	Yes	
Quantity Proposed Equipment (Qty)	Yes	

References:

1. NYSERDA (New York State Energy Research and Development Authority); NY Energy $mart Programs Deemed Savings Database - Source for coincidence factor
2. ASHRAE, 2011, Applications Handbook, Ch. 37, table 4, Comparison of Service Life Estimates
3. CBECS (Commercial Buildings Energy Consumption Survey), 2012 - Total Floor space of Cooled Buildings by Principal Building Activity - source of market segment distributions
4. NTG for cooling is updated through a 2017 program evaluation.
5. Cypress, Ltd. Analysis of office building load profile and RTU efficiency improvement from application of wet bulb depression to reduce air cooled condensing temperatures.
6. International Energy Conservation Code 2018
7. Building America, Research Benchmark Definitions, 2010 (see p. 10). http://www.nrel.gov/docs/fy10osti/47246.pdf
8. Midstream Product Data Analysis by Product Management Vendor
9. California DEER Database 2008
10. Incremental costs for MSHPs were determined from the NEEP Incremental Cost Study Phase 2 Report
11. Equipment life is from Minnesota Technical Reference Manual (TRM) version 3.1 Jan 20, 2020.
12. 2017-2019 CO Cooling Program Participation Data, used for forecasts,minimum qualifying efficiencies

Changes from Recent Filing:

12.2 WSHP

Algorithms

$$Customer\ kW = Size \times \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right) \times Qty$$

$$Customer\ PC\ kW = CF \times Size \times \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right) \times Qty$$

$$EER = SEER$$

$$Incremental\ Cost = Size\ \times Incremental\ Cost\ per\ Ton$$

Electric Baseline

$$WSHP_{Cooling}kWh = Size \times EFLH \times \left(\frac{12}{SEER_{Baseline}} - \frac{12}{SEER_{Eff}}\right)$$

$$WSHP_{Heating}kWh = Size_{Heat} \times EFLH_{Heat} \times \left(\frac{1}{COP_{Baseline} \times 3412} - \frac{1}{COP_{Eff} \times 3412}\right)$$

$$Customer\ kWh = (WSHP_{Cooling}\ kWh + WSHP_{Heating}kWh) \times Qty$$

Gas Baseline

$$Customer\ kWh = (Size\ \times (EFLH_{Cool} \times \left(\frac{12}{SEER_{Baseline}} - \frac{12}{SEER_{Eff}}\right)) + (kWh_{Heat\ Base} - kWh_{Heat\ Eff})) \times Qty$$

$$Dth\ savings\ per\ year = Dth_{Baseline} - Dth_{Eff}$$

$$Dth_{Baseline} = \left(\frac{Size_{Heat}}{1{,}000{,}000}\right) \times EFLH_{HP} * \left(\frac{1}{\%Eff_{Base}}\right)$$

$$Dth_{Eff} = 0$$

$$kWh_{Baseline} = 0$$

$$kWh_{Eff} = \frac{Size_{Heat}}{1000} \times EFLH_{HP} \times \frac{1}{HSPF_{Eff}}$$

Variables

EFLH	See Table 12.0.2	Equivalent Full Load Hours. The equivalent number of hours that the equipment would be running at full load over the course of the year.
$EFLH_{Heat}$	See Table 12.0.2	The equivalent number of hours that WSHP equipment would be running at Full Load over the course of the year for heating.
$\%Eff_{Base}$	0.78	Deemed Baseline Efficiencies based on IECC 2018
$SEER_{Baseline}$ / $IEER_{Baseline}$	See Table 12.0.1	Deemed Baseline Efficiencies based on IECC 2018
$EER_{Baseline}$	See Table 12.0.1	Deemed Baseline Efficiencies based on IECC 2018
CF	90%	Coincidence Factor (Reference 1)
Lifetime, years	15	Reference 11
3412	3,412	kWh to BTU conversion factor
NTG_Midstream	92%	Net-to-gross = We will use 92% for all midstream cooling equipment (Reference 4).
Incremental Costs Per Ton	See Table 12.0.3	Incremental Costs Per Ton.
$COP_{Baseline}$	4.30	COP of standard Water Source Heat Pump equipment in Heating Mode for Water:Air Water Loop from the International Energy Conservation Code, 2018, Table 403.3.2(2).

Customer Inputs	**M&V Verified**	
$SEER_{Eff}$	Yes	SEER of high efficiency equipment that the customer will install.
EER_{Eff}	Yes	EER of high efficiency equipment that the customer will install.
COP_{Eff}	Yes	COP of High Efficiency unit that the customer will install.
Size	Yes	The equipment capacity in tons.
$Size_{Heat}$	Yes	Heating Capacity of Water Source Heat Pumps in BTU/h, provided by customer
Building Type / Market Segment	Yes	
County/Zone	Yes	
Baseline System Type	Yes	Electric or gas heat
Quantity Proposed Equipment (Qty)	Yes	

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

References:

1. NYSERDA (New York State Energy Research and Development Authority); NY Energy $mart Programs Deemed Savings Database - Source for coincidence factor
2. ASHRAE, 2011, Applications Handbook, Ch. 37, table 4, Comparison of Service Life Estimates
3. CBECS (Commercial Buildings Energy Consumption Survey), 2012 - Total Floor space of Cooled Buildings by Principal Building Activity - source of market segment
4. NTG for cooling is updated through a 2017 program evaluation.
5. Cypress, Ltd. Analysis of office building load profile and RTU efficiency improvement from application of wet bulb depression to reduce air cooled condensing
6. International Energy Conservation Code 2018
7. Building America, Research Benchmark Definitions, 2010 (see p. 10). http://www.nrel.gov/docs/fy10osti/47246.pdf
8. Midstream Product Data Analysis by Product Management Vendor
9. California DEER Database 2008
10. Incremental costs for MSHPs were determined from the NEEP Incremental Cost Study Phase 2 Report
11. Equipment life is from Minnesota Technical Reference Manual (TRM) version 3.1 Jan 20, 2020.

Changes from Recent Filing:

12.3 PTAC

Algorithms

Customer $kWh = Size \times EFLH \times \left(\frac{12}{SEER_{Baseline}} - \frac{12}{SEER_{Eff}}\right) \times Qty$

Customer kW $= Size \times \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right) \times Qty$

Customer PC kW $= CF \times Size \times \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right) \times Qty$

$EER = SEER \times 0.85$

$Incremental\ Cost = Size\ \times Incremental\ Cost\ per\ Ton$

Variables

EFLH	See Table 12.0.2	Equivalent Full Load Hours. The equivalent number of hours that the equipment would be running at full load over the course of the year.
$SEER_{Baseline}$ / $IEER_{Baseline}$	See Table 12.0.1	Deemed Baseline Efficiencies based on IECC 2018
$EER_{Baseline}$	See Table 12.0.1	Deemed Baseline Efficiencies based on IECC 2018
CF	90%	Coincidence Factor (Reference 1)
Incremental Costs Per Ton	See Table 12.0.3	Incremental Costs Per Ton.
NTG_Midstream	92%	Net-to-gross = We will use 92% for all midstream cooling equipment (Reference 4).
SEER to EER conversion factor	0.85	SEER to EER conversion factor
Lifetime, years	20	Reference 11

Customer Inputs	**M&V Verified**	
$SEER_{Eff}$ / $IEER_{Eff}$	Yes	Seasonal (or Integrated) Energy Efficiency Ratio in Btu/W-hr of high efficiency equipment that the customer will install.
EER_{Eff}	Yes	EER of high efficiency equipment that the customer will install.
Size	Yes	The equipment capacity in tons.
Building Type / Market Segment	Yes	
County/Zone	Yes	
System Type	Yes	
Quantity Proposed Equipment (Qty)	Yes	

References:

1. NYSERDA (New York State Energy Research and Development Authority); NY Energy $mart Programs Deemed Savings Database - Source for coincidence factor
2. ASHRAE, 2011, Applications Handbook, Ch. 37, table 4, Comparison of Service Life Estimates
3. CBECS (Commercial Buildings Energy Consumption Survey), 2012 - Total Floor space of Cooled Buildings by Principal Building Activity - source of market segment
4. NTG for cooling is updated through a 2017 program evaluation.
5. Cypress, Ltd. Analysis of office building load profile and RTU efficiency improvement from application of wet bulb depression to reduce air cooled condensing
6. International Energy Conservation Code 2018
7. Building America, Research Benchmark Definitions, 2010 (see p. 10). http://www.nrel.gov/docs/fy10osti/47246.pdf
8. Midstream Product Data Analysis by Product Management Vendor
9. California DEER Database 2008
10. Incremental costs for MSHPs were determined from the NEEP Incremental Cost Study Phase 2 Report
11. Equipment life is from Minnesota Technical Reference Manual (TRM) version 3.1 Jan 20, 2020.

Changes from Recent Filing:

12.4 Scroll-Screw Chiller

Algorithms

$$Customer\ kWh = Size \times EFLH \times \left(IPLV_{Baseline} - IPLV_{Eff}\right) \times Qty$$

$$Customer\ kW = Size \times \left(FLV_{Baseline} - FLV_{Eff}\right) \times Qty$$

$$Customer\ PCkW = CF \times Size \times \left(FLV_{Baseline} - FLV_{Eff}\right) \times Qty$$

$$Incremental\ Cost = Size\ \times Incremental\ Cost\ per\ Ton$$

Variables

EFLH	See Table 12.0.2	Equivalent Full Load Hours. The equivalent number of hours that the equipment would be running at full load over the course of the year.
$FLV_{Baseline}$	See Table 12.0.1	Deemed Baseline Efficiencies based on IECC 2018
$IPLV_{Baseline}$	See Table 12.0.1	Deemed Baseline Efficiencies based on IECC 2018
CF	90%	Coincidence Factor (Reference 1)
Incremental Costs Per Ton	See Table 12.0.3	Incremental Costs Per Ton.
NTG_General_Cooling	92%	Net-to-gross = We will use 92% for all cooling equipment except MSHP units (Reference 4).
Lifetime, years	20	Reference 11

Customer Inputs	**M&V Verified**	
FLV_{Eff}	Yes	Full Load Value cooling efficiency in kW/ton, representing the efficiency at design conditions for the customer's operating conditions.
$IPLV_{Eff}$	Yes	Integrated Part Load Value (representing the average efficiency over a range of loaded states) cooling efficiency in kW/ton of high efficiency equipment at the customer's operating conditions.
Size	Yes	The equipment capacity in tons.
Building Type / Market Segment	Yes	
County/Zone	Yes	
System Type	Yes	
Quantity Proposed Equipment (Qty)	Yes	
Air or Waterside Economizer	Yes	Check if the chiller is equpped with or without an Airside/Waterside Economizer

References:

1. NYSERDA (New York State Energy Research and Development Authority); NY Energy $mart Programs Deemed Savings Database - Source for coincidence factor
2. ASHRAE, 2011, Applications Handbook, Ch. 37, table 4, Comparison of Service Life Estimates
3. CBECS (Commercial Buildings Energy Consumption Survey), 2012 - Total Floor space of Cooled Buildings by Principal Building Activity - source of market segment distributions
4. NTG for cooling is updated through a 2017 program evaluation.
5. Cypress, Ltd. Analysis of office building load profile and RTU efficiency improvement from application of wet bulb depression to reduce air cooled condensing temperatures.
6. International Energy Conservation Code 2018
7. Building America, Research Benchmark Definitions, 2010 (see p. 10). http://www.nrel.gov/docs/fy10osti/47246.pdf
8. Midstream Product Data Analysis by Product Management Vendor
9. California DEER Database 2008
10. Incremental costs for MSHPs were determined from the NEEP Incremental Cost Study Phase 2 Report
11. Equipment life is from Minnesota Technical Reference Manual (TRM) version 3.1 Jan 20, 2020.

Changes from Recent Filing:

12.5 Centrifugal Chillers

Algorithms

$$Customer\ kWh = Size \times EFLH \times \left(IPLV_{AHRI_Adj} - IPLV_{Eff}\right) \times Qty$$

$$Customer\ kW = Size \times \left(FLV_{AHRI_Adj} - FLV_{Eff}\right) \times Qty$$

$$Customer\ PCkW = CF \times Size \times \left(FLV_{AHRI_Adj} - FLV_{Eff}\right) \times Qty$$

$$IPLV_{AHRI_Adj} = IPLV_{AHRI} \div K_{adj}$$

$$FLV_{AHRI_Adj} = FLV_{AHRI} \div K_{adj}$$

$$K_{adj} = A \times B$$

$$A = 0.00000014592 \times (Lift)^4 - 0.0000346496 \times (Lift)^3 + 0.00314196 \times (Lift)^2 - 0.147199 \times (Lift) + 3.9302$$

$$B = 0.0015 \times Lvg_{Evap} + 0.934$$

$$Lift = Lvg_{Cond} - Lvg_{Evap}$$

$$Minimum\ Qualifying\ FLV\ = FLV_{AHRI_Adj} - Qualifying\ FLV_{Offset}$$

$$Minimum\ Qualifying\ IPLV\ = IPLV_{AHRI_Adj} - Qualifying\ IPLV_{Offset}$$

$$Incremental\ Cost = Size\ \times Incremental\ Cost\ per\ Ton$$

Variables

EFLH	See Table 12.0.2	Equivalent Full Load Hours. The equivalent number of hours that the equipment would be running at full load over the course of the year.
FLV_{AHRI}	See Table 12.0.1	Full load cooling efficiency in kW/ton of standard equipment, based upon the minimum acceptable efficiency defined by International Energy Conservation Code, 2018, Table 403.2.3(7) for selected centrifugal chiller type, size, condensing and chilled water temperature (provided by customer).
$IPLV_{AHRI}$	See Table 12.0.1	Integrated Part Load Value (representing the average efficiency over a range of loaded states) cooling efficiency in kW/ton of standard equipment, based upon the minimum acceptable efficiency defined by International Energy Conservation Code, 2018 for chiller type and size (type and size provided by customer).
FLV_{AHRI_Adj}		IECC based FLV for water cooled centrifugal chillers adjusted to actual site rated conditions (provided by customer) per IECC 2018 code adjustment formulas.
$IPLV_{AHRI_Adj}$		IECC based IPLV or NPLV for water cooled centrifugal chillers adjusted to actual site rated conditions (provided by customer) per IECC 2018 code adjustment formulas.
Lifetime, years	20	Reference 11
0.00000014592, 0.0000346496, 0.00314196, 0.147199, 3.9302, 0.0015, 0.934		Coefficients to calculate K_{adj} (adjustment factor) per IECC 2018 code adjustment formulas
NTG_General_Cooling	92%	Net-to-gross = We will use 92% for all cooling equipment except MSHP units (Reference 4).
Incremental Costs Per Ton	See Table 12.0.3	Incremental Costs Per Ton.
CF	90%	Coincidence Factor (Reference 1)

Customer Inputs	**M&V Verified**	
FLV_{Eff}	Yes	Full Load Value cooling efficiency in kW/ton, representing the efficiency at design conditions for the customer's operating conditions.
$IPLV_{Eff}$	Yes	Integrated Part Load Value (representing the average efficiency over a range of loaded states) cooling efficiency in kW/ton of high efficiency equipment at the customer's operating conditions.
Lvg_{Evap} (Chilled water supply temperature [°F] at full load)	Yes	The full load water temperature leaving the evaporator, in °F.
Lvg_{Cond} (Condenser water leaving temperature [°F] at full load)	Yes	The full load water temperature leaving the condenser, in °F.
Size	Yes	The equipment capacity in tons.
Building Type / Market Segment	Yes	
County/Zone	Yes	
System Type	Yes	
Quantity Proposed Equipment (Qty)	Yes	
Chill water flow [gpm/ton] at full load	Yes	
Condenser water flow [gpm/ton] at full load	Yes	

References:

1. NYSERDA (New York State Energy Research and Development Authority); NY Energy $mart Programs Deemed Savings Database - Source for coincidence factor
2. ASHRAE, 2011, Applications Handbook, Ch. 37, table 4, Comparison of Service Life Estimates
3. CBECS (Commercial Buildings Energy Consumption Survey), 2012 - Total Floor space of Cooled Buildings by Principal Building Activity - source of market segment distributions
4. NTG for cooling is updated through a 2017 program evaluation.
5. Cypress, Ltd. Analysis of office building load profile and RTU efficiency improvement from application of wet bulb depression to reduce air cooled condensing temperatures.
6. International Energy Conservation Code 2018
7. Building America, Research Benchmark Definitions, 2010 (see p. 10). http://www.nrel.gov/docs/fy10osti/47246.pdf
8. Midstream Product Data Analysis by Product Management Vendor
9. California DEER Database 2008
10. Incremental costs for MSHPs were determined from the NEEP Incremental Cost Study Phase 2 Report
11. Equipment life is from Minnesota Technical Reference Manual (TRM) version 3.1 Jan 20, 2020.

Changes from Recent Filing:

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Algorithms

$$\text{Customer } kWh = Size \times EFLH \times \left(\frac{12}{SEER_{Baseline}} - \frac{12}{SEER_{Eff}}\right) \times Qty$$

$$\text{Customer kW } = Size \times \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right) \times Qty$$

$$\text{Customer PC kW } = CF \times Size \times \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right) \times Qty$$

$$EER = SEER \times 0.85$$

$$Incremental\ Cost = Size\ \times Incremental\ Cost\ per\ Ton$$

Variables

EFLH	See Table 12.0.2	Equivalent Full Load Hours. The equivalent number of hours that the equipment would be running at full load over the course of the year.
$SEER_{Baseline}$ / $IEER_{Baseline}$	See Table 12.0.1	Deemed Baseline Efficiencies based on IECC 2018
$EER_{Baseline}$	See Table 12.0.1	Deemed Baseline Efficiencies based on IECC 2018
CF	90%	Coincidence Factor (Reference 1)
Incremental Costs Per Ton	See Table 12.0.3	Incremental Costs Per Ton.
NTG_General_Cooling	92%	Net-to-gross = We will use 92% for all cooling equipment except MSHP units (Reference 4).
SEER to EER conversion factor	0.85	SEER to EER conversion factor
Lifetime, years	20	Reference 11

Customer Inputs	**M&V Verified**	
$SEER_{Eff}$ / $IEER_{Eff}$	Yes	Seasonal (or Integrated) Energy Efficiency Ratio in Btu/W-hr of high efficiency equipment that the customer will install.
EER_{Eff}	Yes	EER of high efficiency equipment that the customer will install.
Size	Yes	The equipment capacity in tons.
Building Type / Market Segment	Yes	
County/Zone	Yes	
System Type	Yes	
Quantity Proposed Equipment (Qty)	Yes	

References:

1. NYSERDA (New York State Energy Research and Development Authority); NY Energy $mart Programs Deemed Savings Database - Source for coincidence factor
2. ASHRAE, 2011, Applications Handbook, Ch. 37, table 4, Comparison of Service Life Estimates
3. CBECS (Commercial Buildings Energy Consumption Survey), 2012 - Total Floor space of Cooled Buildings by Principal Building Activity - source of market segment
4. NTG for cooling is updated through a 2017 program evaluation.
5. Cypress, Ltd. Analysis of office building load profile and RTU efficiency improvement from application of wet bulb depression to reduce air cooled condensing
6. International Energy Conservation Code 2018
7. Building America, Research Benchmark Definitions, 2010 (see p. 10). http://www.nrel.gov/docs/fy10osti/47246.pdf
8. Midstream Product Data Analysis by Product Management Vendor
9. California DEER Database 2008
10. Incremental costs for MSHPs were determined from the NEEP Incremental Cost Study Phase 2 Report
11. Equipment life is from Minnesota Technical Reference Manual (TRM) version 3.1 Jan 20, 2020.

Changes from Recent Filing:

12.7 VFD Chill Retrofit

Algorithms

$$Customer\ kWh = Size \times EFLH \times \left(IPLV_{VFDBaseline} - IPLV_{VFDEff}\right) \times Qty$$

$$Customer\ kW = Size \times \left(FLV_{VFDBaseline} - FLV_{VFDEff}\right) \times Qty$$

$$Customer\ PCkW = CF \times Size \times \left(FLV_{VFDBaseline} - FLV_{VFDEff}\right) \times Qty$$

$$Incremental\ Cost = Size \times Incremental\ Cost\ per\ Ton$$

Variables

EFLH	See Table 12.0.2	Equivalent Full Load Hours. The equivalent number of hours that the equipment would be running at full load over the course of the year.
Incremental Costs Per Ton	See Table 12.0.3	Incremental Costs Per Ton.
NTG_General_Cooling	92%	Net-to-gross = We will use 92% for all cooling equipment except MSHP units (Reference 4).
Lifetime, years	15	Equal to the value used in the Motors and Drives program for VFDs.

Customer Inputs	**M&V Verified**	
$FLV_{VFDBaseline}$ [Chiller Full Load efficiency without VFD]	Yes	Full Load Value cooling efficiency in kW/ton, representing the efficiency of existing chiller without a VFD at 95% load.
FLV_{VFDEff} [Chiller Chiller Full Load efficiency with VFD]	Yes	Full Load Value cooling efficiency in kW/ton, representing the efficiency of existing chiller with a VFD at 95% load.
$IPLV_{VFDBaseline}$ [Chiller Part Load efficiency without VFD]	Yes	Integrated Part Load Value (representing the average efficiency over a range of loaded states) cooling efficiency in kW/ton of existing chiller without a VFD.
$IPLV_{VFDEff}$ [ChillerPart Load Efficiency with VFD]	Yes	Integrated Part Load Value (representing the average efficiency over a range of loaded states) cooling efficiency in kW/ton of existing chiller with a VFD.
Size	Yes	The equipment capacity in tons.
Building Type / Market Segment	Yes	
County/Zone	Yes	
System Type	Yes	
Quantity of same size Chillers with VFD Retrofit (Qty)	Yes	

References:

1. NYSERDA (New York State Energy Research and Development Authority); NY Energy $mart Programs Deemed Savings Database - Source for coincidence factor
2. ASHRAE, 2011, Applications Handbook, Ch. 37, table 4, Comparison of Service Life Estimates
3. CBECS (Commercial Buildings Energy Consumption Survey), 2012 - Total Floor space of Cooled Buildings by Principal Building Activity - source of market segment distributions
4. NTG for cooling is updated through a 2017 program evaluation.
5. Cypress, Ltd. Analysis of office building load profile and RTU efficiency improvement from application of wet bulb depression to reduce air cooled condensing temperatures.
6. International Energy Conservation Code 2018
7. Building America, Research Benchmark Definitions, 2010 (see p. 10). http://www.nrel.gov/docs/fy10osti/47246.pdf
8. Midstream Product Data Analysis by Product Management Vendor
9. California DEER Database 2008
10. Incremental costs for MSHPs were determined from the NEEP Incremental Cost Study Phase 2 Report
11. Equipment life is from Minnesota Technical Reference Manual (TRM) version 3.1 Jan 20, 2020.

Changes from Recent Filing:

12.8 CRAC Units

Algorithms

$$Customer\,kWh_{No\ Economizer} = Size * EFLH * \left(\frac{12}{3.412 * SCOP_{Baseline}} - \frac{12}{3.412 * SCOP_{Eff}}\right) * Quantity$$

$$Customer\ Coincident\ kW_{No\ Economizer} = CF * Size * \left(\frac{12}{3.412 * SCOP_{Baseline}} - \frac{12}{3.412 * SCOP_{Eff}}\right) * Quantity$$

$$Customer\,kWh_{With\ Economizer} = \left(\begin{array}{c} Size * Hours_{Not\ Economizing} * \left(\frac{12}{3.412 * SCOP_{Baseline}} - \frac{12}{3.412 * SCOP_{Eff}}\right) + \\ Economizer\ Size * Hours_{Economizing} * \left(\frac{12}{3.412 * SCOP_{Adj\ Baseline}} - \frac{12}{3.412 * SCOP_{Economizer\ Eff}}\right) \end{array}\right) * Quantity$$

$$Customer\ Coincident\ kW_{With\ Economizer} = CF * Size * \left(\frac{12}{3.412 * SCOP_{Baseline}} - \frac{12}{3.412 * SCOP_{Eff}}\right) * Quantity$$

Variables

EFLH	8760	Equivalent Full Load Hours. The equivalent number of hours that the equipment would be running at full load over the course of the year.
$Hours_{Not\ Economizing}$	See Table 12.8.0	Number of hours that cooling is provided by compressors
$Hours_{Economizing}$	See Table 12.8.0	Number of hours that cooling is provided by economization
$SCOP_{Baseline}$	See Table 12.8.1	The minimum acceptable SCOP, as defined by the DOE, for a specific size and type of equipment (Reference 2)
$SCOP_{Adj\ Baseline}$	See Table 12.8.1	The minimum acceptable SCOP during economizer operation, which is defined by adjusting the DOE minimum acceptable SCOP to align with Test D of the rating standard (Reference 1).
Coincidence Factor	100%	Probability that the calculated Customer kW will coincide with the period of peak generator operation
Lifetime	20	Life of a new CRAC unit, in years
NTG_General_Cooling	92%	Net-to-gross = We will use 92% for all cooling equipment except MSHP units (Reference 4).
Incremental Cost	See Table 12.8.1	Incremental cost incurred for purchasing a CRAC unit that is more efficient than the DOE minimum requirement (Reference 3)

Customer Inputs	**M&V Verified**	
Size	Yes	The rated equipment sensible capacity in tons, based on the actual indoor operating conditions of the data center (RAT and RH) and the outdoor conditions specified in the rating standard (Reference 1). The maximum eligible unit size is 759,999 Btu/h (63.3 tons).
$SCOP_{Eff}$	Yes	The rated SCOP of the equipment that the customer will install, based on the actual indoor operating conditions of the data center (RAT and RH) and the outdoor conditions specified in the rating standard (Reference 1).
Economizer Size	Yes	The rated equipment sensible capacity during economization in tons, based on the actual indoor operating conditions of the data center (RAT and RH) and the outdoor conditions specified in Optional Test D of the rating standard (Reference 1). The maximum eligible unit size is 759,999 Btu/h (63.3 tons).
$SCOP_{Economizer\ Eff}$	Yes	The SCOP of the equipment that the customer will install, based on the actual indoor operating conditions of the data center (RAT and RH) and the outdoor conditions specified in Test D of the rating standard (Reference 1).
Quantity	Yes	Number of more efficient CRAC units that the customer installed

Table 12.8.0

Equipment Type	**$Hours_{Economizing}$**	**$Hours_{Not\ Economizing}$**
CRAC, Air-Cooled with Economizer	1,989	6,771
CRAC, Water-Cooled with Economizer	1,289	7,471
CRAC, Glycol-Cooled with Economizer	1,257	7,503

Table 12.8.1

Equipment Type	**Net Sensible Cooling Capacity (Btu/h)**		**SCOP_Standard**		**SCOP_Standard_Adj**		
	Lower Limit ≥	**Upper Limit <**	**Downflow Units**	**Upflow Units**	**Downflow Units**	**Upflow Units**	**Incremental Cost $/SCOP**
CRAC, Air-Cooled	1	65,000	2.20	2.09	N/A	N/A	$7,181.33
	65,000	240,000	2.10	1.99	N/A	N/A	$7,715.73
	240,000	760,000	1.90	1.79	N/A	N/A	$11,110.13
CRAC, Air-Cooled with Economizer	1	65,000	2.20	2.09	6.58	6.25	$12,152.77
	65,000	240,000	2.10	1.99	6.28	5.95	$13,057.12
	240,000	760,000	1.90	1.79	5.67	5.36	$18,801.37
CRAC, Water-Cooled	1	65,000	2.60	2.49	N/A	N/A	$18,628.16
	65,000	240,000	2.50	2.39	N/A	N/A	$32,837.67
	240,000	760,000	2.40	2.29	N/A	N/A	$62,303.50
CRAC, Water-Cooled with Economizer	1	65,000	2.55	2.44	4.86	4.65	$19,714.89
	65,000	240,000	2.45	2.34	4.67	4.46	$34,751.50
	240,000	760,000	2.35	2.24	4.48	4.27	$65,931.00
CRAC, Glycol-Cooled	1	65,000	2.50	2.39	N/A	N/A	$18,575.38
	65,000	240,000	2.15	2.04	N/A	N/A	$32,791.17
	240,000	760,000	2.10	1.99	N/A	N/A	$62,303.50
CRAC, Glycol-Cooled with Economizer	1	65,000	2.45	2.34	4.65	4.44	$19,656.86
	65,000	240,000	2.10	1.99	3.99	3.78	$34,700.33
	240,000	760,000	2.05	1.94	3.89	3.68	$65,931.00

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

References:

1. ASHRAE 127-2007
2. CFR Title 10, Volume 3, Chapter II, Subchapter D, Part 431, Subpart F
3. Chapter 3 of the Technical Support Document for the DOE CRAC efficiency final rule making, https://www.regulations.gov/document?D=EERE-2011-BT-STD-0029-0039

Changes from Recent Filing:

Assumptions:

1. The DOE standard does not apply to CRAH units, horizontal flow units, or ceiling-mounted units; therefore, these units are excluded from this prescriptive rebate.
2. The equipment type of CRAC, Air-Cooled with Economizer is not in the DOE standard, but are included in the prescriptive rebate since these are in the market and have a large market share.
3. Minimum SCOP requirements for CRAC, Air-Cooled with Economizer are assumed to be the same as CRAC, Air-Cooled, because market research showed that these types of unit's don't have additional coils for economization. Therefore, no reduction in minimum SCOP is needed to account for the additional flow resistance through the unit.
4. Proposed SCOP ratings must be based on the same outdoor operating conditions used in the rating standard (Reference 1), i.e. air-cooled units are rated at the same OAT, water-cooled units are rated at the same entering and leaving water temperatures, and glycol-cooled units are rated at the same entering and leaving glycol temperatures.
5. Proposed SCOP ratings must be based on actual indoor operating conditions in the data center, i.e. RAT and RH. Credits or penalties for operating the data center above or below the RAT rating condition of 75F and RH rating condition of 45% are part of the savings for this prescriptive rebate. For Glycol Cooled CRAC units, credits or penalties for operating with a propylene glycol solution above or below the rating condition of 40% are also part of the savings for this prescriptive rebate.
6. Credit for being able to run CRAC fans at reduced speeds is not given in the prescriptive savings, because speed controls are standard on all units with EC fans, i.e. new CRAC units. Since units with EC fans have the necessary controls to reduce speed below 100%, the fan speed in the baseline for a new CRAC unit would be the same as the fan speed in the new, proposed CRAC unit.
7. The rated size for units in economization is required since most Water-Cooled and Glycol-Cooled CRAC units have a separate coil for economization, and this coil typically has a different cooling capacity than the evaporator coil. For Air-Cooled units with Economizer, the rated size in economization is likely the same as non-economization, since these units only have one coil for economization and refrigerant evaporation.
8. Economization hours are based on the OA conditions outlined in rating Test D of the rating standard (Reference 1), and an assumed approach temperature of 15 °F for cooling towers and dry coolers.
9. The efficiency curves used for adjusting the minimum SCOP values for economization are from past M&V projects or previous TAs. The efficiency curves are used to find the difference in efficiency at the outdoor operating conditions in Test A and Test D of the rating standard (Reference 1). This difference is then applied to the DOE minimum SCOP values to obtain the minimum SCOP values for economizer operation.
10. CRAC cost from taken from the DOE's data is only for downflow units (Reference 3), but it is assumed that the incremental cost calculated from this data would be the same for upflow units.
11. The DOE's cost data shows negative incremental cost as efficiency improves for smaller Water-Cooled and Glycol-Cooled CRAC units (Reference 3). The DOE mentioned that the negative values were likely due to an insufficient amount of data and the result did not make sense. Therefore, this was corrected here by using ratios of the known, positive incremental cost to correct the DOE's negative incremental cost.
12. The incremental cost for CRAC, Air-Cooled with Economizer is based on a cost multiplier calculated from past Xcel Energy projects. The DOE's cost multiplier was not used, since it did not account for the additional labor and components associated with a CRAC, Air-Cooled with Economizer. The DOE value only accounted for an additional coil, but air-cooled units with economizers don't have additional coils. These units usually have additional mechanical components (e.g. pumps), and these components require more labor beyond connecting a second coil that is housed within the same CRAC enclosure.

12.9 DEPACC

Algorithms

$$Customer\ kWh_{With\ Economizer} = Size \times DEPACC\ EFLH\ Factor \times EFLH_{With\ Economizer} \times KW\ per\ Ton_{Average}$$

$$Customer\ kWh_{No\ Economizer} = Size \times DEPACC\ EFLH\ Factor \times EFLH_{No\ Economizer} \times KW\ per\ Ton_{Average}$$

$$Customer\ KW = Size \times KW\ per\ Ton_{peak}$$

$$Customer\ PC\ KW = Size \times KW\ per\ Ton_{peak} \times Coincidence\ Factor$$

$$Incremental\ Cost\ of\ Equipment = Size \times Incremental\ Cost\ per\ Ton$$

Variables

DEPACC EFLH Factor	1.1631	= DEPACC_Operating_Hours_Office / EFLH for Front Range Office (w/economizer). Equivalent Full Load Hours. The equivalent number of hours that the equipment would be running at full load over the course of the year.
DEPACC_Operating_Hours_Office	1134	DEPACC Operating hrs/yr = Estimated annual hours of operation of the DEPACC system for an office in the Front Range. Used to scale DEPACC operating hours to A/C EFLH by segment
$EFLH_{With\ Economizer}$	See Table 12.0.2	Equivalent Full Load Hours. The equivalent number of hours that cooling equipment with an economizer would be running at full load over the course of the year.
$EFLH_{No\ Economizer}$	See Table 12.0.2	Equivalent Full Load Hours. The equivalent number of hours that cooling equipment without an economizer would be running at full load over the course of the year
KW per $Ton_{Average}$	0.1488	Average kW/ton = kWh/ ton / DEPACC Operating hrs/yr = Efficiency improvement of incumbent air-cooled condensers in kW per ton resulting from installation of condenser evaporative pre-cooler averaged for annual cooling hours.
KW per Ton_{Peak}	0.4544	Peak Coincident kW/ton = Efficiency improvement of incumbent air-cooled condensers in kW per ton resulting from installation of condenser evaporative pre- cooler at summer cooling design conditions: 0.4% design temperatures @ DIA = 93.9°F DB and 64.7°F WB
Coincidence Factor	90%	Probability that the calculated Customer kW will coincide with the period of peak generator operation
Incremental_O&M_Cost_Factor	0.000886667	$ / ton-hour = (Water Cost / Ton) / DEPACC Operating Hours. Factor used to calculate Incremental annual non-energy Operations and Maintenance cost per ton-hr for water usage.
Incremental Cost of Equipment	See Table 12.9.0 DEPACC Incremental Costs	$ / ton-hour = (Water Cost / Ton) / DEPACC Operating Hours. Factor used to calculate Incremental annual non-energy Operations and Maintenance cost per ton-hr for water usage.
Baseline Cost of Equipment	$0.00	= $0 because the baseline option is to do nothing.
NTG_General_Cooling	92%	Net-to-gross = We will use 92% for all cooling equipment.
Lifetime	20	Life of a new Direct Evaporative Cooling unit, in years

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Customer Inputs	M&V Verified	
Size	Yes	The rated cooling equipment capacity in tons.
Building Type / Market Segment	Yes	
County/Zone	Yes	
System Type	Yes	
Quantity Proposed Equipment (Qty)	Yes	
Economizer	Yes	Indicates if the equipment does or does not have a functional cooling economizer (ie., Air or Waterside Economizer).

Table 12.9.0 DEPACC Incremental Costs

System Tons	Incremental Capital Cost ($/ton)	Incremental Electrical O&M Cost ($/ton-hr)
10 to 59	$ 248.27	$ 0.0008867
60 to 99	$ 219.91	$ 0.0008867
100 to 139	$ 209.23	$ 0.0008867
140 to 239	$ 202.80	$ 0.0008867
240 and above	$ 190.49	$ 0.0008867

References:

1. Cypress, Ltd. Analysis of office building load profile and RTU efficiency improvement from application of wet bulb depression to reduce air cooled condensing temperatures.

Changes from Recent Filing:

Assumptions:

1. Minimum equipment size that DEPACC can be installed on is 10 ton.

2. Qualifying evaporative cooling units must have a minimum Media Saturation Effectiveness of 75% and above. The units must be installed with an evaporative media, a remote thermostat, outside air temp sensor and a periodic purge water control if sump is used.

3. Units should have outdoor air, humidity and controls to determine operation of spray nozzles to wet media. If sump is used, periodic purge control would need to be installed.

4. Condenser fan energy costs due to DEPACC media are not expected to increase measurably. Media decreases condenser fan cfm while increasing fan static.

5. Denver Water 2018 average rate at $3.167/1000 gal (Source https://www.denverwater.org/business/billing-and-rates/2018-rates)

6. DEPACC estimate of water consumed by the evaporative pre-cooling system is 0.28 gallons per ton-hour of cooling based on manufacturer's data.

12.10 Mini-Split Heat Pump

Algorithms

$$Cooling\ Electrical\ Energy\ Savings\ (kWh) = Size \times EFLH \times \left(\frac{12}{SEER_{Baseline}} - \frac{12}{SEER_{Eff}}\right)$$

$$Heating\ Electrical\ Energy\ Savings\ (kWh) = \frac{MSHP_{Size_{Heating}}}{1000} \times MSHP_EFLHH \times \left(\frac{1}{HSPF_{Standard}} - \frac{1}{HSPF_Eff}\right)$$

$$Customer\ kWh = Cooling\ Electrical\ Energy\ Savings + Heating\ Electrical\ Energy\ Savings$$

$$Customer\ kW = Size \times \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right)$$

$$Customer\ PC\ kW = CF \times Size \times \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right)$$

Electric Heating Baseline

$$Heating\ Electrical\ Energy\ Savings\ (kWh) = \frac{MSHP_{Size_{Heating}}}{1000} \times MSHP_EFLHH \times \left(\frac{1}{HSPF_{Standard}} - \frac{1}{HSPF_Eff}\right)$$

Gas Heating Baseline

Dth savings per year $= Dth_{Baseline} - Dth_{Eff}$

$$Dth_{Baseline} = \left(\frac{Capacity_{Heat}}{1{,}000{,}000}\right) \times EFLH_{Heat,Base} * \left(\frac{1}{\%Eff_{Base}}\right)$$

$$Dth_{Eff} = 0$$

$$kWh_{Baseline} = 0$$

$$kWh_{Eff} = \frac{Capacity_{Heat}}{1000} \times EFLH_{HP} \times \frac{1}{HSPF_{Eff}}$$

Variables

EFLH	See Table 12.0.2	Equivalent Full Load Hours. The equivalent number of hours that the equipment would be running at full load over the course of the year.
MSHP_EFLHH	950	Mini-Split Heat Pump Equivalent Full Load Hours Heating: The equivalent number of hours that MSHP equipment would be running at full load over the course of the year for heating. From Heating Efficiency Program.
$SEER_{Baseline}$	See Table 12.0.1	Seasonal (or Integrated) Energy Efficiency Ratio in BTU/W-hr of standard equipment, based upon the minimum acceptable efficiency defined by the current building code.
$EER_{Baseline}$	See Table 12.0.1	EER of standard equipment, based upon the minimum acceptable efficiency defined by the current building code. If unavailable, EER_Baseline is calculated from SEER_Eff using a polynomial conversion.
HSPF_Standard	8.20	Heating Seasonal Performance Factor (HSPF) of standard equipment, based upon the minimum Federal standard for efficiency as manufactured.
SEER to EER conversion factor	0.85	SEER to EER conversion factor
CF	90%	Coincidence Factor
NTG_General_Cooling	92%	Net-to-gross = 92% for all cooling equipment.
Measure Life[2]	18	Life of a new unit, in years

Customer Inputs	**M&V Verified**	
Cooling capacity (BTU/h)	Yes	(Btu/h) Size - Cooling capacity of equipment at standard ARI test conditions
Cooling efficiency (SEER)	Yes	SEER_Eff - Seasonal (or Integrated) Energy Efficiency Ratio in Btu/W-hr of high efficiency equipment that the customer will install.
Cooling efficiency (EER)	No	EER_Eff - Full-load efficiency of efficient equipment. If unavailable, value is calculated from SEER_Eff using a polynomial conversion.
Heating capacity (BTU/h)	Yes	(Btu/h) MSHP_Size_Heating - Heating capacity of Mini Split Heat Pump at 17 F outdoor air temperature, in BTU/h
Heating efficiency (HSPF)	Yes	HSPF_Eff - Heating Seasonal Performance Factor (HSPF) of High Efficiency equipment that the customer will install.
Building Type / Market Segment	Yes	
County/Zone	Yes	
System Type	Yes	
Quantity Proposed Equipment (Qty)	Yes	
Primary use, cooling or heating (MSHP)	No	

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

References:

1. Incremental costs for MSHPs were determined from the NEEP Incremental Cost Study Phase 2 Report

2. MSHP equipment life is from Measure Life Report Residential and Commercial/Industrial Lighting and HVAC Measures; http://library.cee1.org/content/measure-life-report-residential-and-commercialindustrial-lighting-and-hvac-measures

3. IECC 2018 for Equipment Baseline Efficiencies

4. No heating demand (kW) saving are claimed for MSHP during winter, only summer cooling demand (kW) savings are claimed.

5. It is assumed that NO supplemental heating source is used.

6. For new Mini-Split Heat Pumps (MSHP) it is assumed that the MSHP is being installed in either new construction or to supplement an existing heating and cooling system. The MSHP rebate is intended to incent customers to install a high efficiency MSHP rather than the code level baseline unit.

Changes from Recent Filing:

12.11 Mini-Split AC

Algorithms

$$Customer\ kWh\ = Size \times EFLH \times \left(\frac{12}{SEER_{Baseline}} - \frac{12}{SEER_{Eff}}\right)$$

$$Customer\ kW = Size \times \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right)$$

$$Customer\ PC\ kW = CF \times Size \times \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right)$$

Variables

EFLH	See Table 12.0.2	Equivalent Full Load Hours. The equivalent number of hours that the equipment would be running at full load over the course of the year.
$SEER_{Baseline}$	See Table 12.0.1	Seasonal (or Integrated) Energy Efficiency Ratio in BTU/W-hr of standard equipment, based upon the minimum acceptable efficiency defined by the current building code.
$EER_{Baseline}$	See Table 12.0.1	EER of standard equipment, based upon the minimum acceptable efficiency defined by the current building code. If unavailable, EER_Baseline is calculated from SEER_Eff using a polynomial conversion.
SEER to EER conversion factor	0.85	SEER to EER conversion factor
CF	90%	Coincidence Factor
NTG_General_Cooling	92%	Net-to-gross = We will use 92% for all cooling equipment.
Measure Life[2]	18	Life of a new unit, in years

Customer Inputs	**M&V Verified**	
Cooling capacity (BTU/h)	Yes	(Btu/h) Size - Cooling capacity of equipment at standard ARI test conditions
Cooling efficiency (SEER)	Yes	SEER_Eff - Seasonal (or Integrated) Energy Efficiency Ratio in Btu/W-hr of high efficiency equipment that the customer will install.
Cooling efficiency (EER)	No	EER_Eff - Full-load efficiency of efficient equipment. If unavailable, value is calculated from SEER_Eff using a polynomial conversion.
County/Zone	No	
Building type	Yes	
System Type	Yes	
Equipment quantity	Yes	
Primary use, cooling or heating (MSHP)	No	

References:

1. Incremental costs were determined from the NEEP Incremental Cost Study Phase 2 Report

2. Equipment life is from Measure Life Report Residential and Commercial/Industrial Lighting and HVAC Measures; http://library.cee1.org/content/measure-life-report-residential-and-commercialindustrial-lighting-and-hvac-measures

3. IECC 2018 for Equipment Baseline Efficiencies

4. For new Mini-Split Air Conditioners (MSAC) it is assumed that the MSAC is being installed in either new construction or to supplement an existing cooling system. The MSAC rebate is intended to incent customers to install a high efficiency MSAC rather than the code level baseline unit.

Changes from Recent Filing:

12.12 Plate & Frame Heat Exchangers

Algorithms

$$Customer\ kWh = \left(A \times T_{WB\ Onset}{}^{2} + B \times T_{Balance}{}^{2} + C \times T_{WB\ Onset} \times T_{Balance} + D \times T_{WB\ Onset} + E \times T_{Balance} + F\right) \times \left(\frac{Cooling\ Hrs\ No\ Econ}{G_EFLH}\right) \times \left(\frac{IPLV_{Eff}}{IPLV_{Baseline}}\right) \times \left(\frac{PF\ Tons\ Offset}{100}\right)$$

$$Customer\ kW = \frac{PF\ Tons\ Offset}{IPLV_{Baseline}}$$

$$\text{Customer PC kW} = CF \times Customer\ kW$$

$$PF\ Tons\ Offset = \left(\frac{Load_{onset}}{\left(T_{DB\ Design} - T_{Balance}\right)}\right) \times T_{WB\ to\ MCDB} + \left(Load_{onset} - \left(\frac{Load_{onset}}{\left(T_{DB\ Design} - T_{Balance}\right)}\right) \times T_{DB\ Design}\right)$$

Variables

$IPLV_{Baseline}$	0.570	Baseline Chiller IPLV (kW/ton)
$T_{DB\ Design}$	92	Design dry-bulb temperature for cooling (°F)
$T_{WB\ to\ MCDB}$	30.505	Mean Coincident Dry Bulb Temperature (as determined from binned TMY3 data for the location) corresponding to the Onset Wet Bulb Temperature provided by the customer
A	3.254	Coefficient from regression
B	0	Coefficient from regression
C	0	Coefficient from regression
D	5958.821	Coefficient from regression
E	0	Coefficient from regression
F	-47208.137	Coefficient from regression
G_EFLH	8760	Coefficient from regression
Coincidence Factor (CF)	0%	Coincidence Factor, the probability that peak demand of the equipment will coincide with peak utility system demand. Because this technology is used when temperatures are at or below 65 F, the CF =0%.
Cooling Hrs No Econ	8760	Equivalent Full Load Hours. The equivalent number of hours that the equipment would be running at full load over the course of the year.
NTG_General_Cooling	92%	Net-to-gross = We will use 92% for all cooling equipment.
Lifetime	20	Measure life is taken at 20 years for all cooling equipment. (Reference 1) (years)

Customer Inputs	**M&V Verified**	
$IPLV_{Eff}$	Yes	Efficient Chiller IPLV (kW/ton)
$T_{WB\ Onset}$	No	Wet Bulb Temperature at which waterside economizer is activated (°F)
$Capacity_{HX}$	Yes	Cooling capacity of plate and frame heat exchanger (tons)
$T_{balance}$	No	Building Balance Point Temperature, the outside air dry bulb temperature at which there is no cooling load. Customer input for all segments except Industrial and Data Center (20°F default); Not used for Industrial and Data Centers since Load (OADB) = Load (°F)
$Load_{onset}$	No	Cooling load at onset wet-bulb temperature ($T_{WB\ Onset}$) (tons)
County/Zone	No	
Building type	Yes	
System Type	Yes	
Equipment quantity	Yes	

References:

1. ASHRAE, 2007, Applications Handbook, Ch. 36, table 4, Comparison of Service Life Estimates
2. Data from historic Xcel Energy Custom Efficiency cooling tower projects

Assumptions:

Description

Prescriptive rebates will be offered for installation of plate & frame heat exchangers on existing chiller systems to allow cooling towers to provide "free cooling" in lieu of chiller operation. Eligible systems will NOT have air-side economizers install

12.13 ASHP < 5.5 Tons

w/ HP/Electric baseline

$$Customer\ kWh = (Size\ \times (EFLH_{Cool} \times \left(\frac{12}{SEER_{Baseline}} - \frac{12}{SEER_{Eff}}\right)) + (kWh_{Heat\ Base} - kWh_{Heat\ Eff})) \times Qty$$

$$kWh_{Heat\ Base} = \left(\frac{Capacity_{Heat}}{1{,}000}\right) \times EFLH_{Heat} \times \left(\frac{1}{HSPF_{Base}}\right)$$

$$kWh_{Heat\ Eff} = \left(\frac{Capacity_{Heat}}{1{,}000}\right) \times EFLH_{Heat\ HP} \times \left(\frac{1}{HSPF_{Eff}}\right)$$

$$Customer\ kW = Size\ * \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right) \times Qty$$

$$Customer\ PCkW = Customer\ kW\ \times\ CF$$

w/Gas heating or dual fuel baseline

$$Customer\ kWh = (Size\ \times (EFLH_{Cool} \times \left(\frac{12}{SEER_{Baseline}} - \frac{12}{SEER_{Eff}}\right)) + (kWh_{Heat\ Base} - kWh_{Heat\ Eff})) \times Qty$$

$$Dth\ savings\ per\ year = Dth_{Baseline} - Dth_{Eff}$$

$$Dth_{Baseline} = \left(\frac{Capacity_{Heat}}{1{,}000{,}000}\right) \times EFLH_{Heat,Base} * \left(\frac{1}{\%Eff_{Base}}\right)$$

$$Dth_{Eff} = 0$$

$$kWh_{Baseline} = 0$$

$$kWh_{Eff} = \frac{Capacity_{Heat}}{1000} \times EFLH_{HP} \times \frac{1}{HSPF_{Eff}}$$

Variables

$EFLH_{Cool}$	See Table 12.0.2	Equivelant Full load Cooling Hours, the equivalent number of hours that the equipment would be running at full load over the course of the year
$EFLH_{Heat}$	See Table 12.0.2	Equivelant Full load Heating Hours, the equivalent number of hours that the equipment would be running at full load over the course of the year
$SEER_{Baseline}$	See Table 12.13.1	Deemed Baseline Efficiencies based on IECC 2018
$EER_{Baseline}$	See Table 12.13.1	Deemed Baseline Efficiencies based on IECC 2018
$HSPF_{Baseline}$	See Table 12.13.1	Deemed Baseline Efficiencies based on IECC 2018
$\%Eff_{Base}$	0.78	Deemed Baseline Efficiencies based on IECC 2018
CF	90%	Coincidence Factor (Reference 1)
Incremental Cost Per Ton	See Table 12.13.2	Incremental Costs Per Ton (Reference 3)
Lifetime	15	MN TRM

Customer Inputs	**M&V Verified**	
$SEER_{Eff}$	Yes	Seasonal Energy Efficiency Ratio inf BTU/W-hr of high efficiency equipment to be installed
EER_{Eff}	Yes	EER of high efficienty equipment to be installed
$HSPF_{Eff}$	Yes	Heating Seasonal Performance Factor
Size	Yes	Equipment Cooling Capacity in tons
$Capacity_{Eff}$	Yes	Equipment Heating Capacity in BTU
System Type	Yes	Split or Packaged System
Building Type	Yes	
Zone	Yes	
Baseline System Type	Yes	Electric or gas heat
Proposed Equipment Quantity	Yes	

Table 12.13.1

Equipment	$SEER_{BASE}$	EER_{BASE}	$HSPF_{BASE}$
ASHP Units less than or equal to 5.4 tons (Split System)	14	11.4	8.2
ASHP Units less than or equal to 5.4 tons (Packaged System)	14	11.4	8

Table 12.13.2

Efficiency level	Incremental Cost
SEER 14	$137.00/ton
SEER 15	$274.00/ton
SEER 16	$411.00/ton
SEER 17	$548.00/ton
SEER 18	$685.00/ton

References

1. NYSERDA (New York State Energy Research and Development Authority); NY Energy $mart Programs Deemed Savings Database - Source for coincidence factor
2. IECC 2018 For baseline equipment efficiencies
3. Equations and measure life from MN TRM

12.14 Indoor Agriculture Dehumidification

Algorithms

$$Customer\ kWh = CAP\ x\ Conversion\ Factor\ x\ Hours\ x\ \left(\frac{1}{Base\ Eff} - \frac{1}{Prop\ Eff}\right) x\ \frac{1}{24}$$

$$Customer\ kW = \frac{Customer\ kWh}{Hours}$$

$$Customer\ Coincident\ kW = Customer\ kW \times CF$$

Variables

CAP	Customer Input	Capacity (pints/day).
Quantity	Customer Input	Number of standalone dehumidification units.
Conversion Factor	0.473	Conversion constant (Liters to pint conversion factor)
CF	100%	Coincidence Factor (Reference 1)
Hours	8,760	Annual operating hours (Reference 3)
Measure Life	12	Measure lifetime (Reference 1)
Incremental Cost	See Table 12.14.2	Incremental Capital Cost (Reference 3)
Base Eff	See Table 12.14.1	Energy Factor of baseline standard (Reference 2)
Prop Eff	Customer Input	Energy Factor of new high efficiency unit (Reference 1)

Customer Inputs	**M&V Verified**	
CAP	Yes	Capacity (pints/day).
Quantity	Yes	Number of standalone dehumidification units.
Proposed Efficiency	Yes	Energy Factor of new high efficiency unit. Minimum of 3.4 L/kWh required per IL TRM (Reference 1)

Table 12.14.1 Portable Dehumidifiers Equipment Specifications [1, 2]

Capacity Range (Pints/Day)	Baseline Efficiency (>=L/kWh)
>=155	2.41

Table 12.14.2 Incremental Cost Assumptions [3]

Equipment Specification	Avg $/ Capacity PPD
Portable or Standalone Dehumidifier	$7.35

References:

1. Illinois Statewide Techncial Reference Manual for Energy Efficiency, Version 11.0 Final Technical Version as of September 22, 2022.
2. Code of Federal Regulations, Title 10, Chapter II, Subchapter D, Part 430, Subpart C, 430.32. https://www.ecfr.gov/current/title-10/chapter-II/subchapter-D/part-430/subpart-C/section-430.32
3. Xcel Energy custom project historical participation

Changes from Recent Filing:

New measure

12.15 GSHP

w/ HP/Electric baseline

$$Customer\ kWh = Size\ \times (EFLH_{Cool} \times \left(\frac{12}{IEER_{Base}} - \frac{12}{IEER_{Eff}}\right) + (kWh_{Heat\ Base} - kWh_{Heat\ Eff})) \times Qty$$

$$kWh_{Heat\ Base} = \left(\frac{Capacity_{Heat}}{1{,}000}\right) \times EFLH_{Heat\ Base} \times (\frac{1}{3.412 \times COP_{Base}})$$

$$kWh_{Heat\ Eff} = \left(\frac{Capacity_{Heat}}{1{,}000}\right) \times EFLH_{Heat\ HP} \times \left(\frac{1}{3.412 \times COP_{Eff}}\right)$$

$$Customer\ kW = Size\ * (\frac{12}{EER_{Base}} - \frac{12}{EER_{Rff}}) \times Qty$$

$$Customer\ PCkW = Customer\ kW\ \times\ CF$$

w/Gas heating or dual fuel baseline

$$Customer\ kWh = (Size\ \times (EFLH_{Cool} \times \left(\frac{12}{SEER_{Baseline}} - \frac{12}{SEER_{Eff}}\right)) + (kWh_{Heat\ Base} - kWh_{Heat\ Eff})) \times Qty$$

Dth savings per year = $Dth_{Baseline} - Dth_{Eff}$

$$Dth_{Baseline} = \left(\frac{Capacity_{Heat}}{1{,}000{,}000}\right) \times EFLH_{Heat,Base} * (\frac{1}{\%Eff_{Base}})$$

$$Dth_{Eff} = 0$$

$$kWh_{Baseline} = 0$$

$$kWh_{Eff} = \frac{Capacity_{Heat}}{1000} \times EFLH_{HP} \times \left(\frac{1}{3.412 \times COP_{Eff}}\right)$$

Variables

$EFLH_{Cool}$	See Table 12.0.2	Equivalent Full load Cooling Hours, the equivalent number of hours that the equipment would be running at full load over the course of the year
$EFLH_{Heat}$	See Table 12.0.2	Equivalent Full load Heating Hours, the equivalent number of hours that the equipment would be running at full load over the course of the year
$IEER_{Base}$	14	Deemed Baseline Efficiencies based on IECC 2018
EER_{Base}	11.9	Deemed Baseline Efficiencies based on IECC 2018
COP_{Base}	1	
$\%Eff_{Base}$	0.78	
Fan Energy%	0.0314	
CF	90%	Coincidence Factor (Reference 1)
Incremental Cost Per Ton	See Table 12.15.1	Incremental Costs Per Ton
Lifetime	15	MN TRM

Customer Inputs	**M&V Verified**	
$SEER_{Eff}$	Yes	Seasonal Energy Efficiency Ratio inf BTU/W-hr of high efficiency equipment to be installed
EER_{Eff}	Yes	EER of high efficienty equipment to be installed
$HSPF_{Eff}$	Yes	Heating Seasonal Performance Factor
Size	Yes	Equipment Cooling Capacity in tons
$Capacity_{Heat}$	Yes	Equipment Heating Capacity in BTU
System Type	Yes	Open or Closed loop
Building Type	Yes	
Zone	Yes	
Baseline System Type	Yes	Electric or gas heat
Proposed Equipment Quantity	Yes	

Table 12.15.1 Incremental Capital Costs Reference 4

	Baseline AC Cost per Ton w/ Labor	Baseline Cost of Heat / kBTUH	Baseline Air Handler	Proposed Cost per Heat Ton Including Wells
GSHP - w/ Gas Furance & AC Basel	$ 2,507.42	$ 48.37		$ 6,960.00
GSHP - w/ ER Heat & Air Handler &	$ 2,507.42	$ 40.00	$ 1,200.00	$ 6,960.00
GSHP - w/ Boiler Heat & Air Handler	$ 2,507.42	$ 74.22	$ 1,200.00	$ 6,960.00

References

1. NYSERDA (New York State Energy Research and Development Authority); NY Energy $mart Programs Deemed Savings Database - Source for coincidence factor
2. IECC 2018 For baseline equipment efficiencies
3. Equations and measure life from MN TRM
4. IL TRM

12.16 VRF

w/ HP/Electric baseline

$$Customer\ kWh = (Size\ \times (EFLH_{Cool} \times \left(\frac{12}{SEER_{Baseline}} - \frac{12}{SEER_{Eff}}\right)) + (kWh_{Heat\ Base} - kWh_{Heat\ Eff})) \times Qty$$

$$kWh_{Heat\ Base} = \left(\frac{Capacity_{Heat}}{1{,}000}\right) \times EFLH_{Heat} \times \left(\frac{1}{HSPF_{Base}}\right)$$

$$kWh_{Heat\ Eff} = \left(\frac{Capacity_{Heat}}{1{,}000}\right) \times EFLH_{Heat\ HP} \times \left(\frac{1}{HSPF_{Eff}}\right)$$

$$Customer\ kW = Size\ * \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right) \times Qty$$

$$Customer\ PCkW = Customer\ kW\ \times\ CF$$

w/Gas heating or dual fuel baseline

$$Customer\ kWh = (Size\ \times (EFLH_{Cool} \times \left(\frac{12}{SEER_{Baseline}} - \frac{12}{SEER_{Eff}}\right)) + (kWh_{Heat\ Base} - kWh_{Heat\ Eff})) \times Qty$$

$$Dth\ savings\ per\ year = Dth_{Baseline} - Dth_{Eff}$$

$$Dth_{Baseline} = \left(\frac{Capacity_{Heat}}{1{,}000{,}000}\right) \times EFLH_{Heat,Base} * \left(\frac{1}{\%Eff_{Base}}\right)$$

$$Dth_{Eff} = 0$$

$$kWh_{Baseline} = 0$$

$$kWh_{Eff} = \frac{Capacity_{Heat}}{1000} \times EFLH_{HP} \times \frac{1}{HSPF_{Eff}}$$

$EFLH_{Cool}$	See Table 12.0.2	Equivelant Full load Cooling Hours, the equivalent number of hours that the equipment would be running at full load over the course of the year
$EFLH_{Heat}$	See Table 12.0.2	Equivelant Full load Heating Hours, the equivalent number of hours that the equipment would be running at full load over the course of the year
$SEER_{Baseline}$	See Table 12.16.1	Deemed Baseline Efficiencies based on IECC 2018
$EER_{Baseline}$	See Table 12.16.1	Deemed Baseline Efficiencies based on IECC 2018
$HSPF_{Baseline}$	See Table 12.16.1	Deemed Baseline Efficiencies based on IECC 2018
$\%Eff_{Base}$	0.78	Deemed Baseline Efficiencies based on IECC 2018
CF	90%	Coincidence Factor (Reference 1)
Incremental Cost Per Ton	See Table 12.16.2	Incremental Costs Per Ton (Reference 4)
Lifetime	15	MN TRM

Customer Inputs	**M&V Verified**	
$SEER_{Eff}$	Yes	Seasonal Energy Efficiency Ratio inf BTU/W-hr of high efficiency equipment to be installed
EER_{Eff}	Yes	EER of high efficienty equipment to be installed
$HSPF_{Eff}$	Yes	Heating Seasonal Performance Factor
Size	Yes	Equipment Cooling Capacity in tons
$Capacity_{Eff}$	Yes	Equipment Heating Capacity in BTU
System Type	Yes	Split or Packaged System
Building Type	Yes	
Zone	Yes	
Baseline System Type	Yes	Electric or gas heat
Proposed Equipment Quantity	Yes	

Table 12.16.1

Equipment	$SEER_{BASE}$	EER_{BASE}	$HSPF_{BASE}$
Baseline ASHP	14	11.4	8.2

Table 12.16.2

Equipment	Incremental Cost ($/ton)
VRF	$3,004.00

References

1. NYSERDA (New York State Energy Research and Development Authority); NY Energy $mart Programs Deemed Savings Database - Source for coincidence factor
2. IECC 2018 For baseline equipment efficiencies
3. Equations and measure life from MN TRM
4. NEEP VRF_HP Study: https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fneep.org%2Fsites%2Fdefault%2Ffiles%2FVRF_HP.xlsx

12.13 PTHP Gas Baseline

$$Customer\ kWh = (Size\ \times (EFLH_{Cool} \times \left(\frac{12}{SEER_{Baseline}} - \frac{12}{SEER_{Eff}}\right)) + (kWh_{Heat\ Base} - kWh_{Heat\ Eff})) \times Qty$$

$$Dth\ savings\ per\ year = Dth_{Baseline} - Dth_{Eff}$$

$$Dth_{Baseline} = \left(\frac{Capacity_{Heat}}{1{,}000{,}000}\right) \times EFLH_{Heat,Base} * (\frac{1}{\%Eff_{Base}})$$

$$Dth_{Eff} = 0$$

$$kWh_{Baseline} = 0$$

$$kWh_{Eff} = \frac{Capacity_{Heat}}{1000} \times EFLH_{HP} \times \frac{1}{HSPF_{Eff}}$$

$$Customer\ kW = Size\ * (\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}) \times Qty$$

$$Customer\ PCkW = Customer\ kW\ \times\ CF$$

Variables

$EFLH_{Cool}$	See Table 12.0.2	Equivelant Full load Cooling Hours, the equivalent number of hours that the equipment would be running at full load over the course of the year
$EFLH_{Heat}$	See Table 12.0.2	Equivelant Full load Heating Hours, the equivalent number of hours that the equipment would be running at full load over the course of the year
$SEER_{Baseline}$	See Table 12.0.1	'Deemed Baseline Efficiencies based on IECC 2018
$EER_{Baseline}$	See Table 12.0.1	'Deemed Baseline Efficiencies based on IECC 2018
$\%Eff_{Base}$	0.78	
Fan Energy%	0.0314	
CF	90%	Coincidence Factor (Reference 1)
Incremental Cost Per Ton	See Table 12.0.3	Incremental Costs Per Ton
Lifetime	15	MN TRM

Customer Inputs	**M&V Verified**	
$SEER_{Eff}$	Yes	Seasonal Energy Efficiency Ratio inf BTU/W-hr of high efficiency equipment to be installed
EER_{Eff}	Yes	EER of high efficienty equipment to be installed
$HSPF_{Eff}$	Yes	Heating Seasonal Performance Factor
Size	Yes	Equipment Cooling Capacity in tons
$Capacity_{Eff}$	Yes	Equipment Heating Capacity in BTU
Building Type	Yes	
Zone	Yes	
System Type	Yes	
Proposed Equipment Quantity	Yes	
$Capacity_{Baseline}$	Yes	Maximum output of the system in BTU/hr or Watt if the baseline is electric

References

1. NYSERDA (New York State Energy Research and Development Authority); NY Energy $mart Programs Deemed Savings Database - Source for coincidence factor
2. IECC 2018 For baseline equipment efficiencies
3. Equations and measure life from MN TRM

12.18 Dual Fuel RTU

Algorithms

$$Cooling\ kWh = EFLH_c \times Size \times \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right)$$

$$Heating\ dTh = Input\ Capacity \times Alt \times \left(\frac{EFLH_{hb}}{Effb} - \frac{EFLH_{hh}}{Effh} -\right) \times 1000000$$

$$Cooling\ kW = Size \times \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right)$$

$$Cooling\ PCkW = CF \times Size \times \left(\frac{12}{EER_{Baseline}} - \frac{12}{EER_{Eff}}\right)$$

$EER = SEER \times 0.85$

Incremental Cost = Size × Incremental Cost per Ton

Variables

$EFLH_c$	See Table 12.18.0	Equivalent Full Load Hours, Cooling. The equivalent number of hours that the equipment will run in cooling mode over the course of the year.
$EER_{Baseline}$	See Table 12.18.0	EER of standard equpment based upon the minimum acceptable efficiency defined by ASHRAE 90.1-2010.
CF	0.90	Coincidence factor
Incremental Cost per Ton	See Table 12.18.0	Incremental cost per ton
Alt	1.00	Altitude adjustment factor to adjust the sea level manufacturer's rated input for altitude
EFF_b	See Table 12.18.1	Efficiency of baseline equipment
$EFLH_{hb}$	See Table 12.18.1	Equivalent Full Load Hours, Heating, baseline. The equivalent number of hours that the baseline equipment will run in heating mode over the course of the year
$EFLH_{hh}$	See Table 12.18.1	Equivalent Full Load Hours, Heating, efficient. The equivalent number of hours that the high efficient equipment will run in heating mode over the course of the year
Conversion Factor	1000000	Conversion from BTU to dTh
Lifetime	20	Life of a new unit, in years

Customer Inputs	**M&V Verified**	
Size	Yes	The equipment capacity in tons.
EER_{EFF}	Yes	EER of high efficiency equipment that the customer will install.
Input Capacity	Yes	Rated input BTUH nameplate data for high efficiency equipment that the customer will install
EFF_h	Yes	Efficiency of purchased high efficiency equipment that the customer will install.

Table 12.18.0	**EFLHc [1]**	**$EER_{Baseline}$**	**Incremental Cost per Ton [3]**
DX Units < 5.4 tons	610	11.05	$1,679.12
DX Units 5.4 - 11.3 tons	1,252	11.00	$855.60
DX Units 11.4 - 19.9 tons	1,596	10.80	$1,424.71
DX Units 20 - 63.3 tons	1,208	9.80	$1,272.06
DX Units ≥ 63.3 tons	1,878	9.50	$1,119.41

Table 12.18.1	**EFF_b**	**$EFLH_h$ [2]**	**$EFLH_{hh}$ [2]**
DX Units < 5.4 tons	80%	1,034	534
DX Units 5.4 - 11.3 tons	80%	1,034	534
DX Units 11.4 - 19.9 tons	80%	1,034	534
DX Units 20 - 63.3 tons	80%	1,034	534
DX Units ≥ 63.3 tons	80%	1,034	534

References:

1. From 2017-2019 DX RTU program participation data
2. From 2018 NREL ComStock Data for commercial buildings in Colorado, 2023 dataset release date
3. Average incremental cost per ton, calculated using published MSRP costs for commercially available dual-fuel RTU units

Changes from Recent Filing:

New offering for beneficial electrification

12.19 DEPACC

Algorithms

$$Customer\ kWh = Size \times DEPACC\ EFLH\ Factor\ DCE \times EFLH \times KW\ per\ Ton_{Average} * \%\ \text{Loaded}$$

$$Customer\ KW = Size \times KW\ per\ Ton_{peak} * \%\ \text{Loaded}$$

$$Customer\ PC\ KW = Size \times KW\ per\ Ton_{peak} \times Coincidence\ Factor * \%\ \text{Loaded}$$

$$Incremental\ Cost\ of\ Equipment = Size \times Incremental\ Cost\ per\ Ton$$

Variables

DEPACC_Operating_Hours_Office	1134	DEPACC Operating hrs/yr = Estimated annual hours of operation of the DEPACC system for an office in the Front Range. Used to scale DEPACC operating hours to A/C EFLH by segment
EFLH	8760	Equivalent Full Load Hours. The equivalent number of hours that cooling equipment would be running at full load over the course of the year. 8760 hours/year operation for data centers.
DEPACC EFLH Factor DCE	0.1295	=DEPACC_Operating_Hours_Office/8760. Scales DEPACC operating hours for data center segment compared to 8760 data center operating hours/year.
KW per $Ton_{Average}$	0.1488	Average kW/ton = kWh/ ton / DEPACC Operating hrs/yr = Efficiency improvement of incumbent air-cooled condensers in kW per ton resulting from installation of condenser evaporative pre-cooler averaged for annual cooling hours.
KW per Ton_{Peak}	0.4544	Peak Coincident kW/ton = Efficiency improvement of incumbent air-cooled condensers in kW per ton resulting from installation of condenser evaporative pre- cooler at summer cooling design conditions: 0.4% design temperatures @ DIA = 93.9°F DB and 64.7°F WB
Coincidence Factor	100%	Probability that the calculated Customer kW will coincide with the period of peak generator operation. 100% for flat data center load profile
Incremental_O&M_Cost_Factor	0.000886667	$ / ton-hour = (Water Cost / Ton) / DEPACC Operating Hours. Factor used to calculate Incremental annual non-energy Operations and Maintenance cost per ton-hr for water usage.
Incremental Cost of Equipment	See Table 12.19.0 DEPACC Incremental Costs	$ / ton-hour = (Water Cost / Ton) / DEPACC Operating Hours. Factor used to calculate Incremental annual non-energy Operations and Maintenance cost per ton-hr for water usage.
Baseline Cost of Equipment	$0.00	= $0 because the baseline option is to do nothing.
Lifetime	20	Life of a new Direct Evaporative Cooling unit, in years

Customer Inputs	**M&V Verified**	
Size	Yes	The rated cooling equipment capacity in tons.
County/Zone	Yes	
System Type	Yes	
Quantity Proposed Equipment (Qty)	Yes	
% Loaded	Yes	Percent loading on the chiller, calculated by peak load/design chiller capacity. Only applies to data center application.

Table 12.19.0 DEPACC Incremental Costs

System Tons	Incremental Capital Cost ($/ton)	Incremental Electrical O&M Cost ($/ton-hr)
10 to 59	$ 248.27	$ 0.0008867
60 to 99	$ 219.91	$ 0.0008867
100 to 139	$ 209.23	$ 0.0008867
140 to 239	$ 202.80	$ 0.0008867
240 and above	$ 190.49	$ 0.0008867

References:

1. Cypress, Ltd. Analysis of office building load profile and RTU efficiency improvement from application of wet bulb depression to reduce air cooled condensing temperatures.

Changes from Recent Filing:

New measure for data center application

Assumptions:

1. Minimum equipment size that DEPACC can be installed on is 10 ton.

2. Qualifying evaporative cooling units must have a minimum Media Saturation Effectiveness of 75% and above. The units must be installed with an evaporative media, a remote thermostat, outside air temp sensor and a periodic purge water control if sump is used.

3. Units should have outdoor air, humidity and controls to determine operation of spray nozzles to wet media. If sump is used, periodic purge control would need to be installed.

4. Condenser fan energy costs due to DEPACC media are not expected to increase measurably. Media decreases condenser fan cfm while increasing fan static.

5. Denver Water 2018 average rate at $3.167/1000 gal (Source https://www.denverwater.org/business/billing-and-rates/2018-rates)

6. DEPACC estimate of water consumed by the evaporative pre-cooling system is 0.28 gallons per ton-hour of cooling based on manufacturer's data.

Table 12.0.1 Deemed Baseline Efficiencies (IECC 2018)

EQUIPMENT BASELINE EFFICIENCIES REQUIRED BY CODE, NOTE: For Rooftop Units Larger Than 5.4 Tons, Add 0.2 to Both IEER and EER for Units That Have No Heat or Electric Heat

Equipment	Equipment Classification	EER	SEER/ IEER/ IPLV	EER2	SEER2/IEER	Path A FLV (kW/ton)	Path A IPLV (kW/ton)	COP or HSPF
Rooftop Units less than 5.4 tons	Baseline Efficiency	11.90	**14.00**	11.39	**13.40**			
Split Systems less than 5.4 tons	Baseline Efficiency	11.05	**13.00**	11.39	**13.40**			
Rooftop Units Condensing Units & Split Systems 5.5-11.3 tons	Baseline Efficiency	**11.00**	**12.70**	**11.00**	**14.60**			
Rooftop Units & Split Systems 11.4-19.9 tons & Condensing Units > 11.4 tons	Baseline Efficiency	**10.80**	**12.20**	**10.80**	**14.00**			
Rooftop Units & Split Systems 20-63.3 tons	Baseline Efficiency	**9.80**	**11.40**	**9.80**	**13.00**			
Rooftop Units greater than 63.3 tons	Baseline Efficiency	**9.50**	**11.00**	**9.50**	**12.30**			
Water Source Heat Pumps (Water:Air - Water Loop)	Baseline Efficiency	13.00	**13.00**					4.30
PTAC Replacement <= 7000 BTUH	Baseline Efficiency	9.40	11.06					
PTAC Replacement >7000 BTUH to <15000 BTUH	Baseline Efficiency	8.34	9.82					
PTAC Replacement >=15000 BTUH	Baseline Efficiency	7.70	9.06					
scroll/screw chiller < 75 tons	Baseline Efficiency					**0.750**	**0.600**	
scroll/screw chiller >=75 to < 150 tons	Baseline Efficiency					**0.720**	**0.560**	
scroll/screw chiller >=150 to <300 tons	Baseline Efficiency					**0.660**	**0.540**	
scroll/screw chiller >= 300 to <600 tons	Baseline Efficiency					**0.610**	**0.520**	
scroll/screw chiller >= 600 tons	Baseline Efficiency					**0.560**	**0.500**	
Centrifugal Chillers < 150 tons	AHRI Rated Efficiency					**0.610**	**0.550**	
Centrifugal Chillers >= 150 to < 300 tons	AHRI Rated Efficiency					**0.610**	**0.550**	
Centrifugal Chillers >=300 tons to < 400 tons	AHRI Rated Efficiency					**0.560**	**0.520**	
Centrifugal Chillers >=400 tons to < 600 tons	AHRI Rated Efficiency					**0.560**	**0.500**	
Centrifugal Chillers >= 600 tons	AHRI Rated Efficiency					**0.560**	**0.500**	
Air-Cooled Chillers - < 150 tons	Baseline Efficiency	**10.100**	**13.700**					
Air-Cooled Chillers - >= 150 tons	Baseline Efficiency	**10.100**	**14.000**					
Mini-Split Heat Pump (16-21 SEER, 9-12 HSPF)	Baseline Efficiency	8.75	14.00					8.20
Mini-Split Heat Pump (21-24 SEER, 9-12 HSPF)	Baseline Efficiency	8.75	14.00					8.20
Mini-Split Heat Pump (24-26 SEER, 9-12 HSPF)	Baseline Efficiency	8.75	14.00					8.20

NOTES

* Bold values indicates direct sourcing to IECC 2018, tables 403.2.3(x), otherwise estimated by using the code SEER in the algorithm above to get EER, or using EER in the following algorithm to get SEER = 28 - SQRT(784 - (50 x EER)). For water-sourced heat pumps only, the EER is set equal to the SEER because the condenser water loop temperature is assumed to be maintained by cooling towers.

* High Efficiency IEER, SEER and EER values are supplied by Customer.

* AHRI rated efficiency is converted to Standard efficiency as per Table 403.3.2(7)

* Values for Centrifugal Chillers assumed to be at AHRI rating conditions of 85 degrees condensing temperature, 44 degrees chilled water temperature, 2.4 gpm/ton chill water flow, and 3 gpm/ton condenser water flow. Reference International Energy Conservation Code (IECC), 2015, Sec. 403.2.3.1 . Reference International Energy Conservation Code (IECC), 2018, Sec. 403.3.2.1

* Values for PTAC from IECC 2018 formula, Table 403.3.2(3) for Cooling Mode, Replacements.

* Chiller categories are now aligned with the IECC 2018.

Table 12.0.2 Equivalent Full Load Hours by Building Type

	County/Zone	CO1	CO1	CO1
	System Type	Front Range EFLH	Front Range EFLH w/ Economizer	Front Range EFLH Hydronic System
Building Type / Market Segment				
Data Center	Data CenterCO1	8760	8760	8760
Full Service Restaurant	Full Service RestaurantCO1	1284	1037	1820
High-rise Apartment	High-rise ApartmentCO1	1797	1387	1768
Hospital	HospitalCO1	2579	1446	3178
Large Office	Large OfficeCO1	2124	1387	2341
LargeHotel	LargeHotelCO1	2404	1005	2453
Medium Office	Medium OfficeCO1	1209	688	1068
Mid-rise Apartment	Mid-rise ApartmentCO1	1647	688	1610
Outpatient Healthcare	Outpatient HealthcareCO1	2469	1358	2662
Primary School	Primary SchoolCO1	948	711	1142
Process Load	Process LoadCO1	5840	5840	5840
Quick Service Restaurant	Quick Service RestaurantCO1	1099	920	2036
Secondary School	Secondary SchoolCO1	1685	1390	1423
Small Hotel	Small HotelCO1	2010	586	1882
Small Office	Small OfficeCO1	826	586	755
Stand-alone Retail	Stand-alone RetailCO1	1154	873	1088
Strip Mall	Strip MallCO1	901	763	885
Warehouse (non-refrigerated)	Warehouse (non-refrigerated)CO1	129	112	765

	County/Zone	CO2	CO2	CO2
	System Type	Western Slope EFLH	Western Slope EFLH w/ Economizer	Western Slope EFLH Hydronic System
Building Type / Market Segment				
Full Service Restaurant	Full Service RestaurantCO2	1440	1224	2028
High-rise Apartment	High-rise ApartmentCO2	2010	1224	1986
Hospital	HospitalCO2	2706	1663	3261
Large Office	Large OfficeCO2	2257	1623	2432
LargeHotel	LargeHotelCO2	2468	1132	2539
Medium Office	Medium OfficeCO2	1309	799	1174
Mid-rise Apartment	Mid-rise ApartmentCO2	1803	799	1767
Outpatient Healthcare	Outpatient HealthcareCO2	2536	1507	2711
Primary School	Primary SchoolCO2	1048	837	1226
Quick Service Restaurant	Quick Service RestaurantCO2	1258	1093	2217
Stand-alone Retail	Stand-alone RetailCO2	1249	1000	1173
Strip Mall	Strip MallCO2	988	865	947
Secondary School	Secondary SchoolCO2	1840	1570	1535
Small Hotel	Small HotelCO2	2061	656	1923
Small Office	Small OfficeCO2	872	656	808
Warehouse (non-refrigerated)	Warehouse (non-refrigerated)CO2	170	156	847
Process Load	Process LoadCO2	5840	5840	5840
Data Center	Data CenterCO2	8760	8760	8760

	County/Zone	CO3	CO3	CO3
	System Type	Mountain EFLH	Mountain EFLH w/ Economizer	Mountain EFLH Hydronic System
Building Type / Market Segment				
Full Service Restaurant	Full Service RestaurantCO3	797	502	1395
High-rise Apartment	High-rise ApartmentCO3	1332	614	1496
Hospital	HospitalCO3	2098	813	3009
Large Office	Large OfficeCO3	1631	726	2093
LargeHotel	LargeHotelCO3	2377	614	2510
Medium Office	Medium OfficeCO3	1058	388	980
Mid-rise Apartment	Mid-rise ApartmentCO3	1277	388	1422
Outpatient Healthcare	Outpatient HealthcareCO3	2109	886	2621
Primary School	Primary SchoolCO3	691	395	941
Quick Service Restaurant	Quick Service RestaurantCO3	591	402	1322
Stand-alone Retail	Stand-alone RetailCO3	915	537	960
Strip Mall	Strip MallCO3	694	457	735
Secondary School	Secondary SchoolCO3	1294	856	1166
Small Hotel	Small HotelCO3	1804	364	1785
Small Office	Small OfficeCO3	668	364	622
Warehouse (non-refrigerated)	Warehouse (non-refrigerated)CO3	83	58	577
Process Load	Process LoadCO3	5840	5840	5840
Data Center	Data CenterCO3	8760	8760	8760

Recommended System Type by Equipment Type

Equipment Type	Table 12.0.2. System Type
Rooftop Units (RTUs) <5.4 tons	EFLH
Rooftop Units (RTUs) >5.4 tons	EFLH w/Economizer
Mini Split System	EFLH
PTAC	EFLH
Water Cooled Chiller	Hydronic System
Water Source Heat Pump	Hydronic System
Air Cooled Chiller	Hydronic System

Heating Equivalent Full Load Hours	Zone	$EFLH_{Heat}$	$EFLH_{Heat,HP}$	$EFLH_{Heat,ccHP}$
CO1: Denver / Front Range	CO1	950	881	943
CO2: Alamosa / Mountain is climate zone	CO2	950	881	943
CO3: Grand Junction / Western Slope	CO3	950	881	943

NOTES:

*** EFLH- Zone 1 (Front Range/Denver); Zone 2 (Western State as represented by Grand Junction) and Zone 3 (Mountain Areas as represented by Alamosa)**
*** Market segment hours scaled from Minnesota OES data (Reference 10) with Office value calculated for Denver and Grand Junction Typical Meteorological Year data. Distributions developed from CBECS data (Reference 3)**
*** WSHP's will use Non-Economizer hours for all projects.**
*** RTU's that are less than 5.4 tons will use Non-Economizer hours for all projects.**
*** Air Cooled Chillers and RTU's will use Hydronic System hours for all projects.**
*** PTAC's will use Non-Economizer Small Hotel hours for all projects.**

Table 12.0.3 Incremental Costs For Equipment in the Midstream Product

Equipment	Equipment Tier	Incremental Cost per Ton, $/ton (Reference 8)	Min Qualifying SEEF	Min Qualifying EER
Rooftop Units less than 5.4 tons	Tier 1	$97.30	15	12.2
Rooftop Units less than 5.4 tons	Tier 2	$146.42	16	12.2
Rooftop Units less than 5.4 tons	Tier 3	$335.07	17	12.2
Rooftop Units less than 5.4 tons	Tier 4	$790.61	18	12.2
Split Systems less than 5.4 tons	Tier 1	$97.30	15	12.2
Split Systems less than 5.4 tons	Tier 2	$146.42	16	12.2
Split Systems less than 5.4 tons	Tier 3	$335.07	17	12.2
Split Systems less than 5.4 tons	Tier 4	$790.61	18	12.2
Rooftop Units & Split Systems 5.5-11.3 tons	Tier 1	$79.97	13	11.6
Rooftop Units & Split Systems 5.5-11.3 tons	Tier 2	$129.41	13.8	11.6
Rooftop Units & Split Systems 5.5-11.3 tons	Tier 3	$115.75	14.6	11.6
Rooftop Units & Split Systems 5.5-11.3 tons	Tier 4	$283.27	18	11.6
Rooftop Units & Split Systems 11.4-19.9 tons	Tier 1	$106.76	12.6	11.6
Rooftop Units & Split Systems 11.4-19.9 tons	Tier 2	$169.99	13.4	11.6
Rooftop Units & Split Systems 11.4-19.9 tons	Tier 3	$195.07	14	11.6
Rooftop Units & Split Systems 11.4-19.9 tons	Tier 4	$316.18	17.5	11.6
Rooftop Units & Split Systems 20-63.3 tons	Tier 1	$12.84	12	10.3
Rooftop Units & Split Systems 20-63.3 tons	Tier 2	$67.72	12.6	10.3
Rooftop Units & Split Systems 20-63.3 tons	Tier 3	$144.31	13.3	10.3
Rooftop Units & Split Systems 20-63.3 tons	Tier 4	$163.71	15	10.3
Rooftop Units greater than 63.3 tons	Tier 1	$108.99	12	10
Rooftop Units greater than 63.3 tons	Tier 2	$139.21	12.8	10
Rooftop Units greater than 63.3 tons	Tier 3	$264.06	14	10
Rooftop Units greater than 63.3 tons	Tier 4	$333.66	16	10
Air-Cooled Chillers - < 150 tons	Tier 1	$42.75	14.5	10.3
Air-Cooled Chillers - < 150 tons	Tier 2	$66.22	15	10.3
Air-Cooled Chillers - < 150 tons	Tier 3	$91.92	16	10.3
Air-Cooled Chillers - < 150 tons	Tier 4	$167.90	18	10.3
Air-Cooled Chillers - >= 150 tons	Tier 1	$42.75	14.5	10.3
Air-Cooled Chillers - >= 150 tons	Tier 2	$66.22	15	10.3
Air-Cooled Chillers - >= 150 tons	Tier 3	$91.92	16	10.3
Air-Cooled Chillers - >= 150 tons	Tier 4	$167.90	18	10.3
PTAC (Replacements) - 11 EER	Tier 1	$106.62	N/A	11
PTAC (Replacements) - 11.5 EER	Tier 2	$178.85	N/A	11.5
PTAC (Replacements) - 12 EER	Tier 3	$300.03	N/A	12
Water-source Heat Pumps	Tier 1	$80.53	N/A	13.5
Water-source Heat Pumps	Tier 2	$167.63	N/A	15
Water-source Heat Pumps	Tier 3	$261.83	N/A	16
Water-source Heat Pumps	Tier 4	$363.72	N/A	18
MSAC 16-21 SEER - MS	Tier 1	$90.52	16	N/A
MSAC 21-24 SEER - MS	Tier 2	$189.28	21	N/A
MSAC 24+ SEER - MS	Tier 3	$366.33	24	N/A
Mini-Split Heat Pump (16-21 SEER, 9-12 HSPF)	Tier 1	$90.52	16	N/A
Mini-Split Heat Pump (21-24 SEER, 9-12 HSPF)	Tier 2	$189.28	21	N/A
Mini-Split Heat Pump (24-26 SEER, 9-12 HSPF)	Tier 3	$366.33	24	N/A

Table 12.0.4. Incremental Costs For Equipment in the Downstream Product		
Equipment		Incremental Cost per Ton, $/ton (References 9, 11)
scroll/screw chiller < 75 tons		$178.14
scroll/screw chiller >=75 to < 150 tons		$124.41
scroll/screw chiller >=150 to <300 tons		$54.25
scroll/screw chiller >= 300 to <600 tons		$23.61
scroll/screw chiller >= 600 tons		$23.61
Centrifugal Chillers < 150 tons		$84.11
Centrifugal Chillers >= 150 to < 300 tons		$96.40
Centrifugal Chillers >=300 tons to < 400 tons		$80.23
Centrifugal Chillers >=400 tons to < 600 tons		$49.25
Centrifugal Chillers >= 600 tons		$26.67
VFD's for Chillers		$71.88

Assumptions:

- Customer selection of cooling equipment is in lieu of equipment of the same size and configuration that met minimum 2018 International Energy Conservation Code requirements.
- Prescriptive rebates are not given for backup cooling equipment.
- Small RTU assumed to have gas heat for code baseline selection
- No Heating kW saving are claimed for MSHP during winter, only summer cooling kW savings are claimed.

EC Motors:

- Each motor is replaced with the same size on a 1 for 1 basis.
- Rebates do not apply to rewound or repaired motors.

References:

1. NYSERDA (New York State Energy Research and Development Authority); NY Energy $mart Programs Deemed Savings Database - Source for coincidence factor
2. ASHRAE, 2011, Applications Handbook, Ch. 37, table 4, Comparison of Service Life Estimates
3. CBECS (Commercial Buildings Energy Consumption Survey), 2012 - Total Floor space of Cooled Buildings by Principal Building Activity - source of market segment distributions
4. NTG for cooling is updated through a 2017 program evaluation.
5. Cypress, Ltd. Analysis of office building load profile and RTU efficiency improvement from application of wet bulb depression to reduce air cooled condensing temperatures.
6. International Energy Conservation Code 2018
7. Building America, Research Benchmark Definitions, 2010 (see p. 10). http://www.nrel.gov/docs/fy10osti/47246.pdf
   Approximation: EER = 1.12 x SEER - 0.02 x SEER^2
8. Midstream Product Data Analysis by Product Management Vendor
9. California DEER Database 2008
10. Minnesota Office of Energy Security (MOES) 2008 Cooling Equivalent Full Load Hours
11. Incremental costs for MSHPs were determined from the NEEP Incremental Cost Study Phase 2 Report
12. MSHP equipment life is from Measure Life Report Residential and Commercial/Industrial Lighting and HVAC Measures; http://library.cee1.org/content/measure-life-report-residential-and-commercialindustrial-lighting-and-hvac-measures
13. Energy model analysis of EFLH values completed by Energy Solutions in 2019 following the DOE Uniform Methods process using PNNL prototype buildings. EFLH values were peer reviewed by Michael's Energy; "XCEL ENERGY EFLH – EFLH ANALYSIS".

Changes from Recent Filing:

Included EFLH for HP & ccHP

Table 13.0.1 Measure Lives

Hot Water Boilers (Non Condensing)	Product Life (yrs)	Source of Information
Hot Water Boiler - Non-condensing 175 MBTUH	25	Reference 43
Hot Water Boiler - Non-condensing 500 MBTUH	25	Reference 43
Hot Water Boiler - Non-condensing 1MMBTUH	25	Reference 43
Hot Water Boiler - Non-condensing 2 MMBTUH	25	Reference 43
Hot Water Boiler - Non-condensing 4 MMBTUH	25	Reference 43
Hot Water Boiler - Non-condensing 6 MMBTUH	25	Reference 43
Hot Water Boiler - Non-condensing 8, MMBTUH	25	Reference 43
Hot Water Boilers (Condensing)		
Hot Water Boiler - Condensing 175 MBTUH	25	Reference 43
Hot Water Boiler - Condensing 500 MBTUH	25	Reference 43
Hot Water Boiler - Condensing 1 MMBTUH	25	Reference 43
Hot Water Boiler - Condensing 2 MMBTUH	25	Reference 43
Hot Water Boiler - Condensing 4 MMBTUH	25	Reference 43
Hot Water Boiler - Condensing 6 MMBTUH	25	Reference 43
Hot Water Boiler - Condensing 8 MMBTUH	25	Reference 43
Low Pressure Steam Boilers		
Low Pressure Steam Boiler - 300 MBTUH	25	Reference 43
Low Pressure Steam Boiler - 1 MMBTUH	25	Reference 43
Low Pressure Steam Boiler - 10 MMBTUH	25	Reference 43
High Pressure Steam Boilers		
High Pressure Steam Boiler - 300 MBTUH	25	Reference 43
High Pressure Steam Boiler - 1 MMBTUH	25	Reference 43
High Pressure Steam Boiler - 10 MMBTUH	25	Reference 43
Boiler Tune up		
Gas Boiler condensing or non-condensing	2	D.O.E
Outdoor Air Reset		
Gas Boiler condensing or non-condensing	20	Reference 51
Stack Dampers		
Gas Boiler condensing or non-condensing	12	Reference 51
Linkageless Controls		
Gas Boiler condensing or non-condensing	16	Reference 43
Modulating Burners		
Gas Boiler condensing or non-condensing	20	Reference 3
Turbulators		
Gas Boiler condensing or non-condensing	20	Reference 3
O2 Trim Control		
Gas Boiler condensing or non-condensing	20	Reference 51
Water Heaters		
Storage Water Heater	15	Reference 35
Tankless Water Heater	20	Reference 35
Steam Traps		
Gas Boiler - Steam Traps - Low and High Pressure	5	Reference 4
Pipe Insulation		
Insulation - Hot Water System	13	Reference 51
Insulation - Steam System	13	Reference 51
High Efficiency Furnace	20	Reference 48
Unit Heaters		
Unit Heaters - Non-Condensing	20	
Unit Heaters - Infrared	15	
Destratification Fans	15	Reference 48

Table 13.0.2 Heating Equipment Efficiencies

	Baseline Efficiency (EFFb)	Efficient Efficiency (EFFh)	Unit	Reference
New Boilers (Non-Condensing) <300,000 BTU/h	80.0%	85.0%*	AFUE	Ref. 11
New Boilers (Non-Condensing) >= 300,000 BTU/h and <=2,500,000 BTU/h	80.0%	85.0%*	Et (Thermal Eff)	Ref. 11
New Boilers (Non-Condensing) >2,500,000 BTU/h	82.0%	85.0%*	Ec (Combustion Eff)	Ref. 11
New Boilers (Condensing) <300,000 BTU/h	82.0%	88.0%*	AFUE	Ref. 48
New Boilers (Condensing) >= 300,000 BTU/h and <=2,500,000 BTU/h	80.0%	88.0%*	Et (Thermal Eff)	Ref. 48
New Boilers (Condensing) >2,500,000 BTU/h	82.0%	88.0%*	Ec (Combustion Eff)	Ref. 48
Retrofit Boilers <300,000 BTU/h	78.0%	92.0%*	AFUE	Ref. 11
Retrofit Boilers >=300,000 BTU/h and <=2,500,000 BTU/h	78.0%	92.0%*	Et (Thermal Eff)	Ref. 11
Retrofit Boilers >2,500,000 BTU/h	78.0%	92.0%*	Ec (Combustion Eff)	Ref. 11
Low Pressure Steam Boilers	79.0%	81.0%*	Et (Thermal Eff)	Ref. 6
High Pressure Steam Boilers	79.0%	81.0%*	Et (Thermal Eff)	Ref. 6
Boiler Tune Up (Non-Condensing)	78.0%	80.0%		Ref. 12
Boiler Tune Up (Condensing)	87.2%	88.0%		Ref. 21
Outdoor Air Reset	80.0%	83.0%		Ref. 13
Stack Dampers	80.0%	81.0%		Ref. 14
Modulating Burner Controls	80.0%	83.0%		Ref. 15
O2 Trim Control	80.0%	82.0%		Ref. 16
Steam Traps	80.0%	N/A		Ref. 17
Turbulators	80.0%	83.0%		
Linkageless Controls	80.0%	83.0%		Ref. 46
Commercial Furnaces < 225,000 BTUH input	78.0%	92.0%*	AFUE	Ref. 3
Commercial Furnaces >= 225,000 BTUH input	80.0%	92.0%*	Et (Thermal Eff)	Ref. 3
Water Heaters	80.0%	92.0%*		Ref. 18
Unit Heater (Non-condensing)	80.0%	83.0%*		Ref. 3
Pipe Insulation	80.0%	N/A		Ref 17

*High efficiency boiler and furnace efficiencies are per customer. Listed efficiencies are minimum qualifying efficiencies.

Table 13.0.3 Effective Full Load Heating Hours (Ref 28, 47, 48)

Equipment	Use	Hours	Explanation
Boiler	Space Heating Only	1,204	Based on MN TRM Table of EFLH weighted average calculated from historical participation
	Domestic Hot Water Only	2,191	Based on Bin Analysis assuming Constant 25% load and 30% oversizing
	Space Heating and Domestic Hot Water	2,057	Based on Bin Analysis assuming constant 15% load and 30% oversizing for the DHW and TRM values for space heating
Commercial Water Heater	All	1,092	Based on historical custom rebate projects
Furnace	All	612	Based on Bin Analysis assuming 15% oversize factor

Table 13.0.4 Altitude Adjustment

Climate Zone	Alt
CO1: Denver / Front Range	0.823
~~CO3~~ CO2: Grand Junction / Western Slope	0.837
~~CO2~~ CO3: Alamosa / Mountain	0.756

References:

1. 1999 Minnesota Energy Code - Chapter 7676.1100 Subpart 3D, 4A
2. Centerpoint TRM
3. International Energy Conservation Code (IECC) 2015 Table C403.2.3 (4)
4. ASHRAE HVAC Systems and Equipment 2008 pg 15.1
5. Whole Building Design Guide for US Army. Tech Note 14: Overhead Radiant Heating <https://www.wbdg.org/ffc/army-coe/technotes/technote-14>
6. 2015 Minnesota Energy Code Table C403.2.3(5) pg C-44
7. Cost data from online review on 8/5/15 of available products from various distributors
8. Nicor Gas Energy Efficiency Plan 2011-2014. Revised Plan Filed Pursuant to Order Docket 10-0562, May 27, 2011
9. Sachs, Harvey M., Unit Heaters Deserve Attention for Commercial Programs, ACEEE, April 2003
10. TMY3 Weather data from Department of Energy
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12. 2% efficiency improvement for boiler tune up based on Michaels Energy literature review. Sources included (but not limited to):
    12A. Illinois Technical Reference Manual (2015-2016)
    12B. Michigan Energy Measures Database (MEMD) accessed at <https://www.michigan.gov/mpsc/0,9535,7-395-93309_94801_94808_94811---,00.html>
    12C. Arkansas Technical Reference Manual <http://www.apscservices.info/EEInfo/TRM4.pdf>
13. 3% efficiency improvement for boiler outdoor air reset based on Michaels Energy literature review. Sources included (but not limited to):
    13A. Arkansas Technical Reference Manual <http://www.apscservices.info/EEInfo/TRM4.pdf>
    13B. NEEP Mid-Atlantic TRM. V5. >http://www.neep.org/sites/default/files/resources/Mid-Atlantic_TRM_V5_FINAL_5-26-2015.pdf>
14. 1% efficiency improvement for stack dampers based on Michaels Energy literature review. Sources included (but not limited to):
    14A. Arkansas Technical Reference Manual <http://www.apscservices.info/EEInfo/TRM4.pdf>
    14B. Illinois Technical Reference Manual (2015-2016)
    14C. Minnesota TRM. Version 1.3. <http://mn.gov/commerce-stat/pdfs/trm-version-1.3.pdf>
15. 3% efficiency improvement for modulating boiler controls based on Michaels Energy literature review. Sources included (but not limited to):
    15A. Illinois Technical Reference Manual (2015-2016)
    15B. Minnesota TRM. Version 1.3. <http://mn.gov/commerce-stat/pdfs/trm-version-1.3.pdf>
16. 2% efficiency improvement for O2 trim control based on Michaels Energy literature review. Sources included (but not limited to):
    16A. Illinois Technical Reference Manual (2015-2016)
    16B. Minnesota TRM. Version 1.3. <http://mn.gov/commerce-stat/pdfs/trm-version-1.3.pdf>
17. 80% boiler efficiency assumed based on minimum boiler efficiency from IECC 2015.
18. California DEER Database, 2014 (value used is for remaining useful life of commercial high efficiency furnaces)

19. AHRI Directory of Certified Product Performance; average of Standby Loss in BTUH per gallon of storage calculated for units with 80% or less thermal efficiency for baseline unit and <96% thermal efficiency for efficient unit
20. Leakage data from Energy Management Handbook, by Wayne Turner
21. Measure life from the Federal Energy Management Program (FEMP).
22. The average baseline and high efficiency costs are based on the California DEER database.
23. Cost information supplied by Engineered Products
24. Material costs taken from zoro.com for fiberglass pipe insulation (February 2016)
25. Commercial Condensing Boiler Optimization. Center for Energy and Environment. Prepared for Minnesota Department of Commerse, Division of Energy Resources. 2015.
26. AHRI Directory of Certified Product Performance; average of Standby Loss in BTUH per gallon of storage calculated for units with 80% or less thermal efficiency for baseline unit and <96%
27. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant.
28. MN Bin Temp Bin Hrs are taken from the "Thermal Environmental Engineering, Third Edition, Thomas H. Kuehn, James W. Ramsey and James L. Threlkeld, Pages 717-718, Table B.5" to
29. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant.
30. Baseline and Energy Efficient equipment costs provided by vendors
31. Minnesota DER Deemed Values
32. Bradford White RightSpec® commercial water heater sizing software
33. Bosch tankless water heater sizing software
34. Commercial Buildings Energy Consumption Study (CBECS), 2006
35. 2008 DEER Effective Useful Life Summary October 1st 2008
36. 2007 ASHRAE HVAC Applications Handbook Chapter 36, page 36.3, Table 4
37. 2006 IECC
38. "Electricity Savings from Variable-Speed Furnaces in Cold Climates" Pigg, Scott and Talerico, Tom. ACEEE Summer Study Proceedings 2004
39. U.S. Department of Energy, Preliminary Analysis Report, 2012 (http://www1.eere.energy.gov/buildings/appliance_standards/pdfs/ff_prelim_ch_00_execsummary_2012_06_26.pdf)
40. http://www.grainger.com
41. Wisconsin Focus on Energy, ECM Furnace Fan Impact Evaluation Report, https://focusonenergy.com/sites/default/files/emcfurnaceimpactassessment_evaluationreport.pdf)
42. MN custom rebates and conversations with Distributors (Tim Stoklosa, Clean Energy Designs in Lakewood CO)
43. Illinois 2023 TRM (Version 11); https://icc.illinois.gov/programs/illinois-statewide-technical-reference-manual-for-energy-efficiency
45. Source BTU for electricity based on MN DOC No. G008/CIP-00-864.07 Reply Comments of May 23, 2003 which states a Source BTU comparison must be made using an assumed heat rate of 7500 BTU/Generator kWh , based on typical Heat Rate for Combined-Cycle Natural Gas-fired Plant.
46. Wisconsin Focus on Energy 2019 TRM
47. Historical program participation
48. State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs version 3.0 Jan 10 2019
49. Custom DCV Projects, 2010-2011
50. MN Lighting Efficiency Tech Assumption , Tab "Forcast Market Segment".
51. 2011 Tetratech Program Evaluation
52. 99.6% design temperature for Denver (Stapleton), taken from the 2005 ASHRAE Handbook - Fundamentals. Grand Junction - Station 724760; Alamosa - Station 724620.

13.1.Water Heater

Algorithms

$$Customer\ Dth = Quantity \times (BTUH\ Input \times Alt \times \left(\left(\frac{EFFh}{EFFb}\right) - 1\right) \times EFLH + \left(Gallons\ Storage \times \left(\frac{SL_{Base}}{EFFb} - \frac{SL_{New}}{EFFh}\right)\right) \times \frac{SLHrs}{1000000}$$

$$Customer\ Dth/hr = Quantity \times (BTUH\ Input \times Alt \times \left(\left(\frac{EFFh}{EFFb}\right) - 1\right) x \frac{EFLH}{8760} + (Gallons\ Storage \times \left(\frac{SL_{Base}}{EFFb} - \frac{SL_{New}}{EFFh}\right))/1000000$$

Variables

Alt	See Table 13.0.4	Altitude Adjustment factor to adjust the sea level manufacturer's rated input for altitude effects. No adjustment for near sea-level altitude.
Effb	See Table 13.0.2	Efficiency Rating of standard replacement water heater, Thermal Efficiency
SL_base	13.21	Standby Losses for baseline storage water heater, BTUH per gallon of storage (Ref 26)
SL_new	8.9	Standby Losses for efficient water heater, BTUH per gallon of storage (Ref 26)
SLHrs	8,760	Standby loss annual hours for commercial water heaters.
EFLH	See Table 13.0.3	
NTG	86%	Net-to-gross = 86% Per 2011 Cadmus Program Evaluation and Michaels Energy Review.
Incremental Cost	See Table 13.1.1	Incremental cost of efficient water heater over standard water heater.
Measure Life	See Table 13.0.1	

Customer Inputs	**M&V Verified**	
BTUH input	Yes	BTUH of proposed water heater
Quantity	Yes	Quantity of water heaters
Effh	Yes	Efficiency Rating of high efficiency replacement water heater, Thermal Efficiency
Gallons Storage	Yes	Only needed for tank type water heaters

Table 13.1.1 Commercial Water Heater Incremental Cost (Ref 30)

Water Heater Type/Capacity	Incremental Cost
75,000 to 199,99 BTUh	$1,018.46
200,000 to 299,000 BTUh	$1,000.36
>=300,000 BTUh	$1,728.11
Tankless 75,000 to 199,99 BTUh	$1,242.36
Tankless >= 200,000 BTUh	$1,000.36

References:

26. AHRI Directory of Certified Product Performance; average of Standby Loss in BTUH per gallon of storage calculated for units with 80% or less thermal efficiency for baseline unit and <96% thermal efficiency for efficient unit
30. Baseline and Energy Efficient equipment costs provided by vendors

Changes from Recent Filing:

Added peak gas demand savings calculation.

13.2 Boiler

Algorithms

$$Customer\ Dth = Input\ Capacity \times Alt \times (\frac{Effh - Adj}{Effb} - 1) \times EFLH$$

$$CustomerDth/hr = Input\ Capacity \times Alt \times (\frac{Effh - Adj}{Effb} - 1)$$

Variables

Alt	See Table 13.0.4	Altitude Adjustment factor to adjust the sea level manufacturer's rated input for altitude effects. No adjustment for near sea-level altitude.
EFFb	See Table 13.0.2	Efficiency of Baseline equipment
Adj	0%	Adjustment for operation at less than nominal efficiency Efficiency adjustment for non-condensing boilers.
EFLH	See Table 13.0.3	Based on Bin Analysis assuming 30% oversizing for boiler plant.
Conversion Factor	1,000,000	Conversion from BTU to Dth
Incremental Cost	See Tables 13.2.1a and 13.2.1b	Incremental cost of efficient boiler or furnace over standard equipment.
Measure Life	See Table 13.0.1	

Customer Inputs	**M&V Verified**	
Input Capacity	Yes	Rated input BTUH nameplate data for the new boiler, furnace, unit heater, or water heater.
EFFh	Yes	Efficiency of purchased boiler, provided by customer.
Use	Yes	Use of boiler: space heating, domestic water, or both.
Cost		

Table 13.2.1a Hot water boiler costs

Input Capacity Range	Baseline	High Efficient - Non Condensing	Baseline to High Efficient - Non Condensing Incremental Cost	High Efficient - Condensing
0 - 0.499 MMBTUH	$3,000	$3,500	$500	$4,600
0.5 - 0.999 MMBTUH	$5,000	$9,000	$4,000	$11,200
1 - 1.999 MMBTUH	$7,300	$11,700	$4,400	$15,000
2 - 3.999 MMBTUH	$12,000	$17,000	$5,000	$26,500
4 - 5.999 MMBTUH	$24,000	$34,000	$10,000	$53,000
6 - 7.999 MMBTUH	$36,000	$51,000	$15,000	$79,500
8 -9.999 MMBTUH	$48,000	$68,000	$20,000	$106,000

Table 13.2.1b Steam boiler costs, Vendor supplied, Engineered Products

Boiler Input Capacity Range	Incremental
Low Pressure Steam Boiler; 0 - 0.499 MMBTUH	$1,320
Low Pressure Steam Boiler; 0.5 - 4.999 MMBTUH	$3,168
Low Pressure Steam Boiler; 5 - 9.999 MMBTUH	$16,500
High Pressure Steam Boiler; 0 - 0.499 MMBTUH	$1,320
High Pressure Steam Boiler; 0.5 - 4.99 MMBTUH	$3,168
High Pressure Steam Boiler; 5 - 9.999 MMBTUH	$16,500

References:

1. 1999 Minnesota Energy Code - Chapter 7676.1100 Subpart 3D, 4A
2. Centerpoint TRM
3. International Energy Conservation Code (IECC) 2015 Table C403.2.3 (4)
4. ASHRAE HVAC Systems and Equipment 2008 pg 15.1
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8. Nicor Gas Energy Efficiency Plan 2011-2014. Revised Plan Filed Pursuant to Order Docket 10-0562, May 27, 2011
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    15B. Minnesota TRM. Version 1.3. <http://mn.gov/commerce-stat/pdfs/trm-version-1.3.pdf>
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18. California DEER Database, 2014 (value used is for remaining useful life of commercial high efficiency furnaces)
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20. Leakage data from Energy Management Handbook, by Wayne Turner
21. Measure life from the Federal Energy Management Program (FEMP).
22. The average baseline and high efficiency costs are based on the California DEER database.

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28. MN Bin Temp Bin Hrs are taken from the "Thermal Environmental Engineering, Third Edition, Thomas H. Kuehn, James W. Ramsey and James L. Threlkeld, Pages 717-718, Table B.5" to determine
29. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant.
30. Baseline and Energy Efficient equipment costs provided by vendors
31. Minnesota DER Deemed Values
32. Bradford White RightSpec® commercial water heater sizing software
33. Bosch tankless water heater sizing software
34. Commercial Buildings Energy Consumption Study (CBECS), 2006
35. 2008 DEER Effective Useful Life Summary October 1st 2008
36. 2007 ASHRAE HVAC Applications Handbook Chapter 36, page 36.3, Table 4
37. 2006 IECC
38. "Electricity Savings from Variable-Speed Furnaces in Cold Climates" Pigg, Scott and Talerico, Tom. ACEEE Summer Study Proceedings 2004
39. U.S. Department of Energy, Preliminary Analysis Report, 2012 (http://www1.eere.energy.gov/buildings/appliance_standards/pdfs/ff_prelim_ch_00_execsummary_2012_06_26.pdf)
40. http://www.grainger.com
41. Wisconsin Focus on Energy, ECM Furnace Fan Impact Evaluation Report, https://focusonenergy.com/sites/default/files/emcfurnaceimpactassessment_evaluationreport.pdf)
42. MN custom rebates and conversations with Distributors (Tim Stoklosa, Clean Energy Designs in Lakewood CO)
43. Illinois 2017 TRM ; http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_6/Final/IL-TRM_Effective_010118_v6.0_Vol_2_C_and_I_020817_Final.pdf
44. St Paul 2015 Water Rate Schedule - http://mn-stpaul.civicplus.com/DocumentView.asp?DID=3493 (From 2017-2019 MN Energy Efficient Showerhead Tech Assumptions)
45. Source BTU for electricity based on MN DOC No. G008/CIP-00-864.07 Reply Comments of May 23, 2003 which states a Source BTU comparison must be made using an assumed heat rate of 7500
46. Wisconsin Focus on Energy 2019 TRM
47. Historical program participation
48. State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs version 3.0 Jan 10 2019
49. Custom DCV Projects, 2010-2011
50. MN Lighting Efficiency Tech Assumption , Tab "Forcast Market Segment".
51. 2011 Tetratech Program Evaluation

Changes from Recent Filing:

Added peak gas decatherm savings.
Adjusted boiler costs

13.3 Destratification Fans

Algorithms

$$Customer\ (Dth) = \left(U\ roof \times (Area\ Destrat \times deltaT\ C) + U\ wall \times \sqrt{(Area\ Total)} \times 4 \times \frac{Area\ Destrat}{Area\ Total} \times Ceilingheight \times Destrat\ Height \times deltaT\ C\right) \times Heati$$

$$\times \frac{\frac{HrsPerDay}{24}}{\frac{HeatEff}{1000000}} + Destrat\ Fan\ kWh \times (\frac{3412}{HeatEff} - Source\ BTU\ Factor)/1000000$$

$$Destrat\ Fan\ kWh = Destrat\ Fan\ kW \times QTY \times Heating\ Hours \times HrsPerDay/24$$

$$Customer\ (Dth/hr) = Customer\ (Dth)/HeatingHours$$

Variables

HeatingHours	6499	Heating hours in season with outdoor air temperatures below 65F. (Ref 10)
deltaT_C	10	Difference between ceiling air temperature (deg F) and floor temperature in stratified space. Ref (48)
Destrat_Height	0.25	Assumption that the top 25% of the wall height will experience the same stratified deltaT as the ceiling.
U_roof	0.08	Average heat transfer coefficient for the roof (BTU/h*ft^2*F). (Ref 48)
U_walls	0.115	Average heat transfer coefficient for the walls (BTU/h*ft^2*F) assuming equal distribution between newer and older buildings. (Ref 43)
Heat_Eff	80%	Assumed efficiency of heating equipment.
Conversion Factor	1,000,000	Conversion factor from BTU to Dth.
Destrat_Fan_kW	0.588	kW per fan, based on typical 1 HP motor with 65% load factor.
Source_BTU_Factor	7500	Source BTU per kWh, used to account for cross-fuel penalty of this measure. (Ref 45)
Measure Life	See Table 13.0.1	Refer to table 15 for measure life.

Customer Inputs	**M&V Verified**	
HrsPerDay	Yes	Hours per day of destratification fan operation.
Qty	Yes	Quantity of destratification fans installed.
Ceiling Height	Yes	Height of ceiling in space being destratified, in feet.
Area_Destrat	Yes	Total area being destratified, in square feet.
Cost	No	Total cost for equipment and installation of destratification fans.
Area_Total	Yes	Total facility floor area, in square feet

References:

10. TMY3 Weather data from Department of Energy

43. Illinois 2017 TRM ; http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_6/Final/IL-TRM_Effective_010118_v6.0_Vol_2_C_and_I_020817_Final.pdf

45. Source BTU for electricity based on MN DOC No. G008/CIP-00-864.07 Reply Comments of May 23, 2003 which states a Source BTU comparison must be made using an assumed heat rate of 7500 BTU/Generator kWh , based on typical Heat Rate for Combined-Cycle Natural Gas-fired Plant.

48. State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs version 3.0 Jan 10 2019

Changes from Recent Filing:

Added peak gas decatherm savings

13.4 Unit Heater

Algorithms

$$Unit\ Heater\ Savings\ (Dth) = Input\ Capacity \times Alt \times (\frac{EFFh}{EFFb} - 1) \times EFLH_UH \times (Oversize\ Factor_{heat}) \div 1000000$$

$$Infrared\ Heater\ Savings\ (Dth) = Dth\ Base\ Infrared - Dth\ Eff\ Radiant$$

$$Dth\ Base\ Infrared = \left(\frac{Infrared\ Input\ Capacity \times Alt}{Infrared\ Size\ Factor}\right) \times Oversize\ Factor_{heat} \times EFLH_{UH} \times \left(\frac{1\ Dth}{1000000\ BTU}\right) - Dth_{fan}$$

$$Dth\ Eff\ Infrared = Infrared\ Input\ Capacity \times Alt \times Oversize\ Factor_heat \times EFLH_UH \times (\frac{1Dth}{1000000\ BTU})$$

$$EFLH_{UH} = \frac{HDD_a \times {T_{indoor}}^2 + HDD_b \times T_{indoor} + HDD_c}{T_{indoor} - T_{design}} \times 24 \times \%conditioned$$

$$FLH = \frac{HDD_a \times {T_{indoor}}^2 + HDD_b \times T_{indoor} + HDD_c}{T_{indoor} - T_{offset}} \times 24 \times \%conditioned$$

Fan_kW = Input Capacity x Heat_eff_infrared x (Alt ÷Infrared Size Factor) x Oversize Factor_heat x (HP/BTUh) x 0.746 x LF ÷Mtr_eff

Fan_kWh = Fan kW x FLH

$$Dth_{fan} = Fan_kW \times 3412 \times FLH \div 1000000$$

$$Unit\ Heater\ Savings\ (Dth/hr) = Input\ Capacity \times Alt \times \left(\frac{EFFh}{EFFb} - 1\right) \times (Oversize\ Factor_{heat}) \div 1000000$$

$$Infrared\ Heater\ Savings\ (Dth) = Dth\ Base\ Infrared - Dth\ Eff\ Radiant/EFLH_{UH}$$

Variables

Alt	See Table 13.0.4	Altitude Adjustment factor to adjust the sea level manufacturer's rated input for altitude effects.
HP/BTUh	2.96834E-06	Average axial/propeller/centrifugal fan power (rated) per BTU/h of heating output. Taken from manufacturer data for 38 unit heaters from Trane and Sterling; Applies to Infrared Heaters only
Oversize Factor_heat	0.9	Factor to account for design oversize commonly found on unit heater installations. Reference 1
T_design	See Table 13.4.1	Winter Design temperature for the given location. Reference 52.
LF	0.8	Design load factor of fan motor, deemed based on typical engineering assumption
EFFb	80%	Thermal efficiency of the baseline, non-power-vented, code-compliant unit heater. Reference 3.
EFFh	See Table 13.0.2	Thermal efficiency of the new, efficient unit heater
EFLH	See Table 13.0.3	The equivalent full load heating hours for unit heaters.
Heat_eff_infrared	80%	Thermal efficiency of the new, radiant heater. = 0.80, same as baseline because the radiant heaters do not have specific combustion efficiency improvements over the baseline unit heater, their savings are all from radiation heat transfer versus convection. Also, Ref 5 uses this value.
Radiation Size Factor	0.85	Factor to account for the fact that radiant heaters should be designed smaller than an equivalent standard unit heater due to radiation heat transfer being more effective at producing thermal comfort. This also accounts for the lower room temperature afforded by radiant heaters. = 0.85 (Ref 4)
HDD_a	See Table 13.4.1	Polynomial Constants used in calculating HDD based on TMY3 weather data and design indoor temperature. HDD is proportional to the indoor temperature based on the formula HDD = a * Tin^2 + b * Tin + c
HDD_b	See Table 13.4.1	Polynomial Constants used in calculating HDD based on TMY3 weather data and design indoor temperature. HDD is proportional to the indoor temperature based on the formula HDD = a * Tin^2 + b * Tin + c

HDD_c	See Table 13.4.1	Polynomial Constants used in calculating HDD based on TMY3 weather data and design indoor temperature. HDD is proportional to the indoor temperature based on the formula HDD = a * Tin^2 + b * Tin + c
T-Offset	See Table 13.4.1	Difference between the maximum heating degree day and the indoor design temperature.
Mtr_eff	29.58%	Average efficiency of 6 unit heater fans, calculated by taking the manufacturer-provided (Reznor, Sterling, and Trane) current draw to calculate power consumption and working backwards with the rated motor power and an assumed load factor of 0.8 to compute the efficiency for each fan and then taking the average of all of the fans. = 0.296 and includes both axial and centrifugal fans.
Conversion Factor	0.746	Conversion factor from HP to kW
Conversion Factor	1000	Conversion factor from kBTU/h to BTU/h
Conversion Factor	3412	Conversion factor from kW to BTU/h
Measure Life	See Table 13.0.1	Refer to table for measure life.
Incremental Cost	Table 10	Incremental cost of efficient unit heater over standard power vented unit heater.

Customer Inputs	**M&V Verified**	
Input capacity	Yes	Rated Input Capacity of the new non-infrared heater in BTU/h
Infrared Input Capacity	Yes	Rated Input Capacity of the new infrared heater in BTU/h
%conditioned	Yes	Percentage of the time during heating season the space is heated
T_indoor	Yes	Space temperature set point of space being heated

Table 13.4.1 HDD Estimation Constants and Site Weather Data (Ref 10 and 52)

Climate Zone	**HDD_a**	**HDD_b**	**HDD_c**	**T_design**	**T-Offset**
CO1: Denver / Front Range	2.87	-111.29	901.25	-4.00	-12.40
CO2: Alamosa / Mountain is climate zone	2.65	-103.77	906.11	3.40	-14.62
CO3 Grand Junction / Western Slope	3.33	-109.56	1,677.73	-16.80	4.96
Minnesota	2.51	(54.61)	679.14	(16.00)	(12.40)

Table 13.4.2 Unit Heater and Radiant Heater Costs (Ref 7)

	$/kBTUh (output)	**Incremental Cost**
Baseline Unit Heater	$8.42	N/A
Power-vented Unit Heater (83%)	$10.04	$1.62
Radiant Heater (uses input kBTU/h)	$9.45	$1.03

References:

1. 1999 Minnesota Energy Code - Chapter 7676.1100 Subpart 3D, 4A
3. International Energy Conservation Code (IECC) 2015 Table C403.2.3 (4)
4. ASHRAE HVAC Systems and Equipment 2008 pg 15.1
7. Cost data from online review on 8/5/15 of available products from various distributors
10. TMY3 Weather data from Department of Energy
52. 99.6% design temperature for Denver (Stapleton), taken from the 2005 ASHRAE Handbook - Fundamentals. Grand Junction - Station 724760; Alamosa - Station 724620.

Changes from Recent Filing:

Added peak gas decatherm savings.

13.5 Boiler Controls

Algorithms

$$Customer\ Dth = Input\ Capacity \times Alt \times (1 - \frac{EFFb}{Effh}) \times EFLH$$

$$Customer\ Dth/hr = Input\ Capacity \times Alt \times (1 - \frac{EFFb}{Effh})$$

Variables

Alt	See Table 13.0.4	Altitude Adjustment factor to adjust the sea level manufacturer's rated input for altitude effects. No adjustment for near sea-level altitude.
Effb	See Table 13.0.2	Efficiency of Baseline equipment.
Effh	See Table 13.0.2	Efficiency of equipment after controls implemented
EFLH	See Table 13.0.3	Based on Bin Analysis assuming 30% oversizing for boiler plant. (Ref 28)
Measure Life	See Table 13.0.1	

Customer Inputs	**M&V Verified**	
Input Capacity	Yes	Rated input BTUH nameplate data for the boiler
Use	Yes	Use of boiler: space heating, domestic water, or both.
Cost	Yes	Cost of boiler tuneup

References:

28. MN Bin Temp Bin Hrs are taken from the "Thermal Environmental Engineering, Third Edition, Thomas H. Kuehn, James W. Ramsey and James L. Threlkeld, Pages 717-718, Table B.5" to determine full load equivalent hours (FLEH) in Minnesota area. See Forecast furnace operating hours for calculation. Adjusted for CO

Changes from Recent Filing:

Added peak gas decatherm savings.

13.6 Steam Traps

Algorithms

$$Customer\ (Dth) = LeakRate \times Leak\ Hours \times \frac{BTU\ Per\ Pound}{EFFb} / 1000000$$

$$Customer\ (Dth/hr) = LeakRate \times \frac{BTU\ Per\ Pound}{EFFb} / 1000000$$

Variables

	5	Leakage rate for low pressure steam traps in pounds of steam per hour.(Reference 20)
Leak_Rate	11	Leakage rate for high pressure steam traps in pounds of steam per hour.(Reference 20)
Leak_Hours	See Table 13.6.1	Annual hours boiler lines are pressurized, based on customer-provided system type.
Effb	See Table 13.0.2	Efficiency of steam boiler
BTU_Per_Pound	1064	Loss in btu/lb for Steam traps in Low Pressure Applications: 1164 BTU per pound for lost to atmosphere, 964 BTU per pound lost to condensate. Assume 50/50 mix = 1064 BTU per pound. (Reference 20)
	1081	Loss in btu/lb for Steam traps in High Pressure Applications: 1181 BTU per pound for lost to atmosphere, 981 BTU per pound lost to condensate. Assume 50/50 mix = 1081 BTU per pound. (Reference 20)
Measure Life	See Table 13.0.1	

Customer Inputs	**M&V Verified**	
Incremental Cost	No	Cost of replacing or repairing steam traps, per trap, provided by the customer.
Steam Pressure	Yes	Steam pressure, low or high.
Use	Yes	Use of steam system: space heating, domestic water, or both.

Table 13.6.1 Annual Leak Hours - Steam Traps

Use	Hours
Space Heating	7,940
Domestic Water Heating	8,760
Space and Domestic Water Heating	8,760

References:

20. Leakage data from Energy Management Handbook, by Wayne Turner

28. MN Bin Temp Bin Hrs are taken from the "Thermal Environmental Engineering, Third Edition, Thomas H. Kuehn, James W. Ramsey and James L. Threlkeld, Pages 717-718, Table B.5" to determine full load equivalent hours (FLEH) in Minnesota area. See Forecast furnace operating hours for calculation. Adjusted for CO

Changes from Recent Filing:

Added peak gas decatherm savings.

13.7 Pipe Insulation

Algorithms

$$Customer\ (Dth) = LFT \times Hrs \times (BTU\ Per\ Foot\ U - BTU\ Per\ Foot\ I) \times Existing/EFFb$$

$$BTU\ Per\ Foot = Coef0 + (Coef1 \times DeltaT) + (Coef2 \times DeltaT^2) + (Coef3 \times DeltaT^3)$$

$$DeltaT = Tfluid - Tambient$$

$$Customer\ (Dth/hr) = LFT \times BTU\ Per\ Foot\ U - BTU\ Per\ Foot\ I) \times Existing/EFFb$$

Variables

Hrs	See Table 13.7.1	The operating hours for the boiler system.
T ambient	70	Average temperature of the space surrounding the pipe for conditioned spaces.
	51	= Average temperature of the space surrounding the pipe for outside domestic hot water, full year average based on average TMY3 temperatures for Colorado. (Ref 10)
	44	= Average temperature of the space surrounding the pipe for outside space heating (average excluding June-September) based on average TMY3 temperatures for Colorado. (Ref 10)
Existing		= Pipe insulation savings multiplier to determine credit if existing deteriorated insulation is being replaced.
	1	= Multiplier of 1 if no existing insulation is present.
	0.25	= Pipe insulation savings multiplier of 0.25 if existing insulation is being replaced.
Effb	See Table 13.0.2	= Efficiency of boiler or water heater serving the pipes being insulated.
Coef0, Coef1, Coef2, Coef3	See Table 13.7.2	= Polynomial coefficients
Measure Life	See Table 13.0.1	Refer to table 15 for measure life.

Customer Inputs	**M&V Verified**	
LFT	Yes	Linear feet of insulation installed, provided by the customer.
T fluid	Yes	Average temperature of the fluid in the pipe receiving insulation in degrees F

Table 13.7.1 Hours for Pipe Insulation (Ref 28)

Use of Pipe	Location	Pipe Insulation Hours	Explanation
Domestic Hot Water	Inside	5,558	Hours when outside temp is above building balance point. Heat loss from pipe is wasted.
Domestic Hot Water	Outside	8,760	Domestic hot water available year round, outside temp is always less than 120 F.
Space Heating	Inside	1,648	Hours when boiler is running but outdoor temp is above building balance point
Space Heating	Outside	4,791	Hours that boiler is running

Changes from Recent Filing:
Added peak gas decatherm savings.

Table 13.7.2 Deemed Insulation Polynomial Equation Coefficients and Incremental Costs

Pipe Nominal Diameter (inches)	Insulation Thickness (Inches)	Heat Loss (BTU/Hr) at Specified					Polynomial Coefficients				Cost Per Foot	Cost Per 3' Materials
		5	70	135	200	265	Coef0	Coef1	Coef2	Coef3	Total	(Ref 28)
0.50	-	1.73000	35.90	81.40	136.0	201.0	-0.516993042	0.432767085	0.001310573	-2.82203E-07	$ -	$ -
0.50	0.5	0.64500	10.10	21.20	34.4	50.0	-0.020554913	0.132795641	0.000150494	2.291E-07	$ 6.18	$ 6.18
0.50	1	0.46300	7.07	14.80	23.9	34.6	-0.005067924	0.093143865	0.000102935	1.44743E-07	$ 7.47	$ 7.47
0.50	1.5	0.37900	5.75	12.00	19.4	28.0	0.003984993	0.07518613	8.91729E-05	9.74056E-08	$ 14.18	$ 14.18
0.50	2	0.33700	5.10	10.60	17.1	24.7	0.000608336	0.067400189	6.8221E-05	1.1015E-07	$ 22.02	$ 22.02
0.50	2.5	0.29500	4.45	9.28	14.9	21.6	-0.00747838	0.059744424	4.96359E-05	1.22895E-07	$ 26.02	$ 26.02
0.50	3	0.27800	4.18	8.72	14.0	20.3	-0.006305586	0.056116414	4.66467E-05	1.15916E-07	$ 31.44	$ 31.44
0.50	3.5	0.26400	3.97	8.28	13.3	19.2	-0.001850367	0.052723779	5.22687E-05	8.37506E-08	$ 36.87	$ 36.87
0.50	4	0.25300	3.80	7.92	12.7	18.4	-0.0060451	0.051105544	4.13115E-05	1.05295E-07	$ 42.29	$ 42.29
0.50	4.5	0.24200	3.64	7.59	12.2	17.6	-0.000563522	0.048200035	4.96014E-05	7.22E-08	$ 47.71	$ 47.71
0.50	5	0.23500	3.53	7.34	11.8	17.1	-0.003366019	0.047319386	3.88419E-05	9.86193E-08	$ 53.14	$ 53.14
0.50	5.5	0.23400	3.51	7.31	11.8	17.0	0.005221094	0.045902204	5.38618E-05	5.64406E-08	$ 58.56	$ 58.56
0.50	6	0.22700	3.41	7.10	11.4	16.5	-0.003540178	0.045661627	3.91228E-05	8.89091E-08	$ 63.98	$ 63.98
0.75	-	2.09000	43.40	98.50	165.0	245.0	-0.641016191	0.52569402	0.001536569	-8.79988E-08	$ -	$ -
0.75	0.5	0.75300	11.80	24.90	40.4	58.7	-0.02396278	0.154265394	0.000194013	2.26673E-07	$ 7.00	$ 7.00
0.75	1	0.55600	8.51	17.80	28.8	41.8	-0.00762203	0.112369747	0.000117924	2.01487E-07	$ 8.17	$ 8.17
0.75	1.5	0.43900	6.66	13.90	22.4	32.5	-0.008498524	0.08880715	8.10579E-05	1.76301E-07	$ 14.24	$ 14.24
0.75	2	0.38300	5.80	12.10	19.5	28.2	-0.002610027	0.076775636	7.83555E-05	1.26536E-07	$ 22.77	$ 22.77
0.75	2.5	0.32900	4.97	10.40	16.7	24.1	-0.0040483	0.065832705	6.97763E-05	9.43711E-08	$ 26.39	$ 26.39
0.75	3	0.30800	4.64	9.66	15.5	22.5	-0.009461577	0.062664109	4.6068E-05	1.43226E-07	$ 31.73	$ 31.73
0.75	3.5	0.29100	4.38	9.12	14.7	21.2	0.002692685	0.057657531	6.2664E-05	8.16265E-08	$ 37.07	$ 37.07
0.75	4	0.27700	4.17	8.69	14.0	20.2	0.001543377	0.054974131	5.90396E-05	7.98058E-08	$ 42.40	$ 42.40
0.75	4.5	0.26600	3.99	8.32	13.4	19.3	0.003691319	0.052371762	5.99558E-05	6.4937E-08	$ 47.74	$ 47.74
0.75	5	0.25600	3.85	8.02	12.9	18.6	0.000585786	0.050883434	5.32258E-05	7.40404E-08	$ 53.08	$ 53.08
0.75	5.5	0.25300	3.80	7.92	12.7	18.4	-0.0060451	0.051105544	4.13115E-05	1.05295E-07	$ 58.42	$ 58.42
0.75	6	0.24500	3.68	7.67	12.3	17.8	-0.004914104	0.049356493	4.19306E-05	9.55849E-08	$ 63.76	$ 63.76
1.00	-	2.52000	52.60	120.00	201.0	297.0	-0.728366214	0.624723758	0.002067703	-7.0399E-07	$ -	$ -
1.00	0.5	0.88700	13.90	29.40	47.8	69.5	-0.022272215	0.180671207	0.000242842	2.467E-07	$ 7.22	$ 7.22
1.00	1	0.57800	8.83	18.50	29.8	43.2	-0.015207075	0.117310055	0.000117809	2.06949E-07	$ 8.77	$ 8.77
1.00	1.5	0.47600	7.22	15.10	24.3	35.2	-0.009419026	0.096051889	9.35275E-05	1.71142E-07	$ 15.25	$ 15.25
1.00	2	0.41300	6.24	13.00	21.0	30.3	0.005230275	0.081790418	9.32915E-05	1.11364E-07	$ 24.21	$ 24.21
1.00	2.5	0.37300	5.63	11.70	18.9	27.3	0.00381926	0.074149847	7.78159E-05	1.17433E-07	$ 28.23	$ 28.23
1.00	3	0.34500	5.21	10.90	17.5	25.2	-0.002010924	0.068712866	7.74465E-05	8.34471E-08	$ 33.97	$ 33.97
1.00	3.5	0.32400	4.88	10.20	16.4	23.6	0.001685103	0.06407339	7.52741E-05	7.16128E-08	$ 39.72	$ 39.72
1.00	4	0.30700	4.63	9.64	15.5	22.4	-0.002917771	0.06161312	5.81228E-05	1.07116E-07	$ 45.46	$ 45.46
1.00	4.5	0.29200	4.40	9.16	14.7	21.3	-0.007199584	0.059166006	4.73061E-05	1.23805E-07	$ 51.21	$ 51.21
1.00	5	0.26800	4.02	8.37	13.5	19.4	0.0071897	0.052385938	6.46778E-05	5.21924E-08	$ 56.95	$ 56.95
1.00	5.5	0.27500	4.13	8.61	13.8	20.0	-0.007331946	0.055629289	4.39788E-05	1.16826E-07	$ 62.70	$ 62.70
1.00	6	0.26600	4.00	8.33	13.4	19.3	0.001648014	0.052737954	5.69907E-05	7.10059E-08	$ 68.44	$ 68.44
1.00	6.5	0.25800	3.88	8.08	13.0	18.8	-0.001520359	0.051606845	4.87015E-05	9.16401E-08	$ 74.19	$ 74.19
1.00	7	0.25100	3.78	7.87	12.7	18.3	0.0040483	0.049530214	5.68509E-05	6.34198E-08	$ 79.93	$ 79.93
1.00	7.5	0.24500	3.69	7.67	12.3	17.8	-0.005652253	0.049631391	3.93036E-05	1.01654E-07	$ 85.68	$ 85.68
1.00	8	0.24000	3.60	7.50	12.1	17.4	0.006196242	0.046927845	5.77671E-05	4.85511E-08	$ 91.42	$ 91.42
1.00	8.5	0.23500	3.53	7.35	11.8	17.1	-0.004671175	0.047410679	3.85038E-05	9.86193E-08	$ 97.17	$ 97.17
1.00	9	0.23000	3.46	7.20	11.6	16.7	0.003090708	0.045439517	5.10371E-05	5.76544E-08	$ 102.91	$ 102.91
1.00	9.5	0.22600	3.40	7.07	11.4	16.4	0.004308785	0.044519345	5.15157E-05	5.27993E-08	$ 108.66	$ 108.66
1.00	10	0.22200	3.34	6.95	11.2	16.1	0.004221705	0.043690465	5.16562E-05	4.79442E-08	$ 114.40	$ 114.40
1.25	-	3.11000	64.80	147.00	248.0	368.0	-0.818940893	0.767967466	0.002475005	-4.58201E-07	$ -	$ -
1.25	0.5	1.01000	15.80	33.40	54.2	78.8	-0.031513883	0.206374602	0.000264133	3.0041E-07	$ 7.71	$ 7.71
1.25	1	0.73700	11.30	23.70	38.4	55.6	-0.001419104	0.147521133	0.000181817	2.01183E-07	$ 9.48	$ 9.48
1.25	1.5	0.53100	8.05	16.80	27.1	39.2	-0.002577359	0.106352439	0.000111172	1.7266E-07	$ 16.60	$ 16.60
1.25	2	0.48900	7.41	15.50	24.9	36.0	-0.009713167	0.098536218	9.81917E-05	1.61129E-07	$ 25.56	$ 25.56
1.25	2.5	0.43300	6.55	13.70	22.0	31.8	-0.008124039	0.087122646	8.65811E-05	1.41708E-07	$ 30.01	$ 30.01
1.25	3	0.39700	5.98	12.50	20.1	29.0	-0.001061994	0.078960628	8.58034E-05	1.1015E-07	$ 36.07	$ 36.07
1.25	3.5	0.36900	5.56	11.60	18.7	26.9	0.006159386	0.072610714	8.88153E-05	7.61645E-08	$ 42.14	$ 42.14
1.25	4	0.34700	5.23	10.90	17.5	25.3	-0.005578542	0.069831729	6.35978E-05	1.25322E-07	$ 48.21	$ 48.21
1.25	4.5	0.32800	4.94	10.30	16.5	23.9	-0.009947435	0.066555736	5.29215E-05	1.37157E-07	$ 54.27	$ 54.27
1.25	5	0.31400	4.72	9.83	15.8	22.8	-0.000838598	0.062614323	6.21848E-05	9.8922E-08	$ 60.34	$ 60.34
1.25	5.5	0.30300	4.55	9.47	15.2	22.0	-0.005033331	0.060996088	5.12276E-05	1.20467E-07	$ 66.41	$ 66.41
1.25	6	0.29200	4.39	9.14	14.7	21.2	0.000448248	0.058090578	5.95175E-05	8.73919E-08	$ 72.47	$ 72.47
1.50	-	3.50000	73.10	167.00	280.0	416.0	-1.089467456	0.8782643	0.002727811	-3.94477E-07	$ -	$ -
1.50	0.5	1.18000	18.70	39.40	64.1	93.2	-0.041432863	0.243931118	0.00030924	3.70202E-07	$ 8.88	$ 8.88
1.50	1	0.74800	11.50	24.00	38.8	56.2	-0.011669003	0.151852526	0.000158962	2.58534E-07	$ 10.23	$ 10.23
1.50	1.5	0.59900	9.11	19.00	30.7	44.4	-0.000571611	0.119949509	0.000129735	1.88439E-07	$ 17.36	$ 17.36
1.50	2	0.47800	7.23	15.10	24.3	35.1	-0.003649756	0.095659969	0.000100122	1.4626E-07	$ 26.68	$ 26.68
1.50	2.5	0.43400	6.54	13.60	22.0	31.7	0.011069068	0.085292433	0.000101654	1.04992E-07	$ 30.92	$ 30.92
1.50	3	0.40100	6.04	12.60	20.3	29.3	0.001635399	0.079606921	8.63392E-05	1.15005E-07	$ 36.97	$ 36.97
1.50	3.5	0.37500	5.65	11.80	19.0	27.4	0.001530008	0.07434559	8.34742E-05	9.86193E-08	$ 43.03	$ 43.03
1.50	4	0.35300	5.31	11.10	17.8	25.7	-0.005170401	0.070673765	6.97919E-05	1.11364E-07	$ 49.08	$ 49.08
1.50	4.5	0.33700	5.06	10.50	17.0	24.5	0.010881306	0.06598783	7.70382E-05	8.58747E-08	$ 55.13	$ 55.13
1.50	5	0.32300	4.85	10.10	16.3	23.5	0.005816529	0.06357831	7.23994E-05	8.4054E-08	$ 61.19	$ 61.19
1.50	5.5	0.32100	4.82	10.00	16.1	23.3	-0.001186631	0.06432578	5.53879E-05	1.27143E-07	$ 67.24	$ 67.24
1.50	6	0.30900	4.64	9.68	15.6	22.5	0.003362065	0.060986204	6.84368E-05	8.22333E-08	$ 73.29	$ 73.29
2.00	-	4.30000	90.00	205.00	346.0	514.0	-1.168942064	1.063995275	0.003504974	-6.97921E-07	$ -	$ -
2.00	0.5	1.43000	22.70	48.00	78.1	114.0	-0.071199428	0.297777814	0.0003583	5.37096E-07	$ 9.48	$ 9.48
2.00	1	0.87700	13.40	28.20	45.5	66.0	-0.018896703	0.176816709	0.000198555	2.80079E-07	$ 11.07	$ 11.07
2.00	1.5	0.68300	10.40	21.70	35.0	50.6	-0.005820899	0.137369953	0.000144615	2.17569E-07	$ 19.13	$ 19.13
2.00	2	0.58000	8.79	18.30	29.6	42.7	0.008893686	0.114918113	0.000134157	1.51722E-07	$ 28.12	$ 28.12
2.00	2.5	0.51600	7.80	16.30	26.2	37.8	-0.004204383	0.103155168	0.000110122	1.46867E-07	$ 32.95	$ 32.95
2.00	3	0.47000	7.09	14.80	23.8	34.4	-0.00454724	0.094122765	9.37057E-05	1.54756E-07	$ 39.34	$ 39.34
2.00	3.5	0.43600	6.56	13.70	22.0	31.8	-0.005550114	0.08732423	8.44242E-05	1.46867E-07	$ 45.74	$ 45.74
2.00	4	0.40500	6.10	12.70	20.4	29.5	-0.00569777	0.081471325	7.28949E-05	1.50205E-07	$ 52.14	$ 52.14
2.00	4.5	0.38400	5.78	12.00	19.4	28.0	0.007290669	0.075888636	8.20756E-05	1.14095E-07	$ 58.54	$ 58.54
2.00	5	0.36600	5.51	11.50	18.5	26.7	-0.0004715	0.072832824	7.6901E-05	1.07419E-07	$ 64.94	$ 64.94
2.00	5.5	0.35600	5.35	11.10	17.9	25.9	0.000920268	0.071099876	6.48261E-05	1.34729E-07	$ 71.33	$ 71.33
2.00	6	0.34900	5.25	10.90	17.6	25.4	0.00518377	0.069114539	7.26374E-05	1.06509E-07	$ 77.73	$ 77.73
2.50	-	5.12000	107.00	244.00	412.0	612.0	-1.364233305	1.261115807	0.00422519	-9.46746E-07	$ -	$ -
2.50	0.5	1.65000	26.20	55.40	90.0	131.0	-0.078113011	0.342732839	0.00043244	5.31027E-07	$ 9.94	$ 9.94
2.50	1	1.01000	15.50	32.40	52.4	75.9	-0.0121108	0.204126948	0.000223103	3.30754E-07	$ 12.60	$ 12.60
2.50	1.5	0.70300	10.70	22.30	35.9	51.9	-0.011116692	0.142114518	0.000138841	2.41845E-07	$ 20.55	$ 20.55
2.50	2	0.61000	9.24	19.30	31.0	44.9	-0.015685025	0.123574723	0.000111288	2.33652E-07	$ 30.28	$ 30.28
2.50	2.5	0.54700	8.26	17.20	27.8	40.1	0.008994837	0.108095141	0.000125032	1.43529E-07	$ 35.59	$ 35.59
2.50	3	0.50100	7.56	15.80	25.4	36.6	-0.000838364	0.099632627	0.000111516	1.27143E-07	$ 42.48	$ 42.48
2.50	3.5	0.46200	6.96	14.50	23.3	33.7	-0.006182873	0.092860459	8.46622E-05	1.69322E-07	$ 49.38	$ 49.38
2.50	4	0.43400	6.54	13.60	21.9	31.6	0.001038507	0.086510545	8.76741E-05	1.35336E-07	$ 56.28	$ 56.28
2.50	4.5	0.41200	6.20	12.90	20.8	30.0	0.004368659	0.081620608	8.79719E-05	1.17736E-07	$ 63.17	$ 63.17
2.50	5	0.38900	5.85	12.20	19.6	28.3	-0.002697627	0.077698322	7.67599E-05	1.24716E-07	$ 70.07	$ 70.07
2.50	5.5	0.39000	5.86	12.20	19.6	28.4	-0.00663112	0.078566725	6.53814E-05	1.60825E-07	$ 76.97	$ 76.97
2.50	6	0.36100	5.42	11.30	18.2	26.2	0.005261903	0.071073509	8.23987E-05	8.46609E-08	$ 83.86	$ 83.86
3.00	-	6.12000	128.00	292.00	493.0	734.0	-1.713059627	1.51885905	0.004913792	-6.43301E-07	$ -	$ -
3.00	0.5	1.97000	31.30	66.30	108.0	157.0	-0.062350218	0.404796042	0.000578041	4.94614E-07	$ 11.11	$ 11.11
3.00	1	1.18000	18.20	38.10	61.5	89.2	-0.035458482	0.241337755	0.000245777	4.30891E-07	$ 13.47	$ 13.47
3.00	1.5	0.90300	13.80	28.80	46.4	67.2	-0.020650471	0.18354569	0.000176359	3.32878E-07	$ 21.50	$ 21.50
3.00	2	0.75600	11.50	23.90	38.6	55.8	-0.001247623	0.151944426	0.000153453	2.56107E-07	$ 32.08	$ 32.08
3.00	2.5	0.66100	10.00	20.90	33.6	48.6	-0.010802601	0.132954082	0.000131023	2.24245E-07	$ 37.28	$ 37.28
3.00	3	0.59500	8.98	18.70	30.1	43.6	-0.007821705	0.119807562	0.000107338	2.32135E-07	$ 44.37	$ 44.37
3.00	3.5	0.53900	8.13	16.90	27.3	39.4	0.007359204	0.106832835	0.000115989	1.58094E-07	$ 51.46	$ 51.46
3.00	4	0.50200	7.56	15.80	25.4	36.6	0.000265661	0.099608189	0.000111673	1.2684E-07	$ 58.56	$ 58.56
3.00	4.5	0.47300	7.12	14.80	23.9	34.5	0.006580948	0.093656035	0.000100275	1.41708E-07	$ 65.65	$ 65.65
3.00	5	0.44200	6.65	13.90	22.3	32.2	-0.005880122	0.088441164	8.79914E-05	1.38977E-07	$ 72.75	$ 72.75

3.00	5.5	0.42300	6.36	13.30	21.3	30.8	-0.010249015	0.085165171	7.73152E-05	1.50812E-07	$	79.84	$ 79.84
3.00	6	0.40600	6.10	12.70	20.4	29.5	-0.004593745	0.081446886	7.30516E-05	1.49901E-07	$	86.93	$ 86.93
3.50	0	6.92000	145.00	331.00	559.0	832.0	-1.930431367	1.716468344	0.005630873	-8.86057E-07	$	-	$ -
3.50	0.5	2.18000	34.60	73.30	119.0	174.0	-0.142304181	0.457370223	0.000510683	9.16401E-07	$	13.37	$ 13.37
3.50	1	1.11000	17.00	35.70	57.6	83.4	-0.020428636	0.223915621	0.000255225	3.30754E-07	$	14.60	$ 14.60
3.50	1.5	0.89900	13.70	28.50	46.0	66.6	-0.010053892	0.181792217	0.000174042	3.34092E-07	$	23.58	$ 23.58
3.50	2	0.76700	11.60	24.30	39.1	56.5	-0.007137031	0.153221655	0.000167467	2.22425E-07	$	34.83	$ 34.83
3.50	2.5	0.67900	10.30	21.40	34.5	49.9	-0.00525488	0.13683459	0.000128317	2.49128E-07	$	39.94	$ 39.94
3.50	3	0.60900	9.19	19.20	30.9	44.6	-0.001478562	0.121293961	0.000131484	1.73267E-07	$	47.27	$ 47.27
3.50	3.5	0.56200	8.47	17.70	28.4	41.0	-0.007918486	0.112611266	0.000112466	1.75391E-07	$	54.61	$ 54.61
3.50	4	0.52400	7.90	16.50	26.5	38.3	-0.00736386	0.105116067	0.000102467	1.74784E-07	$	61.94	$ 61.94
3.50	4.5	0.52600	7.92	16.50	26.6	38.4	0.003398452	0.104398877	0.000111507	1.5597E-07	$	69.28	$ 69.28
3.50	5	0.48800	7.34	15.30	24.6	35.6	-0.005339333	0.097846891	9.01541E-05	1.79639E-07	$	76.62	$ 76.62
3.50	5.5	0.46500	6.99	14.60	23.4	33.9	-0.012405618	0.093924605	7.89421E-05	1.86618E-07	$	83.95	$ 83.95
3.50	6	0.44400	6.68	13.90	22.4	32.3	0.004144041	0.087998873	9.44041E-05	1.26233E-07	$	91.29	$ 91.29
4.00	0	7.72000	162.00	369.00	624.0	929.0	-2.117593081	1.917129419	0.006241966	-8.25368E-07	$	-	$ -
4.00	0.5	2.32000	36.70	77.80	126.0	184.0	-0.156914234	0.486030084	0.000540165	9.34608E-07	$	14.12	$ 14.12
4.00	1	1.42000	21.90	45.80	74.1	107.0	-0.008294688	0.286131955	0.000349321	3.58064E-07	$	17.83	$ 17.83
4.00	1.5	1.09000	16.60	34.70	55.9	80.9	-0.018592106	0.220043458	0.000224585	3.67167E-07	$	24.48	$ 24.48
4.00	2	0.90100	13.70	28.50	46.0	66.6	-0.007845842	0.18174334	0.000174355	3.33485E-07	$	37.48	$ 37.48
4.00	2.5	0.78100	11.80	24.70	39.7	57.5	-0.015664035	0.157192329	0.000151844	2.78865E-07	$	42.66	$ 42.66
4.00	3	0.68800	10.40	21.70	34.9	50.4	-0.006031966	0.137847931	0.000140326	2.16052E-07	$	50.33	$ 50.33
4.00	3.5	0.62800	9.48	19.80	31.8	46.0	-0.011439599	0.126406008	0.000119272	2.22121E-07	$	58.01	$ 58.01
4.00	4	0.58200	8.77	18.30	29.4	42.5	-0.007483087	0.116755662	0.000111764	1.99666E-07	$	65.68	$ 65.68
4.00	4.5	0.53700	8.09	16.90	27.1	39.2	-0.01195737	0.108218339	9.82229E-05	1.95115E-07	$	73.35	$ 73.35
4.00	5	0.50800	7.64	15.90	25.6	37.0	-0.000604565	0.101373345	9.83601E-05	1.7357E-07	$	81.03	$ 81.03
4.00	5.5	0.48400	7.29	15.20	24.4	35.3	-0.008774875	0.097475497	8.69914E-05	1.80853E-07	$	88.70	$ 88.70
4.00	6	0.46300	6.96	14.50	23.3	33.7	-0.005078848	0.092836021	8.48189E-05	1.69018E-07	$	96.37	$ 96.37
4.50	0	8.52000	178.00	408.00	689.0	1027.0	-2.404449184	2.105609381	0.00699286	-1.06812E-06	$	-	$ -
4.50	0.5	2.55000	40.30	85.30	139.0	202.0	-0.058585084	0.520385482	0.000748911	6.2206E-07	$	15.84	$ 15.84
4.50	1	1.33000	20.30	42.50	64.7	99.3	-0.574813447	0.339228277	-0.000598459	2.78258E-06	$	18.42	$ 18.42
4.50	1.5	1.06000	16.10	33.60	54.3	78.5	0.002667794	0.211535644	0.00023601	3.15582E-07	$	25.56	$ 25.56
4.50	2	0.89700	13.60	28.40	45.8	66.2	-0.003291267	0.179379511	0.000193236	2.7401E-07	$	40.36	$ 40.36
4.50	2.5	0.77800	11.80	24.60	39.5	57.1	-0.01738693	0.157553049	0.000144611	2.79775E-07	$	45.22	$ 45.22
4.50	3	0.70300	10.60	22.10	35.6	51.5	-0.003424384	0.140576056	0.000138841	2.41845E-07	$	53.29	$ 53.29
4.50	3.5	0.64500	9.73	20.30	32.6	47.2	-0.013335718	0.130154572	0.000115563	2.47307E-07	$	61.36	$ 61.36
4.50	4	0.59000	8.89	18.50	29.8	43.1	-0.002088302	0.118048248	0.000112836	2.09376E-07	$	69.43	$ 69.43
4.50	4.5	0.59100	8.90	18.60	29.9	43.1	-0.00044406	0.117375588	0.000129873	1.54453E-07	$	77.50	$ 77.50
4.50	5	0.55500	8.36	17.40	28.0	40.5	-0.004195201	0.111274151	0.000103397	2.0179E-07	$	85.57	$ 85.57
4.50	5.5	0.52800	7.95	16.60	26.6	38.5	-0.013958879	0.106705573	9.16497E-05	2.03914E-07	$	93.64	$ 93.64
4.50	6	0.50300	7.56	15.80	25.3	36.6	-0.012960244	0.101419804	8.89414E-05	1.87225E-07	$	101.71	$ 101.71
5.00	0	9.49000	199.00	454.00	768.0	1145.0	-2.639988816	2.357830483	0.007642948	-7.55576E-07	$	-	$ -
5.00	0.5	2.90000	46.00	97.40	158.0	231.0	-0.196291046	0.609342393	0.000662657	1.24412E-06	$	17.71	$ 17.71
5.00	1	1.76000	27.20	57.00	92.2	134.0	-0.053032837	0.360286538	0.000369179	6.79715E-07	$	20.14	$ 20.14
5.00	1.5	1.32000	20.10	42.10	68.0	98.5	-0.011601795	0.264789648	0.00029262	4.18753E-07	$	27.40	$ 27.40
5.00	2	1.08000	16.40	34.20	55.1	79.7	-0.01265856	0.21749832	0.000216256	3.70202E-07	$	42.88	$ 42.88
5.00	2.5	0.90700	13.70	28.70	46.2	66.8	-0.007263697	0.180986356	0.000196493	2.70976E-07	$	47.73	$ 47.73
5.00	3	0.80600	12.20	25.40	40.9	59.2	-0.010080447	0.162440232	0.000150235	3.01623E-07	$	56.00	$ 56.00
5.00	3.5	0.73100	11.00	23.00	37.1	53.5	0.009459835	0.143922177	0.000172879	1.7266E-07	$	64.28	$ 64.28
5.00	4	0.66100	9.97	20.80	33.5	48.3	0.003031589	0.13119868	0.000146122	1.75694E-07	$	72.56	$ 72.56
5.00	4.5	0.61700	9.29	19.40	31.2	45.0	-0.00033867	0.122636918	0.000132737	1.70839E-07	$	80.83	$ 80.83
5.00	5	0.58100	8.74	18.20	29.3	42.3	0.000947708	0.11564264	0.000117798	1.81763E-07	$	89.11	$ 89.11
5.00	5.5	0.55200	8.31	17.30	27.9	40.2	0.007803212	0.109042265	0.00012328	1.42012E-07	$	97.39	$ 97.39
5.00	6	0.52700	7.92	16.50	26.6	38.4	0.004502477	0.104374439	0.000111663	1.55667E-07	$	105.66	$ 105.66
6.00	0	11.20000	234.00	535.00	905.0	1350.0	-3.089098121	2.76905087	0.009072892	-9.71021E-07	$	-	$ -
6.00	0.5	3.53000	56.30	119.00	194.0	283.0	-0.157084076	0.734636301	0.000932785	1.23502E-06	$	19.84	$ 19.84
6.00	1	2.09000	32.20	67.70	109.0	159.0	-0.121710644	0.433383727	0.000363801	1.0044E-06	$	21.37	$ 21.37
6.00	1.5	1.54000	23.50	49.20	79.4	115.0	-0.022131998	0.310347443	0.000333273	5.03717E-07	$	28.93	$ 28.93
6.00	2	1.22000	18.50	38.70	62.3	90.2	-0.020105599	0.245575785	0.000246973	4.18753E-07	$	44.19	$ 44.19
6.00	2.5	1.04000	15.80	32.90	53.1	76.7	-0.000477794	0.208296595	0.000221042	3.21651E-07	$	48.74	$ 48.74
6.00	3	0.92000	13.90	29.00	46.7	67.5	-0.005274985	0.184050762	0.000187932	2.97375E-07	$	56.80	$ 56.80
6.00	3.5	0.81000	12.20	25.50	41.0	59.3	-0.00868535	0.162037302	0.00016146	2.70065E-07	$	64.86	$ 64.86
6.00	4	0.74500	11.20	23.40	37.7	54.4	0.0052322	0.14727491	0.000166165	1.98756E-07	$	72.92	$ 72.92
6.00	4.5	0.69200	10.40	21.70	35.0	50.5	0.008414695	0.136532068	0.000154933	1.84494E-07	$	80.98	$ 80.98
6.00	5	0.64500	9.70	20.20	32.5	47.0	-0.003800897	0.129017112	0.000121754	2.291E-07	$	89.04	$ 89.04
6.00	5.5	0.61600	9.27	19.30	31.1	44.9	0.003054607	0.122416737	0.000127236	1.89349E-07	$	97.10	$ 97.10
6.00	6	0.58600	8.82	18.40	29.6	42.7	0.000251824	0.116509114	0.000123835	1.68108E-07	$	105.16	$ 105.16
7.00	0	12.70000	267.00	611.00	1034.0	1542.0	-3.557321022	3.151328652	0.010491384	-1.42619E-06	$	-	$ -
7.00	0.5	4.01000	64.00	136.00	221.0	322.0	-0.221965798	0.835039664	0.001116074	1.21074E-06	$	39.14	$ 39.14
7.00	1	2.43000	37.60	79.00	128.0	185.0	-0.014918785	0.488496326	0.000649086	5.37096E-07	$	43.13	$ 43.13
7.00	1.5	1.68000	25.60	53.60	86.5	125.0	-0.009360557	0.336258318	0.000389024	4.61235E-07	$	47.13	$ 47.13
7.00	2	1.36000	20.70	43.20	69.6	101.0	-0.033502308	0.27642001	0.000247584	5.58337E-07	$	51.12	$ 51.12
7.00	2.5	1.16000	17.60	36.60	59.1	85.4	0.001981143	0.232222078	0.000240172	3.76271E-07	$	55.11	$ 55.11
7.00	3	0.98900	15.00	31.20	50.2	72.6	-0.015148371	0.199941099	0.000182163	3.67471E-07	$	59.11	$ 59.11
7.00	3.5	0.89400	13.50	28.10	45.3	65.5	-0.001621224	0.178819711	0.000177095	3.05265E-07	$	63.10	$ 63.10
7.00	4	0.82000	12.40	25.80	41.5	59.9	-0.005709344	0.16455708	0.000161337	2.67031E-07	$	67.10	$ 67.10
7.00	4.5	0.76000	11.40	23.90	38.4	55.5	-0.005211782	0.150915968	0.000161298	2.24549E-07	$	71.09	$ 71.09
7.00	5	0.71100	10.70	22.30	35.9	51.9	-0.002284492	0.141919013	0.000140094	2.39417E-07	$	75.08	$ 75.08
7.00	5.5	0.67400	10.20	21.20	34.0	49.2	-0.01884445	0.1372366	0.000108482	2.80989E-07	$	79.08	$ 79.08
7.00	6	0.63900	9.62	20.00	32.3	46.6	0.010120892	0.126339023	0.000138448	1.8237E-07	$	83.07	$ 83.07
8.00	0	14.30000	300.00	687.00	1163.0	1734.0	-3.915141427	3.531162624	0.011925548	-1.9117E-06	$	-	$ -
8.00	0.5	4.56000	72.80	155.00	252.0	367.0	-0.236558424	0.945864274	0.001334781	1.22591E-06	$	44.73	$ 44.73
8.00	1	2.60000	40.20	84.50	137.0	198.0	-0.006213668	0.521114507	0.000708629	5.46199E-07	$	49.29	$ 49.29
8.00	1.5	1.86000	28.40	59.40	95.9	139.0	-0.02920684	0.375704099	0.000389921	6.4937E-07	$	53.86	$ 53.86
8.00	2	1.50000	22.80	47.70	76.9	111.0	-0.00512257	0.29957171	0.000345731	3.94477E-07	$	58.42	$ 58.42
8.00	2.5	1.23000	18.60	38.90	62.6	90.5	-0.012458287	0.246251924	0.000257448	3.85374E-07	$	62.99	$ 62.99
8.00	3	1.08000	16.40	34.20	55.1	79.6	-0.008359191	0.216880378	0.000225164	3.39857E-07	$	67.55	$ 67.55
8.00	3.5	0.97700	14.80	30.80	49.5	71.6	-0.018743247	0.197757602	0.000175211	3.71112E-07	$	72.12	$ 72.12
8.00	4	0.89400	13.50	28.10	45.3	65.4	0.002678146	0.178201769	0.000186003	2.7492E-07	$	76.68	$ 76.68
8.00	4.5	0.82700	12.50	26.00	41.8	60.4	-0.009972846	0.166542417	0.000153526	2.95251E-07	$	81.24	$ 81.24
8.00	5	0.77200	11.60	24.20	39.0	56.3	0.005703466	0.1527867	0.00016656	2.20907E-07	$	85.81	$ 85.81
8.00	5.5	0.73100	11.00	22.90	36.9	53.3	0.002450276	0.145445467	0.0001483	2.33349E-07	$	90.37	$ 90.37
8.00	6	0.69300	10.40	21.70	35.0	50.5	0.00951872	0.136507629	0.00015509	1.84191E-07	$	94.94	$ 94.94
9.00	0	15.90000	333.00	762.00	1291.0	1926.0	-4.285745497	3.9202278	0.01316464	-1.79032E-06	$	-	$ -
9.00	0.5	4.69000	74.60	158.00	257.0	375.0	-0.244902009	0.977189783	0.001212621	1.67198E-06	$	50.32	$ 50.32
9.00	1	2.85000	44.00	92.40	150.0	217.0	0.004233045	0.570310272	0.000765362	6.52405E-07	$	55.46	$ 55.46
9.00	1.5	2.04000	31.20	65.20	105.0	152.0	-0.049049223	0.414478618	0.000411236	7.16128E-07	$	60.59	$ 60.59
9.00	2	1.57000	23.80	49.70	80.2	116.0	-0.0047678	0.313916921	0.000336283	4.94614E-07	$	65.73	$ 65.73
9.00	2.5	1.34000	20.30	42.40	68.3	98.7	-0.009047922	0.268265384	0.00028392	4.12684E-07	$	70.86	$ 70.86
9.00	3	1.18000	17.80	37.20	59.9	86.6	-0.005963717	0.235435767	0.000246687	3.70202E-07	$	76.00	$ 76.00
9.00	3.5	1.06000	16.00	33.40	53.8	77.7	-0.001102282	0.21119752	0.000225866	3.15582E-07	$	81.13	$ 81.13
9.00	4	0.96800	14.60	30.50	49.0	70.8	-0.01201649	0.193977502	0.000193308	3.13154E-07	$	86.27	$ 86.27
9.00	4.5	0.89300	13.50	28.10	45.2	65.2	-0.004157071	0.178826376	0.000180774	2.75224E-07	$	91.40	$ 91.40
9.00	5	0.83300	12.50	26.20	42.1	60.8	-0.00365951	0.165185263	0.000180735	2.32742E-07	$	96.53	$ 96.53
9.00	5.5	0.78800	11.90	24.70	39.8	57.4	0.003311945	0.157316254	0.000158468	2.46397E-07	$	101.67	$ 101.67
9.00	6	0.75100	11.30	23.60	37.9	54.7	-0.005866519	0.149884854	0.000153125	2.2728E-07	$	106.80	$ 106.80
10.00	-	17.70000	370.00	847.00	1435.0	2142.0	-4.775020482	4.360195721	0.014570323	-1.72963E-06	$	-	$ -
10.00	0.5	5.68000	91.00	193.00	315.0	459.0	-0.230640224	1.17751696	0.001668431	1.61432E-06	$	55.91	$ 55.91
10.00	1	3.35000	51.90	109.00	177.0	257.0	-0.044118603	0.678250536	0.000823688	1.04688E-06	$	61.62	$ 61.62
10.00	1.5	2.18000	33.30	69.60	112.0	163.0	-0.093601405	0.448404968	0.000355017	1.03778E-06	$	67.32	$ 67.32
10.00	2	1.76000	26.80	56.00	90.2	131.0	-0.050608752	0.358344062	0.00031755	7.40404E-07	$	73.03	$ 73.03
10.00	2.5	1.49000	22.60	47.30	76.2	110.0	-0.006509396	0.297339337	0.000339092	3.97512E-07	$	78.73	$ 78.73
10.00	3	1.31000	19.80	41.30	66.5	96.1	-0.007849145	0.262193792	0.000267384	4.21787E-07	$	84.44	$ 84.44
10.00	3.5	1.17000	17.70	36.90	59.4	85.8	-0.007722479	0.234429092	0.000238358	3.73236E-07	$	90.14	$ 90.14

10.00	4	1.06000	16.10	33.50	53.9	77.9	-0.015804149	0.214259271	0.000201287	3.76271E-07	$ 95.85	$ 95.85
10.00	4.5	0.97800	14.70	30.70	49.5	71.5	0.007093205	0.193453302	0.000213927	2.79775E-07	$ 101.56	$ 101.56
10.00	5	0.91000	13.70	28.60	46.0	66.4	-0.002362442	0.181200446	0.000190201	2.70065E-07	$ 107.26	$ 107.26
10.00	5.5	0.85900	12.90	27.00	43.4	62.7	-0.004292269	0.170721493	0.000180973	2.55196E-07	$ 112.97	$ 112.97
10.00	6	0.81000	12.20	25.40	40.9	59.0	0.002934391	0.161106596	0.000168678	2.39721E-07	$ 118.67	$ 118.67
12.00	-	20.80000	435.00	997.00	1691.0	2524.0	-5.466828793	5.10092117	0.017473698	-2.67031E-06	$ -	$ -
12.00	0.5	6.02000	95.60	203.00	330.0	480.0	-0.253354835	1.241314563	0.001737707	1.57184E-06	$ 67.10	$ 67.10
12.00	1	3.51000	54.10	114.00	184.0	267.0	-0.10928747	0.713735288	0.000813128	1.11971E-06	$ 73.94	$ 73.94
12.00	1.5	2.53000	38.60	80.80	130.0	189.0	-0.098635542	0.517971801	0.000442636	1.11364E-06	$ 80.79	$ 80.79
12.00	2	2.04000	30.90	64.70	104.0	151.0	-0.061952533	0.413848105	0.00036715	8.37506E-07	$ 87.63	$ 87.63
12.00	2.5	1.72000	26.10	54.40	87.7	127.0	-0.02054776	0.346655396	0.00033339	6.31164E-07	$ 94.48	$ 94.48
12.00	3	1.50000	22.70	47.30	76.3	110.0	0.01147929	0.29800789	0.000337278	3.94477E-07	$ 101.33	$ 101.33
12.00	3.5	1.34000	20.20	42.10	67.9	98.1	0.005964757	0.266414158	0.000282229	4.12684E-07	$ 108.17	$ 108.17
12.00	4	1.21000	18.30	38.20	61.4	88.7	-0.015603875	0.243012875	0.00024248	3.91443E-07	$ 115.02	$ 115.02
12.00	4.5	1.11000	16.80	34.90	56.2	81.2	-0.007286039	0.223224202	0.000210358	3.91443E-07	$ 121.87	$ 121.87
12.00	5	1.03000	15.50	32.40	52.1	75.3	-0.007223877	0.205438693	0.000211022	3.24685E-07	$ 128.71	$ 128.71
12.00	5.5	0.97200	14.60	30.50	49.1	70.9	0.002430171	0.192661638	0.000207915	2.81596E-07	$ 135.56	$ 135.56
12.00	6	0.91400	13.80	28.70	46.1	66.6	-0.012648209	0.184164445	0.000166249	3.2954E-07	$ 142.41	$ 142.41

References:

10. TMY3 Weather data from Department of Energy

28. MN Bin Temp Bin Hrs are taken from the "Thermal Environmental Engineering, Third Edition, Thomas H. Kuehn, James W. Ramsey and James L. Threlkeld, Pages 717-718, Table B.5" to determine full load equivalent hours (FLEH) in Minnesota area. See Forecast furnace operating hours for calculation. Adjusted for CO

Changes from Recent Filing:

13.8 Demand Control Ventilation

Algorithms

$$Customer\ kW = Quantity \times Total\ Exaust\ Fan\ HP \times ESF$$

$$Customer\ kWh = Customer\ kW \times Hours$$

$$Customer\ Dth = (Quantity \times Total\ Exhaust\ Fan\ HP \times GSF)/10$$

$$Customer\ Dth/hr = (Quantity \times Total\ Exhaust\ Fan\ HP \times GSF/10)/Hours$$

Variables

ESF	See Table 13.8.1	Demand Controlled Ventilation Electric Savings Factor, kW per name plate HP. (Ref 53)
GSF	See Table 13.8.1	Demand Controlled Ventilation Gas Savings Factor (GSF = Therms per name plate HP. (Ref 53)
Coincidence Factor (CF)	See Table 13.8.1	Peak Coincidence Factor for electric savings. (Ref 53)
Hours	See Table 13.8.1	Effective Full Load Hours of energy savings. (Ref 53)
Incremental Cost Per Name Plate HP	$2,284.26	Average Incremental Project Cost per HP (Ref 53)
Measure Life (yrs)	20	

Customer Inputs	**M&V Verified**	
Model Name	Yes	
Model Number	Yes	
Quantity	Yes	
Size	Yes	
Total Exhaust Fan hp	Yes	Total nameplate HP of exhaust fans with DCV installed.

Table 13.8.1 Ref (49, 53)	**Electric Savings Factor (ESF)**	**Gas Savings Factor (GSF)**	**Coincidence Factor (CF)**	**~~O&M Savings - energy Per Name Plate HP~~**	**Hours**
Front Range (Zone 1)	0.559	537.3	44.21%	~~$0~~	5262
Western Slope (Zone 2)	0.724	506.6	47.60%	~~$0~~	4335
Mountain (Zone 3)	0.522	897.3	42.27%	~~$0~~	5355

References:

49. Custom DCV Projects, 2010-2011
53. Factors developed from historical custom projects with corresponding zone weather data transplanted into the analyses.

Changes from Recent Filing:

Added peak gas decatherm savings.
Corrected to original Demand Control Ventilation deemed values for CO w/ climate zones, instead of that of MN.

13.9 Boiler Tune Up

Algorithms

$$Customer\ Dth = Input\ Capacity \times Alt \times (\frac{Effh - Adj}{Effb} - 1) \times EFLH$$

$$Customer\ Dth/hr = Input\ Capacity \times Alt \times (\frac{Effh - Adj}{Effb} - 1)$$

Variables

Alt	1	Altitude Adjustment factor to adjust the sea level manufacturer's rated input for altitude
Effb	See Table 13.0.2	Efficiency of Baseline equipment.
Effh	See Table 13.0.2	Efficiency of Boiler after the tune-up
EFLH	See Table 13.0.3	Based on Bin Analysis assuming 30% oversizing for boiler plant. (Ref 28)
Measure Life	See Table 13.0.1	

Customer Inputs	**M&V Verified**	
Input Capacity	Yes	Rated input BTUH nameplate data for the boiler
Use	Yes	Use of boiler: space heating, domestic water, or both.
Cost	Yes	Cost of boiler tuneup

References:

1. 1999 Minnesota Energy Code - Chapter 7676.1100 Subpart 3D, 4A
2. Centerpoint TRM
3. International Energy Conservation Code (IECC) 2015 Table C403.2.3 (4)
4. ASHRAE HVAC Systems and Equipment 2008 pg 15.1
5. Whole Building Design Guide for US Army. Tech Note 14: Overhead Radiant Heating <https://www.wbdg.org/ccb/ARMYCOE/COETN/technote14.pdf>
6. 2015 Minnesota Energy Code Table C403.2.3(5) pg C-44
7. Cost data from online review on 8/5/15 of products available at Younits.com, ecomfort.com, hvacdistribution.com, grainger.com, simplyplumbing.com, homedepot.com, h-mac.com, ingramswaterandair.com, and zoro.com
8. Nicor Gas Energy Efficiency Plan 2011-2014. Revised Plan Filed Pursuant to Order Docket 10-0562, May 27, 2011
9. Sachs, Harvey M., Unit Heaters Deserve Attention for Commercial Programs, ACEEE, April 2003
10. TMY3 Weather data from Department of Energy
11. International Energy Conservation Code (IECC) 2012
12. 2% efficiency improvement for boiler tune up based on Michaels Energy literature review. Sources included (but not limited to):
    12A. Illinois Technical Reference Manual (2015-2016) <http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_4/2-13-15 Final/Updated/Illinois_Statewide_TRM_Effective_060115_Final_02-24-15_Clean.pdf>
    12B. Michigan Energy Measures Database (MEMD) accessed at <http://www.michigan.gov/mpsc/0,4639,7-159-52495_55129---,00.html>
    12C. Arkansas Technical Reference Manual <http://www.apscservices.info/EEInfo/TRM4.pdf>
13. 3% efficiency improvement for boiler outdoor air reset based on Michaels Energy literature review. Sources included (but not limited to):
    13A. Arkansas Technical Reference Manual <http://www.apscservices.info/EEInfo/TRM4.pdf>
    13B. NEEP Mid-Atlantic TRM. V5. >http://www.neep.org/sites/default/files/resources/Mid-Atlantic_TRM_V5_FINAL_5-26-2015.pdf>
14. 1% efficiency improvement for stack dampers based on Michaels Energy literature review. Sources included (but not limited to):
    14A. Arkansas Technical Reference Manual <http://www.apscservices.info/EEInfo/TRM4.pdf>
    14B. Illinois Technical Reference Manual (2015-2016) <http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_4/2-13-15 Final/Updated/Illinois_Statewide_TRM_Effective_060115_Final_02-24-15_Clean.pdf>
    14C. Minnesota TRM. Version 1.3. <http://mn.gov/commerce-stat/pdfs/trm-version-1.3.pdf>
15. 3% efficiency improvement for modulating boiler controls based on Michaels Energy literature review. Sources included (but not limited to):
    15A. Illinois Technical Reference Manual (2015-2016) <http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_4/2-13-15 Final/Updated/Illinois_Statewide_TRM_Effective_060115_Final_02-24-15_Clean.pdf>
    15B. Minnesota TRM. Version 1.3. <http://mn.gov/commerce-stat/pdfs/trm-version-1.3.pdf>
16. 2% efficiency improvement for O2 trim control based on Michaels Energy literature review. Sources included (but not limited to):
    16A. Illinois Technical Reference Manual (2015-2016) <http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_4/2-13-15 Final/Updated/Illinois_Statewide_TRM_Effective_060115_Final_02-24-15_Clean.pdf>
    16B. Minnesota TRM. Version 1.3. <http://mn.gov/commerce-stat/pdfs/trm-version-1.3.pdf>
17. 80% boiler efficiency assumed based on minimum boiler efficiency from IECC 2015.
18. California DEER Database, 2014 (value used is for remaining useful life of commercial high efficiency furnaces)
19. AHRI Directory of Certified Product Performance; average of Standby Loss in BTUH per gallon of storage calculated for units with 80% or less thermal efficiency for baseline unit and <96% thermal efficiency for efficient unit
20. Leakage data from Energy Management Handbook, by Wayne Turner
21. Measure life from the Federal Energy Management Program (FEMP).
22. The average baseline and high efficiency costs are based on the California DEER database.
23. Cost information supplied by Engineered Products
24. Material costs taken from zoro.com for fiberglass pipe insulation (February 2016)
25. Commercial Condensing Boiler Optimization. Center for Energy and Environment. Prepared for Minnesota Department of Commerse, Division of Energy Resources. 2015.
26. AHRI Directory of Certified Product Performance; average of Standby Loss in BTUH per gallon of storage calculated for units with 80% or less thermal efficiency for baseline unit and <96% thermal efficiency for efficient unit
27. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant.
28. MN Bin Temp Bin Hrs are taken from the "Thermal Environmental Engineering, Third Edition, Thomas H. Kuehn, James W. Ramsey and James L. Threlkeld, Pages 717-718, Table B.5" to determine full load equivalent hours (FLEH) in Minnesota area. See Forecast furnace operating hours for calculation
29. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant.
30. Baseline and Energy Efficient equipment costs provided by vendors
31. Minnesota DER Deemed Values
32. Bradford White RightSpec® commercial water heater sizing software
33. Bosch tankless water heater sizing software
34. Commercial Buildings Energy Consumption Study (CBECS), 2006
35. 2008 DEER Effective Useful Life Summary October 1st 2008
36. 2007 ASHRAE HVAC Applications Handbook Chapter 36, page 36.3, Table 4
37. 2006 IECC
38. "Electricity Savings from Variable-Speed Furnaces in Cold Climates" Pigg, Scott and Talerico, Tom. ACEEE Summer Study Proceedings 2004 (http://aceee.org/files/proceedings/2004/data/papers/SS04_Panel1_Paper23.pdf)
39. U.S. Department of Energy, Preliminary Analysis Report, 2012
40. http://www.grainger.com
41. Wisconsin Focus on Energy, ECM Furnace Fan Impact Evaluation Report,
42. MN custom rebates and conversations with Distributors (Tim Stoklosa, Clean Energy Designs in Lakewood CO)
43. Illinois 2017 TRM ; http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_6/Final/IL-
44. St Paul 2015 Water Rate Schedule - http://mn-stpaul.civicplus.com/DocumentView.asp?DID=3493 (From 2017-2019 MN Energy Efficient Showerhead
45. Source BTU for electricity based on MN DOC No. G008/CIP-00-864.07 Reply Comments of May 23, 2003 which states a Source BTU comparison must be made using an assumed heat rate of 7500 BTU/Generator kWh , based on typical Heat Rate for Combined-Cycle Natural Gas-fired Plant.
46. Wisconsin Focus on Energy 2019 TRM
47. Historical program participation
48. State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs version 3.0 Jan 10 2019
49. Custom DCV Projects, 2010-2011
50. MN Lighting Efficiency Tech Assumption , Tab "Forcast Market Segment".
51. 2011 Tetratech Program Evaluation

Changes from Recent Filing:

Added peak gas decatherm savings
EFLH for space heating adjusted to reflect the MN TRM

13.10 Process Boilers

Algorithms

$$Customer\ Dth = \frac{Input\ Capacity}{Conversion\ Factor} \times Alt \times \left(\frac{Effh}{Effb} - 1\right) \times HOU \times Utilization\ Factor$$

$$Customer\ Dth/hr = \frac{Input\ Capacity}{Conversion\ Factor} \times Alt \times \left(\frac{Effh}{Effb} - 1\right) \times Utilization\ Factor$$

Variables

Alt	1	Altitude Adjustment factor to adjust the sea level manufacturer's rated input for altitude effects. No adjustment for near sea-level altitude.
EFFb	See Table 13.0.2	Efficiency of Baseline equipment
EFFh	See Table 13.0.2	Rated Efficiency provided by customer.
HOU	8760	Hours of Use following IL TRM. Load factor and oversize factor accomplished by blended utilization factor.
Conversion Factor	1000000	Conversion from BTU to Dth
Default Utilization Factor	41.9%	Utilization Factor from Illinois TRM 8.0 Vol 2, 4.43 Process Boiler Tune-up. (Ref 53)
Incremental Cost	See Table 13.10.1	Incremental cost of efficient boiler or furnace over standard equipment.
Measure Life	See Table 13.0.1	Consistent for all Process Boiler sizes.

Customer Inputs	**M&V Verified**	
Input Capacity	Yes	Rated input BTUH nameplate data for the new boiler, furnace, unit heater, or water heater.
Rated Efficiency	Yes	Rated efficiency of purchased boiler, provided by customer.
Utilization Factor	Yes	Use customer input, or default 41.9% if customer input is not available

Table 13.10.1 Incremental process boiler costs (Ref 48)

Boiler Type	Input Capacity Range	Incremental Cost $/kBtuh
Steam	>2.5 MMBTUH	$1.02
Non-Condensing	>2.5 MMBTUH	$2.50
Condensing	>2.5 MMBTUH	$7.25

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

References:

1. 2020 Minnesota Energy Code - Chapter 7676.1100 Subpart 3D, 4A
2. Centerpoint TRM
3. International Energy Conservation Code (IECC) 2015 Table C403.2.3 (4)
4. ASHRAE HVAC Systems and Equipment 2008 pg 15.1
5. Whole Building Design Guide for US Army. Tech Note 14: Overhead Radiant Heating <https://www.wbdg.org/ccb/ARMYCOE/COETN/technote14.pdf>
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7. Cost data from online review on 8/5/15 of products available at Younits.com, ecomfort.com, hvacdistribution.com, grainger.com, simplyplumbing.com, homedepot.com, h-mac.com, ingramswaterandair.com, and zoro.com
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    16A. Illinois Technical Reference Manual (2015-2016) <http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_4/2-13-15 Final/Updated/Illinois_Statewide_TRM_Effective_060115_Final_02-24-15_Clean.pdf>
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20. Leakage data from Energy Management Handbook, by Wayne Turner
21. Measure life from the Federal Energy Management Program (FEMP).
22. The average baseline and high efficiency costs are based on the California DEER database.
23. Cost information supplied by Engineered Products
24. Material costs taken from zoro.com for fiberglass pipe insulation (February 2016)
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26. AHRI Directory of Certified Product Performance; average of Standby Loss in BTUH per gallon of storage calculated for units with 80% or less thermal efficiency for baseline unit and <96% thermal efficiency for efficient unit
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29. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant.
30. Baseline and Energy Efficient equipment costs provided by vendors
31. Minnesota DER Deemed Values
32. Bradford White RightSpec® commercial water heater sizing software
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35. 2008 DEER Effective Useful Life Summary October 1st 2008
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39. U.S. Department of Energy, Preliminary Analysis Report, 2012 (http://www1.eere.energy.gov/buildings/appliance_standards/pdfs/ff_prelim_ch_00_execsummary_2012_06_26.pdf)
40. http://www.grainger.com
41. Wisconsin Focus on Energy, ECM Furnace Fan Impact Evaluation Report, https://focusonenergy.com/sites/default/files/emcfurnaceimpactassessment_evaluationreport.pdf)
42. MN custom rebates and conversations with Distributors (Tim Stoklosa, Clean Energy Designs in Lakewood CO)
43. Illinois 2017 TRM ; http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_6/Final/IL-TRM_Effective_010118_v6.0_Vol_2_C_and_I_020817_Final.pdf
44. St Paul 2015 Water Rate Schedule - http://mn-stpaul.civicplus.com/DocumentView.asp?DID=3493 (From 2017-2019 MN Energy Efficient Showerhead Tech Assumptions)
45. Source BTU for electricity based on MN DOC No. G008/CIP-00-864.07 Reply Comments of May 23, 2003 which states a Source BTU comparison must be made using an assumed heat rate of 7500 BTU/Generator kWh , based on typical Heat Rate for Combined-Cycle Natural Gas-fired Plant.
46. Wisconsin Focus on Energy 2019 TRM
47. Historical program participation
48. State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs version 3.0 Jan 10 2019
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51. 2011 Tetratech Program Evaluation
52. Minnesota TRM. Version 3.3. <http://mn.gov/commerce-stat/pdfs/trm-version-3.3.pdf
53. Illinois Technical Reference Manual (2019-2020) <https://www.ilsag.info/technical-reference-manual/il_trm_version_8/>

Changes from Recent Filing:

New prescriptive rebate offering

13.11 Process Boiler Tune Up

Algorithms

$$Customer\ Dth = \frac{Input\ Capacity}{Conversion\ Factor} \times Alt \times \left(\frac{Effh}{Effb} - 1\right) \times HOU \times Utilization\ Factor$$

$$Percent\ Savings = \left(\frac{Effh}{Effb} - 1\right) \times 100$$

$$Customer\ Dth/hr = \frac{Input\ Capacity}{Conversion\ Factor} \times Alt \times \left(\frac{Effh}{Effb} - 1\right) \times Utilization\ Factor$$

Variables

Alt	1	Altitude Adjustment factor to adjust the sea level manufacturer's rated input for altitude
Effb	Use Percent Savings	Quantities not deemed individually, use percent savings term
Effh	Use Percent Savings	Quantities not deemed individually, use percent savings term
Percent Savings	2.20%	Per MN TRM 4.0, Table 2. Modification Savings, pg. 360 (Ref 48)
Conversion Factor	1,000,000	Conversion from BTU to Dth
Default Utilization Factor	41.9%	Utilization Factor from Illinois TRM 8.0 Vol 2, 4.43 Process Boiler Tune-up. (Ref 52)
HOU	8760	Hours of Use, scaled by blended utlization factor.
Measure Life	See Table 13.0.1	2 years for Process Boiler Tune Up

Customer Inputs	**M&V Verified**	
Input Capacity	Yes	Rated input BTUH nameplate data for the boiler
Use	Yes	Use of boiler: space heating, domestic water, or both.
Utilization Factor	Yes	Use customer input, or default 41.9% if customer input is not available
Cost	Yes	Cost of boiler tuneup

References:

1. 2020 Minnesota Energy Code - Chapter 7676.1100 Subpart 3D, 4A
2. Centerpoint TRM
3. International Energy Conservation Code (IECC) 2015 Table C403.2.3 (4)
4. ASHRAE HVAC Systems and Equipment 2008 pg 15.1
5. Whole Building Design Guide for US Army. Tech Note 14: Overhead Radiant Heating <https://www.wbdg.org/ccb/ARMYCOE/COETN/technote14.pdf>

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7. Cost data from online review on 8/5/15 of products available at Younits.com, ecomfort.com, hvacdistribution.com, grainger.com, simplyplumbing.com,
8. Nicor Gas Energy Efficiency Plan 2011-2014. Revised Plan Filed Pursuant to Order Docket 10-0562, May 27, 2011
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14. 1% efficiency improvement for stack dampers based on Michaels Energy literature review. Sources included (but not limited to):

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15. 3% efficiency improvement for modulating boiler controls based on Michaels Energy literature review. Sources included (but not limited to):
    15A. Illinois Technical Reference Manual (2015-2016)
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16. 2% efficiency improvement for O2 trim control based on Michaels Energy literature review. Sources included (but not limited to):
    16A. Illinois Technical Reference Manual (2015-2016)
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18. California DEER Database, 2014 (value used is for remaining useful life of commercial high efficiency furnaces)
19. AHRI Directory of Certified Product Performance; average of Standby Loss in BTUH per gallon of storage calculated for units with 80% or less thermal
20. Leakage data from Energy Management Handbook, by Wayne Turner
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48. State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs version 4.0, active 1/1/2024
49. Custom DCV Projects, 2010-2011
50. MN Lighting Efficiency Tech Assumption , Tab "Forcast Market Segment".
51. 2011 Tetratech Program Evaluation
52. Illinois Technical Reference Manual (2019-2020)
<https://www.ilsag.info/technical-reference-manual/il_trm_version_8/>

Changes from Recent Filing:

New prescriptive rebate offering.

13.12 Process Steam Traps

Algorithms

$$Customer\ (Dth) = LeakRate \times Leak\ Hours \times \frac{BTU\ Per\ Pound}{EFFb} / 1000000$$

$$Customer\ \left(\frac{Dth}{hr}.\right) = LeakRate \times \frac{BTU\ Per\ Pound}{EFFb} / 1000000$$

Variables

	13.8	Leakage rate for low pressure: psig < 15 (Reference 28)
	6.5	Leakage rate for medium pressure: 15 ≤ psig < 30 (Reference 28)
	23.4	Leakage rate for medium pressure: 30 ≤ psig < 75 (Reference 28)
	43.8	Leakage rate for high pressure: 75 ≤ psig < 125 (Reference 28)
	60.9	Leakage rate for high pressure: 125 ≤ psig < 175 (Reference 28)
	82.1	Leakage rate for high pressure: 175 ≤ psig < 250 (Reference 28)
Leak_Rate	105.2	Leakage rate for high pressure: 250 ≤ psig < 300 (Reference 28)
Leak_Hours	8282	Annual hours boiler lines are pressurized (Reference 28)
Effb	See Table 13.0.2	Efficiency of steam boiler
	1044	Loss in btu/lb for Steam traps in Low Pressure Industrial Applications: 1137 BTU per pound for lost to atmosphere, 951 BTU per pound lost to condensate. Assume 50/50 mix = 1044 BTU per pound. (Reference 28)
	1042.5	Loss in btu/lb for Steam traps in medium pressure: 15 ≤ psig < 30 Industrial Applications: 1141 BTU per pound for lost to atmosphere, 944 BTU per pound lost to condensate. Assume 50/50 mix = 1042.5 BTU per pound. (Reference 28)
	1036	Loss in btu/lb for Steam traps in medium pressure: 30 ≤ psig < 75 Industrial Applications: 1157 BTU per pound for lost to atmosphere, 915 BTU per pound lost to condensate. Assume 50/50 mix = 1036 BTU per pound. (Reference 28)
	1023.5	Loss in btu/lb for Steam traps in high pressure: 75 ≤ psig < 125 Industrial Applications: 1167 BTU per pound for lost to atmosphere, 880 BTU per pound lost to condensate. Assume 50/50 mix = 1023.5 BTU per pound. (Reference 28)
	1016	Loss in btu/lb for Steam traps in high pressure: 125 ≤ psig < 175 Industrial Applications: 1173 BTU per pound for lost to atmosphere, 859 BTU per pound lost to condensate. Assume 50/50 mix = 1016 BTU per pound. (Reference 28)
	1007	Loss in btu/lb for Steam traps in high pressure: 175 ≤ psig < 250 Industrial Applications: 1177 BTU per pound for lost to atmosphere, 837 BTU per pound lost to condensate. Assume 50/50 mix = 1044 BTU per pound. (Reference 28)
	999	Loss in btu/lb for Steam traps in high pressure: 250 ≤ psig < 300 Industrial Applications: 1182 BTU per pound for lost to atmosphere, 816 BTU per pound lost to condensate. Assume 50/50 mix = 1044 BTU per pound. (Reference 28)
BTU_Per_Pound		
Measure Life	See Table 13.0.1	

Customer Inputs	**M&V Verified**	
Incremental Cost	No	Cost of replacing or repairing steam traps, per trap, provided by the customer.
Steam Pressure	Yes	Steam pressure; seven possible ranges of steam pressure.
Use	Yes	Process only.

Table 13.12.1 Deemed Measure Cost (Ref 28)

Use	Cost per Trap
Low pressure: psig < 15	$77
Medium pressure: 15 ≤ psig < 30	$180
Medium pressure: 30 ≤ psig < 75	$223
High pressure: 75 ≤ psig < 125	$276
High pressure: 125 ≤ psig < 175	$322
High pressure: 175 ≤ psig < 250	$370
High pressure: 250 ≤ psig < 300	$418

References:

1. 2020 Minnesota Energy Code - Chapter 7676.1100 Subpart 3D, 4A
2. Centerpoint TRM
3. International Energy Conservation Code (IECC) 2015 Table C403.2.3 (4)
4. ASHRAE HVAC Systems and Equipment 2008 pg 15.1
5. Whole Building Design Guide for US Army. Tech Note 14: Overhead Radiant Heating <https://www.wbdg.org/ccb/ARMYCOE/COETN/technote14.pdf>
6. 2015 Minnesota Energy Code Table C403.2.3(5) pg C-44
7. Cost data from online review on 8/5/15 of products available at Younits.com, ecomfort.com, hvacdistribution.com, grainger.com, simplyplumbing.com, homedepot.com, h-mac.com, ingramswaterandair.com, and zoro.com
8. Nicor Gas Energy Efficiency Plan 2011-2014. Revised Plan Filed Pursuant to Order Docket 10-0562, May 27, 2011
9. Sachs, Harvey M., Unit Heaters Deserve Attention for Commercial Programs, ACEEE, April 2003
10. TMY3 Weather data from Department of Energy
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12. 2% efficiency improvement for boiler tune up based on Michaels Energy literature review. Sources included (but not limited to):
    12A. Illinois Technical Reference Manual (2015-2016) <http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_4/2-13-15 Final/Updated/Illinois_Statewide_TRM_Effective_060115_Final_02-24-15_Clean.pdf>
    12B. Michigan Energy Measures Database (MEMD) accessed at <http://www.michigan.gov/mpsc/0,4639,7-159-52495_55129---,00.html>
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13. 3% efficiency improvement for boiler outdoor air reset based on Michaels Energy literature review. Sources included (but not limited to):
    13A. Arkansas Technical Reference Manual <http://www.apscservices.info/EEInfo/TRM4.pdf>
    13B. NEEP Mid-Atlantic TRM. V5. >http://www.neep.org/sites/default/files/resources/Mid-Atlantic_TRM_V5_FINAL_5-26-2015.pdf>
14. 1% efficiency improvement for stack dampers based on Michaels Energy literature review. Sources included (but not limited to):
    14A. Arkansas Technical Reference Manual <http://www.apscservices.info/EEInfo/TRM4.pdf>
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15. 3% efficiency improvement for modulating boiler controls based on Michaels Energy literature review. Sources included (but not limited to):
    15A. Illinois Technical Reference Manual (2015-2016) <http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_4/2-13-15 Final/Updated/Illinois_Statewide_TRM_Effective_060115_Final_02-24-15_Clean.pdf>
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    16A. Illinois Technical Reference Manual (2015-2016) <http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_4/2-13-15 Final/Updated/Illinois_Statewide_TRM_Effective_060115_Final_02-24-15_Clean.pdf>
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19. AHRI Directory of Certified Product Performance; average of Standby Loss in BTUH per gallon of storage calculated for units with 80% or less thermal efficiency for baseline unit and <96% thermal efficiency for efficient unit
20. Leakage data from Energy Management Handbook, by Wayne Turner
21. Measure life from the Federal Energy Management Program (FEMP).
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24. Material costs taken from zoro.com for fiberglass pipe insulation (February 2016)
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27. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant.
28. Illinois Technical Reference Manual (2023 IL TRM v.11.0 Vol.2_September 22, 2022_FINAL).. Section 4.4.16. Steam Trap Replacement or Repair
29. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant.
30. Baseline and Energy Efficient equipment costs provided by vendors
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36. 2007 ASHRAE HVAC Applications Handbook Chapter 36, page 36.3, Table 4
37. 2006 IECC
38. "Electricity Savings from Variable-Speed Furnaces in Cold Climates" Pigg, Scott and Talerico, Tom. ACEEE Summer Study Proceedings 2004 (http://aceee.org/files/proceedings/2004/data/papers/SS04_Panel1_Paper23.pdf)
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46. Wisconsin Focus on Energy 2019 TRM
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49. Custom DCV Projects, 2010-2011
50. MN Lighting Efficiency Tech Assumption , Tab "Forcast Market Segment".
51. 2011 Tetratech Program Evaluation

Changes from Recent Filing:

New Prescriptive Offering

13.13 Furnace

Algorithms

$$Customer\ Dth = Input\ Capacity \times Alt \times (\frac{Effh}{Effb} - 1) \times EFLH/1000000$$

Variables

Alt	See Table 13.0.4	Altitude Adjustment factor to adjust the sea level manufacturer's rated input for altitude effects. No adjustment for near sea-level altitude.
EFFb	See Table 13.0.2	Efficiency of Baseline equipment
EFLH	See Table 13.0.2	
Conversion Factor	1,000,000	Conversion from BTU to Dth
Incremental Cost	See Table 13.1.3	Incremental cost of efficient boiler or furnace over standard equipment.
Measure Life	See Table 13.0.1	

Customer Inputs	**M&V Verified**	
Input Capacity	Yes	Rated input BTUH nameplate data for the new boiler, furnace, unit heater, or water heater.
EFFh	Yes	Efficiency of purchased boiler, provided by customer. See Table 1 for minimum qualifying efficiency for higher efficiency equipment.
Use	Yes	Use of boiler: space heating~~, domestic water, or both.~~

Table 13.1.3 (Ref 2)	**Standard Unit Cost**	**High Efficient Unit**	**Incremental Cost**
New Energy Star Furnace => 90% AFUE, < 92% AFUE	$1,866.40	$3,120.70	$1,254.30
New Energy Star Furnace => 92% AFUE, < 94% AFUE	$1,866.40	$3,208.29	$1,341.89
New Energy Star Furnace => 94% AFUE, < 96% AFUE	$1,866.40	$3,295.88	$1,429.48
New Energy Star Furnace => 94% AFUE	$1,866.40	$3,383.47	$1,517.07

References:

1. 1999 Minnesota Energy Code - Chapter 7676.1100 Subpart 3D, 4A
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3. International Energy Conservation Code (IECC) 2015 Table C403.2.3 (4)
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28. MN Bin Temp Bin Hrs are taken from the "Thermal Environmental Engineering, Third Edition, Thomas H. Kuehn, James W. Ramsey and James L. Threlkeld, Pages 717-718, Table B.5" to determine full load equivalent hours (FLEH) in Minnesota area. See Forecast furnace operating hours for calculation
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33. Bosch tankless water heater sizing software
34. Commercial Buildings Energy Consumption Study (CBECS), 2006
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48. State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs version 3.0 Jan 10 2019
49. Custom DCV Projects, 2010-2011
50. MN Lighting Efficiency Tech Assumption , Tab "Forcast Market Segment".
51. 2011 Tetratech Program Evaluation

Changes from Recent Filing:

Adjusted new furnace costs.

13.14 HPWH - Gas Baseline

Algorithms

$$Customer\ kWh = -1 * Energy_{HeatWater} * \left(\frac{1}{UEF_{efficient}}\right) * \frac{ESAF}{CF_1}$$

$$PC\ kW = Customer\ kWh/8760$$

$$Energy_HeatWater = C_p * density * gallons/Volume_Daily_SqFt_Usage * SqFt_Served * Days_Year * (T_{set} - T_{supply})$$

$$Customer\ Dth = \left(Energy_{HeatWater} + SL_{base} * Hours_{Average} * Qty * Gallons_{Storage}\right) * \left(\frac{1}{Eff_{baseline}}\right) * \frac{(1 - GIF)}{CF_2}$$

$$UEF_{efficient} = (0.7 * COP_{HP} + 0.3) * (1 - Fraction_{Loss})$$

$$Customer\ Dth/hr = Customer\ Dth * CF_{Gas} / Peak\ Winter\ Hours$$

Variables

density	8.33	Density of water, lbs/gal
C_p	1.00	Specific heat of water, Btu / lb - F
Volume_Daily_SqFt_Usage	See Table 13.14.1	Average daily hot water consumption [gallons / 1,000 ft2 / day].
Days_Year	See Table 13.14.1	Applicable days per year of building operation
T_setpoint	140	Water heater setpoint, deg F (Ref 27).
T_supply	58	Supply temperature of city water to water heater, deg F (Ref 27).
Eff_baseline	See Table 13.0.2	Efficiency Rating of standard replacement water heater, Thermal Efficiency
Incremental Cost	$1728.11, $1018.46	Light Commercial and Commercial size HPWH respectively
ESAF	0.914, 0	0.914 if space is heated electrically, 0 if gas heat, uses balance temperature based bin analysis
GIF	0.056	Gas Impact Factor (Increased gas usage due to space heating effect)
SL_base	13.21	Standby Losses for baseline storage water heater, BTUH per gallon of storage (Ref 26)
Hours Average	3600	Based on WH participation history
Fraction_Loss	0.074	Deemed loss fraction based on GWH past participation and GWH deemed BTUH loss rate
CF_1	3412	Btu/kWh
CF_2	1,000,000	Btu/Dth
Measure Life	10 Years	MN TRM 4.0 pg. 504 (Ref 48)
CF_{Gas}	0.02	Gas Coincidence Factor
Peak Winter Hours	360	Peak Winter hours - 6 AM - 9 AM for December through February

Customer Inputs	**M&V Verified**	
Qty	Yes	Quantity of New Equipment for losses and rebate determination
SqFt_Served	Yes	Number of Square feet served by water heater in thousands of square feet, site specific.
UEF_efficient	Yes	Uniform Energy Factor of new water heater
COP_HP	Yes	Efficient Unit COP in heat pump mode, if UEF rating is not available
Building type	Yes	Facility type from picklist
Gallons Storage	Yes	Size of storage tank in gallons
BTUH Heat Pump capacity	Yes	Output BTUH of proposed water heater heat pump
BTUH capacity	Yes	Output BTUH of proposed water heater

Table 13.14.1 Annual Hot Water Use Data (Ref 52)

Building Type	Applicable Days/Year	Gallons / 1,000 ft2 / day	Eligible?
Small Office	250	6.2	Yes
Large Office	250	7.3	Yes
Fast Food Restaurant	365	121.8	Yes
Sit-Down Restaurant	365	121.8	Yes
Retail	365	3.7	Yes
Grocery	365	1.9	Yes
Warehouse	250	5.0	Yes
Elementary School	200	36.4	Yes
Jr. High/High School/College	200	36.4	Yes
Health	365	67.2	No
Motel	365	81.0	Yes
Hotel	365	81.0	Yes
Other Commercial	250	15.8	Yes

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

References:

1. 2020 Minnesota Energy Code - Chapter 7676.1100 Subpart 3D, 4A
2. Centerpoint TRM
3. International Energy Conservation Code (IECC) 2015 Table C403.2.3 (4)
4. ASHRAE HVAC Systems and Equipment 2008 pg 15.1
5. Whole Building Design Guide for US Army. Tech Note 14: Overhead Radiant Heating <https://www.wbdg.org/ccb/ARMYCOE/COETN/technote14.pdf>

6. 2015 Minnesota Energy Code Table C403.2.3(5) pg C-44
7. Cost data from online review on 8/5/15 of products available at Younits.com, ecomfort.com, hvacdistribution.com, grainger.com, simplyplumbing.com,
8. Nicor Gas Energy Efficiency Plan 2011-2014. Revised Plan Filed Pursuant to Order Docket 10-0562, May 27, 2011
9. Sachs, Harvey M., Unit Heaters Deserve Attention for Commercial Programs, ACEEE, April 2003
10. TMY3 Weather data from Department of Energy
11. International Energy Conservation Code (IECC) 2012

12. 2% efficiency improvement for boiler tune up based on Michaels Energy literature review. Sources included (but not limited to):
    12A. Illinois Technical Reference Manual (2015-2016)
    12B. Michigan Energy Measures Database (MEMD) accessed at <http://www.michigan.gov/mpsc/0,4639,7-159-52495_55129---,00.html>
    12C. Arkansas Technical Reference Manual <http://www.apscservices.info/EEInfo/TRM4.pdf>
13. 3% efficiency improvement for boiler outdoor air reset based on Michaels Energy literature review. Sources included (but not limited to):
    13A. Arkansas Technical Reference Manual <http://www.apscservices.info/EEInfo/TRM4.pdf>
    13B. NEEP Mid-Atlantic TRM. V5. >http://www.neep.org/sites/default/files/resources/Mid-Atlantic_TRM_V5_FINAL_5-26-2015.pdf>
14. 1% efficiency improvement for stack dampers based on Michaels Energy literature review. Sources included (but not limited to):

    14A. Arkansas Technical Reference Manual <http://www.apscservices.info/EEInfo/TRM4.pdf>
    14B. Illinois Technical Reference Manual (2015-2016)
    14C. Minnesota TRM. Version 1.3. <http://mn.gov/commerce-stat/pdfs/trm-version-1.3.pdf>

15. 3% efficiency improvement for modulating boiler controls based on Michaels Energy literature review. Sources included (but not limited to):
    15A. Illinois Technical Reference Manual (2015-2016)
    15B. Minnesota TRM. Version 1.3. <http://mn.gov/commerce-stat/pdfs/trm-version-1.3.pdf>

16. 2% efficiency improvement for O2 trim control based on Michaels Energy literature review. Sources included (but not limited to):
    16A. Illinois Technical Reference Manual (2015-2016)
    16B. Minnesota TRM. Version 1.3. <http://mn.gov/commerce-stat/pdfs/trm-version-1.3.pdf>
17. 80% boiler efficiency assumed based on minimum boiler efficiency from IECC 2015.

18. California DEER Database, 2014 (value used is for remaining useful life of commercial high efficiency furnaces)
19. AHRI Directory of Certified Product Performance; average of Standby Loss in BTUH per gallon of storage calculated for units with 80% or less
20. Leakage data from Energy Management Handbook, by Wayne Turner
21. Measure life from the Federal Energy Management Program (FEMP).
22. The average baseline and high efficiency costs are based on the California DEER database.
23. Cost information supplied by Engineered Products
24. Material costs taken from zoro.com for fiberglass pipe insulation (February 2016)
25. Commercial Condensing Boiler Optimization. Center for Energy and Environment. Prepared for Minnesota Department of Commerse, Division of Energy Resources. 2015.
26. AHRI Directory of Certified Product Performance; average of Standby Loss in BTUH per gallon of storage calculated for units with 80% or less

27. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant.
28. MN Bin Temp Bin Hrs are taken from the "Thermal Environmental Engineering, Third Edition, Thomas H. Kuehn, James W. Ramsey and James L.
29. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant.
30. Baseline and Energy Efficient equipment costs provided by vendors
31. Minnesota DER Deemed Values
32. Bradford White RightSpec® commercial water heater sizing software
33. Bosch tankless water heater sizing software
34. Commercial Buildings Energy Consumption Study (CBECS), 2006
35. 2008 DEER Effective Useful Life Summary October 1st 2008
36. 2007 ASHRAE HVAC Applications Handbook Chapter 36, page 36.3, Table 4

37. 2006 IECC
38. "Electricity Savings from Variable-Speed Furnaces in Cold Climates" Pigg, Scott and Talerico, Tom. ACEEE Summer Study Proceedings 2004
39. U.S. Department of Energy, Preliminary Analysis Report, 2012
40. http://www.grainger.com
41. Wisconsin Focus on Energy, ECM Furnace Fan Impact Evaluation Report,
42. MN custom rebates and conversations with Distributors (Tim Stoklosa, Clean Energy Designs in Lakewood CO)
43. Illinois 2017 TRM ; http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_6/Final/IL-
44. St Paul 2015 Water Rate Schedule - http://mn-stpaul.civicplus.com/DocumentView.asp?DID=3493 (From 2017-2019 MN Energy Efficient Showerhead Tech Assumptions)
45. Source BTU for electricity based on MN DOC No. G008/CIP-00-864.07 Reply Comments of May 23, 2003 which states a Source BTU comparison
46. Wisconsin Focus on Energy 2019 TRM
47. Historical program participation
48. State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs version 3.0 Jan 10 2019
49. Custom DCV Projects, 2010-2011
50. MN Lighting Efficiency Tech Assumption , Tab "Forcast Market Segment".
51. 2011 Tetratech Program Evaluation
52. 2023 Illinois Statewide Techinical Reference Manual for Energy Efficiency - Version 11.0

Changes from Recent Filing:

New prescriptive measure offering.
Added peak gas decatherm savings.

13.15 HPWH - Gas Baseline

Algorithms

$$Customer\ kWh = Energy_{HeatWater} * \left(\frac{1}{UEF_{baseline}} - \frac{1}{UEF_{efficient}}\right) * \frac{ESAF}{CF_1}$$

$$PC\ kW = Customer\ kWh/8760$$

$$Energy_HeatWater = C_p * density * gallons/Volume_Daily_SqFt_Usage * SqFt_Served * Days_Year * (T_{set} - T_{supply})$$

$$Customer\ Dth = -1 * Energy_{HeatWater} * \frac{1}{UEF_{efficient}} * \frac{GIF}{CF_2}$$

$$UEF_{efficient} = (0.7 * COP_{HP} + 0.3) * (1 - Fraction_{Loss})$$

Variables

density	8.33	Density of water, lbs/gal
C_p	1.00	Specific heat of water, Btu / lb - F
Volume_Daily_SqFt_Usage	See Table 13.15.1	Average daily hot water consumption [gallons / 1,000 ft2 / day].
Days_Year	See Table 13.15.1	Applicable days per year of building operation
T_setpoint	140	Water heater setpoint, deg F (Ref 27).
T_supply	58	Supply temperature of city water to water heater, deg F (Ref 27).
Eff_baseline	See Table 13.15.2	Base water heater efficiency based on tank size. If draw pattern unknown, assume medium.
Incremental Cost	$1728.11, $1018.46	Incremental cost of efficient water heater over standard water heater.
ESAF	0.914, 0	0.914 if space is heated electrically, 0 if gas heat, uses balance temperature based bin analysis
GIF	0.056	Gas Impact Factor (Increased gas usage due to space heating effect)
SL_base	13.21	Standby Losses for baseline storage water heater, BTUH per gallon of storage (Ref 26)
Hours Average	3600	Based on WH participation history
Fraction_Loss	0.074	Deemed loss fraction based on GWH past participation and GWH deemed BTUH loss rate
CF_1	3412	Btu/kWh
CF_2	1,000,000	Btu/Dth
Measure Life	10 Years	MN TRM 4.0 pg. 504 (Ref 48)

Customer Inputs	**M&V Verified**	
Qty	Yes	Quantity of New Equipment for losses and rebate determination
SqFt_Served	Yes	Number of Square feet served by water heater in thousands of square feet, site specific.
UEF_efficient	Yes	Uniform Energy Factor of new water heater
COP_HP	Yes	Efficient Unit COP in heat pump mode, if UEF rating is not available
Building type	Yes	Facility type from picklist
Gallons Storage	Yes	Size of storage tank in gallons
BTUH Heat Pump capacity	Yes	Output BTUH of proposed water heater heat pump
BTUH capacity	Yes	Output BTUH of proposed water heater

Table 13.15.1 Annual Hot Water Use Data (Ref 52)

Building Type	Applicable Days/Year	Gallons / 1,000 ft2 / day	Eligible?
Small Office	250	6.2	Yes
Large Office	250	7.3	Yes
Fast Food Restaurant	365	121.8	Yes
Sit-Down Restaurant	365	121.8	Yes
Retail	365	3.7	Yes
Grocery	365	1.9	Yes
Warehouse	250	5.0	Yes
Elementary School	200	36.4	Yes
Jr. High/High School/College	200	36.4	Yes
Health	365	67.2	No
Motel	365	81.0	Yes
Hotel	365	81.0	Yes
Other Commercial	250	15.8	Yes

Table 13.15.2 Baseline efficiency based federal minimum efficiency standards (UEF) (Ref 48)

Product Class	Rated Storage Volume	Draw Pattern	Uniform Energy Factor
Electric Storage Water Heaters	≥20 gallons and ≤55 gallons	Very Small	0.8808 - (0.0008 x Gal)
		Low	0.9254 - (0.0003 x Gal)
		Medium	0.9307 - (0.0002 x Gal)
		High	0.9349 - (0.0001 x Gal)
	>55 gallons and ≤120 gallons	Very Small	1.9236 - (0.0011 x Gal)
		Low	2.0440 - (0.0011 x Gal)
		Medium	2.1171 - (0.0011 x Gal)
		High	2.2418 - (0.0011 x Gal)

References:

1. 2020 Minnesota Energy Code - Chapter 7676.1100 Subpart 3D, 4A
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26. AHRI Directory of Certified Product Performance; average of Standby Loss in BTUH per gallon of storage calculated for units with 80% or less thermal

27. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant.
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31. Minnesota DER Deemed Values
32. Bradford White RightSpec® commercial water heater sizing software
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34. Commercial Buildings Energy Consumption Study (CBECS), 2006
35. 2008 DEER Effective Useful Life Summary October 1st 2008
36. 2007 ASHRAE HVAC Applications Handbook Chapter 36, page 36.3, Table 4

37. 2006 IECC
38. "Electricity Savings from Variable-Speed Furnaces in Cold Climates" Pigg, Scott and Talerico, Tom. ACEEE Summer Study Proceedings 2004
39. U.S. Department of Energy, Preliminary Analysis Report, 2012
40. http://www.grainger.com
41. Wisconsin Focus on Energy, ECM Furnace Fan Impact Evaluation Report,
42. MN custom rebates and conversations with Distributors (Tim Stoklosa, Clean Energy Designs in Lakewood CO)
43. Illinois 2017 TRM ; http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_6/Final/IL-
44. St Paul 2015 Water Rate Schedule - http://mn-stpaul.civicplus.com/DocumentView.asp?DID=3493 (From 2017-2019 MN Energy Efficient Showerhead Tech Assumptions)
45. Source BTU for electricity based on MN DOC No. G008/CIP-00-864.07 Reply Comments of May 23, 2003 which states a Source BTU comparison must be
46. Wisconsin Focus on Energy 2019 TRM
47. Historical program participation
48. State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs version 4.0, Jan 31, 2023
49. Custom DCV Projects, 2010-2011
50. MN Lighting Efficiency Tech Assumption , Tab "Forcast Market Segment".
51. 2011 Tetratech Program Evaluation
52. 2023 Illinois Statewide Techinical Reference Manual for Energy Efficiency - Version 11.0

Changes from Recent Filing:

New prescriptive measure offering.
Added peak gas decatherm savings.

14.1 Lighting Controls

Algorithms

Interior Controls:

$$Customer\ kW = kW\ Connected \times \%\ Savings \times Cooling\ kW\ Savings\ Factor$$

$$Customer\ kWh = kW\ Connected \times \%\ Savings \times Hours \times Cooling\ kWh\ Savings\ Factor$$

$$Customer\ PCkW = kW\ Connected \times \%Savings \times Cooling\ kW\ Savings\ Factor \times CF$$

$$Natural\ Gas\ Savings\ (Dth) = kW\ Connected \times \%\ Savings \times Hours \times Heating\ Penalty\ Factor$$

Exterior Controls:

$$Customer\ kWh = kW\ Connected \times \%\ Savings \times Hours \times Cooling\ kWh\ Savings\ Factor$$

$$Customer\ PCkW = kW\ Connected$$

Variables

Cooling_kW_Savings_Factor	See Table 14.0.1	Cooling system secondary demand savings factor resulting from efficient interior lighting. Reduction in lighting demand results in a reduction in cooling demand, if the customer has air conditioning. Existence of air conditioning determined by HVAC_Type.
Cooling_kWh_Savings_Factor	See Table 14.0.1	Cooling system secondary energy savings factor resulting from efficient interior lighting. Reduction in lighting energy results in a reduction in cooling energy, if the customer has air conditioning. Existence of air conditioning determined by HVAC_Type.
Heating_Penalty_Factor	See Table 14.0.1	Heating system secondary energy penalty factor resulting from efficient interior lighting. Reduction in lighting demand results in an increase in heating usage, if the customer has gas heating. Existence of gas heating to be determined by HVAC_Type.
CF	See Table 14.0.3	Coincidence Factor is the probability that the peak demand of the lights will coincide with the peak utility system demand, determined by Facility_Type.
Hours	See Table 14.0.3	Annual operating hours, determined by Facility_Type.
% Savings	See Table 14.1.1	Stipulated savings percentage based on control type for interior lighting.
% Exterior Savings	See Table 14.1.1	Stipulated savings percentage based on control type for exterior lighting.
Measure Life	See Table 14.0.2	Length of time the lighting equipment will be operational.
NTG	See Table 14.1.2	Net-to-gross.

Customer Inputs	**M&V Verified**	
HVAC_Type	Yes	Type of heating or cooling, verified during M&V.
Facility_Type	No	Type of facility.
kW_Connected	Yes	Total connected fixture load connected to lighting controls, provided by customer and verified during M&V.

Table 14.1.1 Lighting Controls [3, 4, 5, 12, 29 & 30]

Control Type	% Savings	Full Cost Per Watt
Standalone or Integrated LLLC - Occupancy Sensor	24%	$0.49
Standalone or Integrated LLLC - Daylighting (Photocell) Sensor	28%	$0.49
Standalone or Integrated LLLC - Occupancy and Daylighting	38%	$0.49
Networked Lighting Controls (w & w/o LLLC)	49%	$0.72
Integrated LLLC - High End Trim	29%	$0.23
Control Type	**% Exterior Savings**	**Full Cost Per Watt**
Exterior Daylighting Controls	27%	$0.49

Table 14.1.2 Net To Gross[11, 28]

Program	NTG %
Lighting Efficiency	100%
Small Business Solutions	94%

References:

3. State of Illinois Techncial Reference Manual, Version 9.0 Final Technical Version as of October 17th, 2019. Effective January 1st, 2021.

4. Design Lights Consortium. (2017). Energy Savings from Networked Lighting Control (NLC) Systems. Medford: Design Lights Consortium. Retrieved 1 23, 2020, from https://www.designlights.org/lighting-controls/reports-tools-resources/nlc-energy-savings-report/

5. Lawrence Berkeley National Laboratory. (2011). A Meta-Analysis of Energy Savings from Lighting Controls in Commercial Buildings. Berkeley, CA: Lawrence Berkeley National Laboratory. Retrieved 10 01, 2017, from https://eta.lbl.gov/sites/default/files/publications/a_meta-analysis_of_energy_savings_from_lighting_controls_in_commercial_buildings_lbnl-5095e.pdf

6. Measure Life for automatically controlled measures from the Deemed Savings for CO Energy Management Systems, 2019-2020. (NLC Measure Life)

11. The Unopposed Settlement Agreement in Proceeding No. 18A-0606EG.

12. "Lighting Efficiency - CO" and "Lighting - Small Business" participation data

28. Net-to-Gross factor from the Evaluation of Xcel Energy's Small Business Solutions Program. 2020. EMI Consulting.

29. Design Lights Consortium. Energy Savings from Networked Lighting Control (NLC) Systems with and without LLLC. Sept 24, 2020. https://www.designlights.org/resources/reports/report-energy-savings-from-networked-lighting-control-nlc-systems-with-and-without-lllc/

30. NEEA. 2020 Luminaire Level Lighting Controls Incremental Cost Study. https://neea.org/img/documents/2020-LLLC-Incremental-Cost-Study.pdf

Changes from Recent Filing:

Updated NLC measure to include LLLC type networked controls
Added Luminaire Level Lighting controls version of current standalone occupancy & photocell controls offering
Added High End Trim measure for LLLC
Updated controls costs based on reported values

14.2 Lighting Retrofit

Algorithms

$$Customer\ kW = (kW\ Exist - kW\ Prop) \times Cooling\ kW\ Savings\ Factor$$

$$Customer\ kWh = (kW\ Exist - kW\ Prop) \times Hours \times\ Cooling\ kWh\ Savings\ Factor$$

$$Customer\ PCkW = (kW\ Exist - kW\ Prop) \times Cooling\ kW\ Savings\ Factor \times CF$$

$$kW\ Exist = Qty\ Existing\ Equip \times Existing\ Model\ kW$$

$$kW\ Prop = Qty\ Prop\ Equip \times Equipment\ Model\ kW$$

$$Natural\ Gas\ Savings\ (Dth) = (kW\ Exist - kW\ Prop) \times Hours \times Heating\ Penalty\ Factor$$

Variables

Cooling_kW_Savings_Factor	See Table 14.0.1	Cooling system secondary demand savings factor resulting from efficient lighting. Reduction in lighting demand results in a reduction in cooling demand, if the customer has air conditioning. Existence of air conditioning determined by HVAC_Type.
Cooling_kWh_Savings_Factor	See Table 14.0.1	Cooling system secondary energy savings factor resulting from efficient lighting. Reduction in lighting energy results in a reduction in cooling energy, if the customer has air conditioning. Existence of air conditioning determined by HVAC_Type.
Heating_Penalty_Factor	See Table 14.0.1	Heating system secondary energy penalty factor resulting from efficient lighting. Reduction in lighting demand results in an increase in heating usage, if the customer has gas heating. Existence of gas heating to be determined by HVAC_Type.
CF	See Table 14.0.1	Coincidence Factor is the probability that the peak demand of the lights will coincide with the peak utility system demand, determined by Facility_Type.
Hours	See Table 14.0.1	Annual operating hours, determined by Facility_Type.
Measure Life	See Table 14.0.2	Length of time the lighting equipment will be operational.
NTG	See Table 14.2.1	Net-to-gross

Customer Inputs	**M&V Verified**	
Qty_Existing_Equip	Yes	Quantity of existing equipment, verified during M&V.
Qty_Prop_Equip	Yes	Quantity of proposed equipment, verified during M&V.
HVAC_Type	Yes	Type of heating or cooling, verified during M&V.
Facility_Type	No	Type of facility.
Existing_Model_kW	Yes	Existing equipment wattage determined from stipulated fixture or lamp wattage. Specific lighting product provided by customer and verified during M&V.
Equipment_Model_kW	Yes	Proposed equipment wattage of fixture or lamp. Specific lighting product provided by customer and verified during M&V.
Baseline Cost	No	Cost of the baseline technology. For Retrofit, the cost is $0.00 since the baseline is to continue to operate the existing system. For New Construction, the cost is that of the lower efficiency option. Costs are determined through market research and provided by vendors.
High Efficiency Cost	No	Cost of the High Efficiency technology. 9 Equipment and Labor costs are also collected on a per measure basis, data is used to evaluate and identify the need to update costs as needed throughout the year to account for the rapidly evolving market.

Table 14.2.1 Net To Gross[9, 28]

Program	NTG %
Lighting Efficiency	81%
Small Business Solutions	94%

References:

9. Net-to-Gross factor from Evaluation of Xcel Energy's Lighting Efficiency Program. 2019. EMI Consulting.
28. Net-to-Gross factor from the Evaluation of Xcel Energy's Small Business Solutions Program. 2020. EMI Consulting.

Changes from Recent Filing:

Updated the Lighting Efficiency NTG value based on the Xcel Energy 2022 Lighting Efficiency Evaluation

14.3 Lighting Midstream

Algorithms

$$Customer\ kW = Quantity \times \frac{Watts\ Base - Watts\ EE}{1000} \times Cooling\ kW\ Savings\ Factor$$

$$Customer\ kWh = Quantity \times \frac{Watts\ Base - Watts\ EE}{1000} \times Hours \times Cooling\ kWh\ Savings\ Factor$$

$$Customer\ PCkW = Quantity \times \frac{Watts\ Base - Watts\ EE}{1000} \times Cooling\ kW\ Savings\ Factor \times CF$$

$$LPW\ EE = (Lumens\ EE)/(Watts\ EE)$$

$$Watts\ Base = Watts\ EE \times \frac{LPW\ EE}{LPW\ Base}$$

$$Natural\ Gas\ Savings\ (Dth) = Quantity \times \frac{Watts\ Base - Watts\ EE}{1000} \times Hours \times Heating\ Penalty\ Factor$$

Applies to: LED Linear Lamps - Type B & C, LED PL/G based CFL Replacement lamp - Type B, LED Screw-in Lamps - HID Replacement

$$Watts\ Base = Watts\ EE \times \frac{LPW\ EE}{LPW\ Base \times Baseline\ Equivelancy\ Factor \times Ballast\ Factor}$$

*Rest of the equations are the same as the first table

Applies to: LED Linear Lamps - Type A, LED PL/G based CFL Replacement lamp - Type A

$$Customer\ kW = Quantity \times \frac{Watts\ Base - Sys\ Watts\ EE}{1000} \times Cooling\ kW\ Savings\ Factor$$

$$Customer\ kWh = Quantity \times \frac{Watts\ Base - Sys\ Watts\ EE}{1000} \times Hours \times Cooling\ kWh\ Savings\ Factor$$

$$Customer\ PCkW = Quantity \times \frac{Watts\ Base - Sys\ Watts\ EE}{1000} \times Cooling\ kW\ Savings\ Factor \times CF$$

$$Watts\ Base = Watts\ EE \times \frac{LPW\ EE}{LPW\ Base \times Baseline\ Equivelancy\ Factor \times Ballast\ Factor}$$

$$Sys\ Watts\ EE = (Watts\ EE)/(Ballast\ Efficiency)$$

Variables

LPW_Base	See Table 14.3.1	Efficacy of the baseline technology (lumens per watt).
Cooling_kW_Savings_Factor	1.20	Reduction in lighting demand results in a reduction in cooling demand, if the customer has air conditioning. The program will not have direct access to market segment information, so a deemed weighted average was created based on a three year history of downstream participation. [1, 2]
Cooling_kWh_Savings_Factor	1.08	Reduction in lighting energy results in a reduction in cooling energy, if the customer has air conditioning. The program will not have direct access to market segment information, so a deemed weighted average was created based on a three year history of downstream participation. [1, 2]
Heating_Penalty_Factor	-0.000508	Reduction in lighting energy results in an increase in heating usage, if the customer has gas heating (Dth/kWh). [2]
CF	79%	Coincidence Factor is the probability that the peak demand of the lights will coincide with peak utility system demand. The program will not have direct access to market segment information, so a deemed weighted average was created based on a three year history of downstream participation. [1, 2]
Hours	4,349	Annual operating hours. The program will not have direct access to market segment information, so a deemed weighted average based on a three year history of downstream participation was created. [12]
Ballast_Factor	88%	Ballast factor is the measured ability of a fluorescent ballast to produce light from the lamp(s) it powers. In addition to the effect on light output, there is also an indirect impact on energy consumption. A normal ballast factor is assumed here. [16]
Ballast_Efficiency	85%	There is an inefficiency when an LED lamp is running off of a ballast, which adds additional wattage to the nominal lamp wattage. Ballast efficiency may also be referred to as power factor in general terms. Power factor is the fraction of power actually used by the ballast compared to the total power supplied. The ballast efficiency accounts for this inefficiency. [26]
Baseline_Equivalency_Factor	See Table 14.3.2	Accounts for differences in luminaire efficiency (ratio of light emitted by the fixture to the lumen output of the lamp-ballast system alone), lumen depreciation over time, and overdesigned spaces.
Measure Life	See Table 14.3.3	Length of time the lighting equipment will be operational, equals the lifetime hours of the lamp divided by the deemed hours of use.
Baseline Cost	See Table 14.3.4	Cost of the baseline technology.
Labor Cost	See Table 14.3.5	Cost of labor to install fixtures, Type B, and Type C lamps. [1]
NTG	78%	Net-to-gross factor.[24]

Customer Inputs	**M&V Verified**	
Quantity	No	Quantity of lamps or retrofit kits.
Measure Category	No	Type of lamp or retrofit kit.
Watts_EE	No	High efficiency lamp wattage. This is defined by the manufacturer and maintained and reported by the distributor.
Lumens_EE	No	High efficiency lamp rated brightness (lumens). This is defined by the manufacturer and maintained and reported by the distributor.
High Efficiency Cost	No	Cost of the high efficiency technology. Costs will be collected from the equipment distributor on the product invoice.

Table 14.3.1 Baseline Lamp Efficacy based on Lamp Category [15 - 20, 27]

Measure Category	**Avg. Efficacy**
A Lamp rated for 310 - 749 Lumens	45.00
A Lamp rated for 750 - 1049 Lumens	45.00
A Lamp rated for 1050 - 1489 Lumens	45.00
A Lamp rated for 1490 - 2600 Lumens	45.00
General Directional (PAR, BR, R)	45.00
Multifaceted Reflector (MR16)	13.00
Decorative (B, BA, Candle, Globe)	10.45
Downlight Retrofit Kit	24.39
Fluorescent Linear Lamps	88.70
PL/G based CFL lamp	69.30
HID Screw-in Lamp	83.20
LED Interior Fixture <= 25W	54.93
LED Interior Fixture 26W - 50W	50.20
LED Exit Sign	7.50

Table 14.3.2 Baseline Equivalency Factor (BEF) [24]

Measure Category	BEF
LED Linear Lamps - Type A	0.70
LED Linear Lamps - Type B, C	0.87
LED PL/G based CFL Replacement Lamp	0.52
LED Screw-in Lamps, HID Replacement	0.62

Table 14.3.3 Measure Lifetimes in Years [8, 21, 23]

Measure Category	Lifetime
LED Interior Lamp - A Lamp	4.9
General Directional (PAR, BR, R)	5.7
Multifaceted Reflector (MR16)	5.8
Decorative (B, BA, Candle, Globe)	4.3
Downlight Retrofit Kit	10.5
LED Linear & U-Bend Tubes - Type A & B	11.5
LED Linear & U-Bend Tubes - Type C & LED Interior Fixtures	20.0
LED PL/G based CFL Replacement lamp	11.5
LED Screw-in Lamps, HID Replacement	11.5

Table 14.3.4 Baseline Costs [22]

Measure Category	Baseline Cost
A19 60W, 750-1049 lm	$1.45
A19 100W, 1490-2600 lm	$2.42
Decorative (Candle/Globe)	$3.88
BR30	$3.68
BR40	$4.03
MR16	$4.68
PAR16	$6.25
PAR20	$12.54
R20	$2.60
PAR30	$6.62
PAR38	$7.43
Downlight Retrofit Kit	$3.86
LED Linear Lamps - Type A	$2.19
LED Linear Lamps - Type B	$2.07
LED Linear Lamps - Type C	$2.18
LED PL/G based CFL Replacement lamp	$4.59
LED Screw-in Lamps, HID Replacement	$37.68

Table 14.3.5 Labor Costs [12]

Measure Category	Labor Cost
LED Linear Lamps - Type B	$8.00
LED Linear Lamps - Type C	$12.00
LED PL/G based CFL Replacement Lamp - Type B	$12.00
LED Screw-in Lamps, HID Replacement	$55.00
LED Interior Fixtures	$40.00
LED/LEC Exit Sign	$60.00

References:

12. "Lighting Efficiency - CO" and "Lighting - Small Business" participation data from 2017 through 2019.
13. Deemed Savings for 2019-2020 "Product: Lighting Efficiency - CO" to reference deemed values used to create weighted averages for HVAC Interactive Factors, Hours and CF.
14. Net-to-Gross factor from 2020 Xcel Energy Small Business Lighting Efficiency Program Evaluation
15. Energy Independence and Security Act. United States Congress. Jan 4, 2007. https://www.govinfo.gov/content/pkg/BILLS-110hr6enr/pdf/BILLS-110hr6enr.pdf
16. Adoption of Light-Emitting Diodes in Common Lighting Applications. Prepared for the U.S. Department Of Energy by Navigant Consulting. April 2013. http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/led-adoption-
17. Caliper Benchmark Report - Performance of Incandescent A-Type and Decorative Lamps and LED Replacements. U.S. Department of Energy. November, 2008. https://www1.eere.energy.gov/buildings/publications/pdfs/ssl/a-type_benchmark_11-08.pdf
18. ENERGY STAR ® Integral LED Product Qualifications Requirements. 2010.
19. Caliper Benchmark Report - Performance of Halogen Incandescent MR 16 Lamps and LED Replacements. U.S. Department of Energy. November, 2008. https://www1.eere.energy.gov/buildings/publications/pdfs/ssl/a-
20. Incandescent Reflector Lamps minimum efficacy standards. http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/58
21. ENERGY STAR ® Certified Light Bulbs and Light Fixtures Qualified Products Lists. Accessed July 2018.
22. Actual sales data from distributors from 2017-2018. (Baseline Distributor Costs)
23. Design Lights Consortium (2018). Qualified Products List as of February 27, 2018. (Lamp Lifetime Hours)
24. Compared lumen equivalency data in the CO Lighting Efficiency downstream program from 2018 and 2019 to identify the baseline equivalency factors for the lamps.
25. "What is a ballast factor, and how does it affect my fluorescent tubes?". July 7, 2016. https://insights.regencylighting.com/what-is-a-ballast-factor-and-how-does-it-affect-my-fluorescent-tubes
26. Ballast Efficiency (Aka: Power Factor).https://www.yumpu.com/en/document/read/48349742/what-is-the-difference-between-power-factor-and-osram-sylvania
27. Department of Energy, Energy Conservation Program: Energy Conservation Standards for General Service Lamps. https://www.govinfo.gov/content/pkg/FR-2022-05-09/pdf/2022-09477.pdf

Changes from Recent Filing:

Updated GSL baseline lamp efficacies to 45 lm/W standard via EISA ruling
Cost updated based on CleaResult market research

14.4 Lighting DI

Algorithms

$$Customer\ kW = (kW\ Exist - kW\ Prop) \times Cooling\ kW\ Savings\ Factor$$

$$Customer\ kWh = (kW\ Exist - kW\ Prop) \times Hours\ X\ Cooling\ kWh\ Savings\ Factor$$

$$Customer\ PCkW = (kW\ Exist - kW\ Prop) \times Cooling\ kW\ Savings\ Factor \times CF$$

$$kW\ Exist = Qty\ Existing\ Equip \times Existing\ Model\ kW$$

$$kW\ Prop = Qty\ Prop\ Equip \times Equipment\ Model\ kW$$

$$Natural\ Gas\ Savings\ (Dth) = (kW\ Exist - kW\ Prop) \times Hours \times Heating\ Penalty\ Factor$$

Variables

Cooling_kW_Savings_Factor	See Table 14.0.1	Cooling system secondary demand savings factor resulting from efficient lighting. Reduction in lighting demand results in a reduction in cooling demand, if the customer has air conditioning. Existence of air conditioning determined by HVAC_Type.
Cooling_kWh_Savings_Factor	See Table 14.0.1	Cooling system secondary energy savings factor resulting from efficient lighting. Reduction in lighting energy results in a reduction in cooling energy, if the customer has air conditioning. Existence of air conditioning determined by HVAC_Type.
Heating_Penalty_Factor	See Table 14.0.1	Heating system secondary energy penalty factor resulting from efficient lighting. Reduction in lighting demand results in an increase in heating usage, if the customer has gas heating. Existence of gas heating to be determined by HVAC_Type.
CF	See Table 14.0.3	Coincidence Factor is the probability that the peak demand of the lights will coincide with the peak utility system demand, determined by Facility_Type.
Hours	See Table 14.0.3	Annual operating hours, determined by Facility_Type.
Measure Life Hours	25,000	Lifetime of lamps installed through the program in hours. Spec sheets provided by third-party implementer.
High Efficiency Cost	See Table 14.4.1 & Table 14.4.2	Costs are provided by the vendor and are re-evaluated throughout the year to account for the rapidly evolving market.
NTG	See Table 14.4.3	Net-to-gross [14]

Customer Inputs

Qty_Existing_Equip	Quantity of existing equipment.
Qty_Prop_Equip	Quantity of proposed equipment
HVAC_Type	Type of heating or cooling
Facility_Type	Type of facility.
Existing_Model_kW	Existing equipment wattage determined from stipulated fixture or lamp wattage. Specific lighting product provided by third-party implementer.
Equipment_Model_kW	Proposed equipment wattage of fixture or lamp. Specific lighting product provided by third-party implementer. Type-A tubes assume a ballast efficiency built into the lamp kW.

Table 14.4.1 DI Lamp Costs [27]

Lamps	Wattage*	Equipment Cost*	Labor W/ Incandescent Baseline*	Labor W/ CFL Baseline*
A-Lamps	9W	$0.84	$5.00	$3.00
	6W	$0.84		
BR30	8W	$1.47		
MR16	7W	$2.72		
	7W	$2.72		
Par20	11W	$2.33		
Par30	15W	$3.26		
Par38	13W	$4.52		
BR20	7W	$1.10		
LED Exit Sign	0.7W-1.8W**	$16.00	$9.00	$25.00

* See note in the variables section on updating costs and lamp wattages throughout the program year.
** Exit sign wattage varies depending on color

Table 14.4.2 DI Tubes Cost

	Equipment Cost*	Labor Cost*
LED Tubes	$4.75	$9.84

* See note in the variables section on updating costs and lamp wattages throughout the program year.

Table 14.4.3 Net To Gross [28]

Program	NTG %
Small Business Solutions	94%
Multifamily Buildings	100%

References:

14. Net-to-Gross factor from 2019 Xcel Energy Small Business Lighting Efficiency Program Evaluation
27. Cost information supplied by direct install implementer
28. Net-to-Gross factor from the Evaluation of Xcel Energy's Small Business Solutions Program. 2020. EMI Consulting.

Changes from Recent Filing:

14.5 Refrigerated Case LED DI

Algorithms

$$Customer\ kW = \frac{(Existing\ Watts\ - Proposed\ Watts)}{1000} \times Cooling\ kW\ Savings\ Factor \times Qty\ Prop\ Equip$$

$$Customer\ kWh = \frac{(Existing\ Watts\ - Proposed\ Watts)}{1000} \times Hours \times\ Cooling\ kWh\ Savings\ Factor \times Qty\ Prop\ Equip$$

$$Customer\ PCkW = \frac{(Existing\ Watts - Proposed\ Watts)}{1000} \times Cooling\ kW\ Savings\ Factor \times CF \times Qty\ Prop\ Equip$$

Variables

Cooling_kW_Savings_Factor	See Table 14.0.1	Cooling system secondary demand savings factor resulting from efficient lighting. Reduction in lighting demand results in a reduction in cooling demand, if the customer has air conditioning. Existence of air conditioning determined by HVAC_Type.
Cooling_kWh_Savings_Factor	See Table 14.0.1	Cooling system secondary energy savings factor resulting from efficient lighting. Reduction in lighting energy results in a reduction in cooling energy, if the customer has air conditioning. Existence of air conditioning determined by HVAC_Type.
CF	100%	Coincidence Factor is the probability that the peak demand of the lights will coincide with the peak utility system demand. For refrigerated case lighting this is deemed to be 100%
Hours	4,349	Annual operating hours. The program will not have direct access to market segment information, so a deemed weighted average based on a three year history of downstream participation was created. [1, 2]
Measure Life Hours	25,000	Lifetime of lamps installed through the program in hours. Spec sheets provided by vendor
High Efficiency Cost	See Table 14.5.1	Costs are provided by the vendor and are re-evaluated throughout the year to account for the rapidly evolving market.
NTG	94%	Net-to-gross [28]

Customer Inputs

Qty_Prop_Equip	Quantity of proposed equipment.
Existing Watts	Existing equipment wattage determined from stipulated fixture or lamp wattage.
Proposed Watts	See Table 14.5.1. Wattage of proposed LED lamp. Specific lighting product provided by vendor.

Table 14.5.1 DI Lamp Costs [27]

Lamps	Proposed Watts*	Equipment Cost*	Labor W/ Incandescent Baseline*	Labor W/ CFL Baseline*
A Lamps	9	$0.84	$5.00	$3.00

* See note in the variables section on updating costs and lamp wattages throughout the program year.

References:

12. "Lighting Efficiency - CO" and "Lighting - Small Business" participation data from 2017 through 2019.
27. Cost information supplied by direct install implementer
28. Net-to-Gross factor from the Evaluation of Xcel Energy's Small Business Solutions Program. 2020. EMI Consulting.

Changes from Recent Filing:

14.6 Grow Lighting

Algorithms

$$Customer\ kW = \left(\left(\frac{Proposed\ Fixture\ kW\ *Proposed\ Quantity\ *\ \%Reflector\ Eff_{prop}\ *\ Proposed\ PPE}{\%Reflector\ Eff_{base} * Baseline\ PPE}\right) - Proposed\ Quantity * Proposed\ Fixture\ kW\right) * Cooling\ kW\ Savings\ Factor$$

$$Customer\ kWh = \left(\left(\frac{Proposed\ Fixture\ kW\ *Proposed\ Quantity\ *\ \%Reflector\ Eff_{prop}\ *\ Proposed\ PPE}{\%Reflector\ Eff_{base} * Baseline\ PPE}\right) - Proposed\ Quantity * Proposed\ Fixture\ kW\right) * Hours\ * Cooling\ kWh\ Savings\ Factor$$

$$PCkW = Customer\ kW\ *\ CF$$

Variables

%Reflector Eff_base	78.3%	Accounts for reflector losses and amount of useful light delivered using baseline fixtures [2]
%Reflector Eff_prop	97.2%	Accounts for reflector losses and amount of useful light delivered from LED grow lights [2]
Cooling kW Savings Factor*	1.33	Assuming year round A/C cooling for indoor grow facilities
Cooling kWh Savings Factor*	See Table 14.6.1	Assuming year round A/C cooling for indoor grow facilities
Hours	See Table 14.6.1	Annual Hours of Operation
CF	See Table 14.6.1	Coincidence Factor
Incremental Cost	See Table 14.6.2	Average fixture costs per watt based weighted against total watts from historical custom projects
Baseline PPE	See Table 14.6.3	Average value weighted against historical custom project baseline wattage

** These values assume year round mechanical cooling in all facilities. This is the current standard assumption for custom analysis.*

Customer Inputs	**M&V Verified**	
Grow Room Type*	Yes	See Table 14.6.1 Operating Schedule
Proposed Fixture Quantity	Yes	Number of proposed LED grow fixtures being installed
Proposed Fixture PPE (PPF/W)	Yes	Umols/J from spec sheet or DLC listing
Proposed Fixture kW	Yes	kW per proposed LED fixture
Total Equipment Cost	No	Field only used for data collection to update cost assumptions to match changing market conditions
Total Labor Cost	No	Field only used for data collection to update cost assumptions to match changing market conditions

Table 14.6.1: Operating Schedule [1, 4]

Grow Room Type	Annual Hours*	CF*	Cooling kWh Savings Factor
Cannabis Flower Room	4,255	0.68	1.16
Cannabis Veg Room	6,498	0.89	1.24
Flowering Crops (Tomatoes/Peppers/Flowers)	4,200	0.76	1.21
Vegetative/Propagation Growth/Clone Room	6,300	0.95	1.21
Microgreens	6,300	0.95	1.21

** Cannabis values are calculated averages of custom indoor grow project operating schedules*

Table 14.6.2: Incremental Cost per Watt [1]

Baseline Cost/W*	Proposed Cost/W**
$ 0.27	$ 1.40

** Calculated as average baseline cost per watt from historical custom projects weighted against baseline wattage*
*** Calculated as average proposed cost per watt from historical custom projects weighted against proposed wattage*

Table 14.6.3: Baseline PPE [2]

	PPE	Wtd Avg PPE** [1]
Mogul Based HPS	1.02	1.20
DE HPS	1.7	
CMH	1.46	
Fluorescent*	0.84	

** The reference for this was specific to T8. Due to lack of sources T5 is assumed to be equivelant*
*** Baseline average PPE calculated form historical custom projects and weighted against total baseline watts. We investigated using seperate values based on room type but found only a 3% difference between flower and veg and determined a single value was sufficient.*

References:

1. Historical custom grow lighting projects from 2020. 54 spaces and over 5500 proposed fixtures.
2. LED and HID Horticultural Luminaire Testing Report, Lighting Energy Analysis, Natural Resourced Canada, 2018: https://www.lrc.rpi.edu/programs/energy/pdf/HorticulturalLightingReport-Final.pdf
3. Energy Savings Potential of SSL in Horticultural Applications, US Department of Energy Office of Energy Efficiency and Renewable Energy, December 2017: https://www.energy.gov/sites/prod/files/2017/12/f46/ssl_horticulture_dec2017.pdf
4. State of Illinois Techncial Reference Manual, Version 11.0 Final Technical Version as of September 22nd, 2022. Effective January 1st, 2023.

Changes from Recent Filing:

Added clone room under Veg/Propagation room type via IL TRM
Updated baseline PPE via historical participation

14.7 LED to LED Lighting Retrofit

Algorithms

$$Customer\ kW = Quantity \times \frac{Watts\ Base - Watts\ EE}{1000} \times Cooling\ kW\ Savings\ Factor$$

$$Customer\ kWh = Quantity \times \frac{Watts\ Base - Watts\ EE}{1000} \times Hours \times Cooling\ kWh\ Savings\ Factor$$

$$Customer\ PCkW = Quantity \times \frac{Watts\ Base - Watts\ EE}{1000} \times Cooling\ kW\ Savings\ Factor \times CF$$

$$LPW\ EE = (Lumens\ EE)/(Watts\ EE)$$

$$Watts\ Base = Watts\ EE \times \frac{LPW\ EE}{LPW\ Base}$$

$$Natural\ Gas\ Savings\ (Dth) = Quantity \times \frac{Watts\ Base - Watts\ EE}{1000} \times Hours \times Heating\ Penalty\ Factor$$

Variables

LPW_Base	See Table 14.7.1	Efficacy of the baseline technology (lumens per watt). [3]
Cooling_kW_Savings_Factor	See Table 14.7.2	Reduction in lighting demand results in a reduction in cooling demand, if the customer has air conditioning. Based on a deemed weighted average was created based on a three year history of downstream participation. [1, 2]
Cooling_kWh_Savings_Factor	See Table 14.7.2	Reduction in lighting energy results in a reduction in cooling energy, if the customer has air conditioning. Based on a deemed weighted average was created based on a three year history of downstream participation. [1, 2]
Heating_Penalty_Factor	See Table 14.7.2	Reduction in lighting energy results in an increase in heating usage, if the customer has gas heating (Dth/kWh). [2]
CF	See Table 14.7.2	Coincidence Factor is the probability that the peak demand of the lights will coincide with peak utility system demand. Based on a deemed weighted average was created based on a three year history of downstream participation. [1, 2]
Hours	See Table 14.7.2	Annual operating hours based on a deemed weighted average based on a three year history of downstream participation.
Lifetime	See Table 14.0.2	Lifetime of the proposed equipment.

Customer Inputs	**M&V Verified**	
Quantity	Yes	Quantity of fixtures or retrofit kits.
Measure Category	Yes	Type of lamp or retrofit kit.
Watts_EE	Yes	High efficiency lamp wattage. This is defined by the manufacturer and maintained and reported by the distributor.
Lumens_EE	Yes	High efficiency fixture rated brightness (lumens). This is defined by the manufacturer and maintained and reported by
High Efficiency Cost	No	Cost of the high efficiency technology. Costs will be collected from the equipment distributor on the product invoice.

Table 14.7.1 Efficacies for LED Fixtures [3]

LED Fixture Type	Baseline Efficacy (lm/W)	Efficient Efficacy (lm/W)
Area Light	87.0	169.8
Canopy	92.3	160.0
Downlight	68.2	100.0
Highbay	105.4	173.5
Linear Ambient	100.0	157.9
Troffer	94.5	145.5
Type A Tube	94.7	150.0
Type B Tube	100.0	163.6
Type C Tube	94.7	150.0
Wallpack	100.0	166.7

Table 14.7.2 Factors for LED Fixture Types [4]

LED Fixture Type	Hours	Coincidence Factor	kW Factor	kWh Factor	Heating Penalty Factor
Interior Fixture	4,349	79%	1.20	1.08	-0.000508
Exterior Fixture	4,380	0%	1.00	1.00	0
Linear Tube	4,349	79%	1.20	1.08	-0.000508

References:

1. HVAC Interactive Factors developed based on the Rundquist Simplified HVAC Interaction Factor method for Minnesota, ASHRAE Journal - "Calculating lighting and HVAC
2. COP values from the Deemed Savings for CO Commercial Refrigeration, 2019-2020. (Cooler and Freezer Door Interactive Factors).
3. Historical vendor project data from EMC
4. Midstream factors based on historical downstream participation

Changes from Recent Filing:

New Measure

Table 14.0.1: HVAC Interactive Factors [1, 2]

HVAC_Type	Cooling_kWh_ Savings_Factor	Cooling_kW_ Savings_Factor	Heating_Penalty _ Factor (Dth/kWh)
Heating Only	1.00	1.00	-0.000508
Heating and Cooling	1.13	1.33	-0.000508
Cooler Door Retrofit to LED	1.44	1.44	N/A
Freezer Door Retrofit to LED	1.70	1.70	N/A

Table 14.0.2: Measure Lifetimes in Years [3, 6, 7 & 8]

Measure	Lifetime
LED Fixtures & Retrofit Kits	20.0
Lighting Sensors	8.0
Networked Lighting Controls	15.0
Luminaire Level Lighting Controls	15.0
LED Interior Lamp	7.0
LED Ref and Frz Screw In Fixture Retrofit	5.0
LED Tubes	11.0

Table 14.0.3: Coincident Peak Demand Factors and Annual Operating Hours by Facility Type [3]

Facility_Type	CF	Annual Operating Hours
24-Hour Facility	100%	8,760
Assisted Living	66%	7,862
College	63%	3,395
Elementary School	65%	3,038
Exterior - Dusk to Dawn	0%	4,380
Grocery/Convenience Store	79%	4,661
Healthcare Office / Outpatient	67%	3,890
Hospital	56%	7,616
Hotel/Motel Common Areas	85%	6,138
Hotel/Motel Guest Rooms	46%	2,390
Manufacturing	81%	4,618
Office - Low Rise	52%	2,698
Office - Mid Rise	60%	3,266
Office - High Rise	59%	2,886
Other/Misc.	67%	3,379
Religious Building	48%	2,085
Restaurant	100%	5,571
Retail - Department Store	94%	4,099
Retail - Strip Mall	71%	4,093
Safety or Code Required (Including Exit Signs)	100%	8,760
Secondary School	65%	3,038
Warehouse	85%	3,135

References:

1. HVAC Interactive Factors developed based on the Rundquist Simplified HVAC Interaction Factor method, ASHRAE Journal - "Calculating lighting and HVAC interactions".
2. COP values from the Deemed Savings for CO Commercial Refrigeration, 2019-2020. (Cooler and Freezer Door Interactive Factors).
3. State of Illinois Techncial Reference Manual, Version 9.0 Final Technical Version as of October 17th, 2019. Effective January 1st, 2021. (Hours and CF)
4. Design Lights Consortium. (2017). Energy Savings from Networked Lighting Control (NLC) Systems. Medford: Design Lights Consortium. Retrieved 1 23, 2020, from https://www.designlights.org/lighting-controls/reports-tools-resources/nlc-energy-savings-report/

5. Lawrence Berkeley National Laboratory. (2011). A Meta-Analysis of Energy Savings from Lighting Controls in Commercial Buildings. Berkeley, CA: Lawrence Berkeley National Laboratory. Retrieved 10 01, 2017, from https://eta.lbl.gov/sites/default/files/publications/a_meta-analysis_of_energy_savings_from_lighting_controls_in_commercial_buildings_lbnl-5095e.pdf

6. Measure Life for automatically controlled measures from the Deemed Savings for CO Energy Management Systems, 2019-2020. (NLC Measure Life)
7. Design Lights Consortium (2018). Qualified Products List as of February 27, 2018. (Lamp Lifetime Hours)
8. Hours of Use to calculate measure life for lamps was determined using a weighted hours of operation from Xcel Energy 2018/2019 participation.
9. Net-to-Gross factor from Evaluation of Xcel Energy's Lighting Efficiency Program. 2019. EMI Consulting.
10. LED baseline and proposed costs come from previous Xcel Energy Custom Lighting Efficiency projects, as well as market research through ShineRetrofits.com, LightingAtlanta.org, 1000bulbs.com, grainger.com, Pro Lighting.com, and more.
11. The Unopposed Settlement Agreement in Proceeding No. 18A-0606EG.
29. Design Lights Consortium. Energy Savings from Networked Lighting Control (NLC) Systems with and without LLLC. Sept 24, 2020. https://www.designlights.org/resources/reports/report-energy-savings-from-networked-lighting-control-nlc-systems-with-and-without-lllc/
30. NEEA. 2020 Luminaire Level Lighting Controls Incremental Cost Study. https://neea.org/img/documents/2020-LLLC-Incremental-Cost-Study.pdf

Midstream:
12. "Lighting Efficiency - CO" and "Lighting - Small Business" participation data from 2020 through 2022.
13. Deemed Savings for 2019-2020 "Product: Lighting Efficiency - CO" to reference deemed values used to create weighted averages for HVAC Interactive Factors, Hours and CF.
14. Net-to-Gross factor from 2020 Xcel Energy Small Business Lighting Efficiency Program Evaluation
15. Energy Independence and Security Act. United States Congress. Jan 4, 2007. https://www.govinfo.gov/content/pkg/BILLS-110hr6enr/pdf/BILLS-110hr6enr.pdf
16. Adoption of Light-Emitting Diodes in Common Lighting Applications. Prepared for the U.S. Department Of Energy by Navigant Consulting. April 2013. http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/led-adoption-report_2013.pdf
18. ENERGY STAR ® Integral LED Product Qualifications Requirements. 2010.
17. Caliper Benchmark Report - Performance of Incandescent A-Type and Decorative Lamps and LED Replacements. U.S. Department of Energy. November, 2008. https://www1.eere.energy.gov/buildings/publications/pdfs/ssl/a-type_benchmark_11-08.pdf
20. Incandescent Reflector Lamps minimum efficacy standards. http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/58
21. ENERGY STAR ® Certified Light Bulbs and Light Fixtures Qualified Products Lists. Accessed July 2018.
22. Actual sales data from distributors from 2017-2018. (Baseline Distributor Costs)
23. Design Lights Consortium (2018). Qualified Products List as of February 27, 2018. (Lamp Lifetime Hours)
24. Compared lumen equivalency data in the CO Lighting Efficiency downstream program from 2018 and 2019 to identify the baseline equivalency factors for the lamps.
25. "What is a ballast factor, and how does it affect my fluorescent tubes?". July 7, 2016. https://insights.regencylighting.com/what-is-a-ballast-factor-and-how-does-it-affect-my-fluorescent-tubes
26. Ballast Efficiency (Aka: Power Factor).https://www.yumpu.com/en/document/read/48349742/what-is-the-difference-between-power-factor-and-osram-sylvania

DI:
27. Cost information supplied by direct install implementer

Small Business Solutions:
28. Net-to-Gross factor from the Evaluation of Xcel Energy's Small Business Solutions Program. 2020. EMI Consulting.

15.1 Motors

Algorithms

$$Customer\ kWh = (HP\ x\ LF_Motors\ x\ Conversion\ x\ \left(\frac{1}{Standard_Eff} - \frac{1}{High_Eff}\right)\ x\ Hrs\ x\ Refrigeration_Factor)$$

$$Customer\ Coincident\ kW = (HP\ x\ LF_Motors\ x\ Conversion\ x\ \left(\frac{1}{Standard_Eff} - \frac{1}{High_Eff}\right)\ x\ CF\ x\ Refrigeration_Factor)$$

Variables

Hrs	Table 15.1 and Table 15.3	Annual operational hours per year of the motor. Deemed values are used for hours based on the type and use of the motor. The customer provides the following information on the rebate form: HP, industrial/non-industrial, building type, and compressor/pump/fan/other.
LF_Motors	Table 15.2	Motor load factor as a percentage.[1]
COP	Table 15.4	Coefficient of Performance = Refrigeration/Cooling Capacity (BTU/hr) / Energy Input (BTU/hr)
Cost Factor b	Table 15.5	Coincidence factor
High_Eff	Table 15.6	Efficiency of high efficiency replacement motor as a percentage. New Enhanced and Upgrade Enhanced are NEMA Premium plus 1%. Upgrade is NEMA Premium. The customer will provide the model and serial number of the motor along with actual nameplate efficiency from the new motor. If the actual efficiency is not provided by the customer, it will be determined from specification sheet.
Standard_Eff	Table 15.6	Efficiency of standard replacement motor as a percentage. New Enhanced is NEMA Premium. Upgrade and Upgrade Enhanced are EPACT. Based on customer provided motor size, speed, and enclosure type.
Conversion	0.746	Conversion from HP to kW
Refrigeration_Factor	1+1/COP	Multiplier to include interactive effects of refrigeration or cooling energy to remove heat from the motor.
Lifetime Upgrade	15	This is the incremental lifetime of retiring an EPACT motor early[1]
Lifetime Enhanced	20	This is the full lifetime of a motor since this is a new to new comparison[1]

Customer Inputs	**M&V Verified**	
New motor model and serial number	Yes	HP, efficiency, type, and speed can then be looked up in a database
Application of motor	Yes	
Building type	Yes	Where motor is installed for non-industrial motors
Use of motor	Yes	Pump, fan, other
Equipment is installed	Yes	

References:

1. Efficiency Vermont's Technical Reference User Manual, 2004 - Source for operating hours for non-industrial motors (p.15) and source for measure life, source for load factor
2. Office of Industrial Electric Motor Systems Market Opportunities Assessment : Department of Energy (assessment of 265 Industrial facilities in 1997) - Source for VSD opportunity in the US market along with load factors for fans and pumps along with average savings

Assumptions:

- Each motor is replaced with the same size on a 1 for 1 basis. Motors replaced with different sizes can participate in the Custom Efficiency product.
- Prescriptive rebates are only given for motors put into service, rebates are not given for backup motors.
- Prescriptive rebates are only given to VFD's installed on centrifugal pump or fan applications.
- Rebates do not apply to rewound or repaired motors.

Changes from Recent Filing:

Opening the Enhanced efficiency program to all motors that meet that efficiency level. This includes induction, Permanent Magnet, Electronically Commutated, Switched Reluctance

15.2 VFDs

Algorithms

$$Customer\ kWh = \frac{HP \times LF_{Motors} \times Conversion \times Hours \times \%_Savings_Drives \times Refigeration_Factor}{Avg_Motor_Efficency}$$

$$Customer\ Coincident\ kW = \frac{HP \times LF_{Motors} \times Conversion \times CF \times \%_Savings_Drives \times Refigeration_Factor}{Avg_Motor_Efficency}$$

Variables

Hours	Table 15.1 and Table 15.3	Annual operational hours per year of the motor. Deemed values are used for hours based on the type and use of the motor. The customer provides the following information on the rebate form: HP, industrial/non-industrial, building type, and compressor/pump/fan/other.[1]
LF_Motors	Table 15.2	Motor load factor as a percentage.[2]
Refrigeration_Factor	Table 15.3	Coefficient of Performance = Refrigeration/Cooling Capacity (BTU/hr) / Energy Input (BTU/hr)
CF	Table 15.5	Coincidence factor
Incremental Cost	Table 15.7	Incremental cost for VFD[3]
Avg_Motor Efficiency	Table 15.8	Efficiency of NEMA premium efficient motor as a percentage. Value is a weighted average by HP based on customer past selections.
% Savings Drives	33%	Average savings achieved by installing a VFD on a fan or pumping motor.[2]
Measure life	15	Years[1]
Conversion	0.746	Conversion from horsepower to kW.

Customer Inputs	**M&V Verified**	
HP	Yes	Rated motor horsepower.
Facility Type	Yes	
Application	Yes	

Assumptions:

- Each VFD is replaced with the same size on a 1 for 1 basis.
- Prescriptive rebates are only given for VFDs put into service, rebates are not given for backup VFDs.
- Prescriptive rebates are only given to VFD's installed on centrifugal pump and fan applications.

References:

1. Efficiency Vermont's Technical Reference User Manual, 2004 - Source for operating hours for non-industrial motors (p.15) and source for measure life, source for load factor

2. Office of Industrial Electric Motor Systems Market Opportunities Assessment : Department of Energy (assessment of 265 Industrial facilities in 1997) - Source for VSD opportunity in the US market along with load factors for fans and pumps along with average savings

3. Costs are derived from customer invoices received through Xcel Energy's prescriptive program.

Changes from Recent Filing:

15.3 Refigeration Fans

Algorithms

$$Customer\ kWh = \frac{(ECM_{Baseline\ Fan\ W} - ECM_{Efficient\ Fan\ W})}{1000} x\ Refrigeration_{Factor} x\ ECM_{Hours}$$

$$Customer\ Coincident\ kW = \frac{(ECM_{Baseline\ Fan\ W} - ECM_{Efficient\ Fan\ W})}{1000} x\ Refrigeration_{Factor}\ x\ CF$$

Variables

ECM_Baseline_Fan_ Watts	Table 15.3.1	Average input watts for shaded pole or permanent split capacitor motor
ECM_Efficient_Fan_Watts	Table 15.3.1	Average input watts for efficient motor[1]
ECM_Hours	Table 15.3.1	Hours per year (freezer subtracts defrost time)[1]
Cost Factor b	Table 15.3.2	Deemed Incremental Costs
COP	Table 15.4	Coefficient of Performance = Refrigeration/Cooling Capacity (BTU/hr) / Energy Input (BTU/hr)
CF	Table 15.5	Coincidence factor
Refrigeration_Factor	1+1/COP	Multiplier to include interactive effects of refrigeration or cooling energy to remove heat from the motor. Reduction in motor energy results in a reduction in refrigeration/cooling energy.
Lifetime	15	Years[4]

Customer Inputs	**M&V Verified**	
Size of motor	Yes	Watts
Application of motor	Yes	Display Case or Walk-in
Case or Walk-in temperature (Medium Temp or Low Temp)	Yes	Medium Temp or Low Temp
For Walk-in's: Fan diameter (<= 15 inches or >15 inches	Yes	<= 15 inches or >15 inches

Table 15.3.1

Motor Application	ECM_Baseline_Fan_Watts[1]	ECM_Efficient_Fan_Watts[1,2]	ECM_Hours[1]
MediumTemp Shaded Pole to PMSM in display case	49.69	15.25	8,672
Low Temp Shaded Pole to PMSM in display case	49.69	15.25	8,672
MediumTemp Shaded Pole to ECM in display case	49.69	16.50	8,672
Low Temp Shaded Pole to ECM in display case	49.69	16.50	8,672
Med Temp Shaded Pole to ECM in Walk-in	95.08	30.88	8,585
Low Temp Shaded Pole to ECM in Walk-in	95.08	30.88	8,585
Med Temp permanent split capcaitor (PSC) to ECM in Walk-in	96.00	47.00	8,585
Low Temp permanent split capcaitor (PSC) to ECM in Walk-in	96.00	47.00	8,585
Medium Temp Shaded Pole to PMSM in Walk-In	95.08	37.20	8,585
Low Temp Shaded Pole to PMSM in Walk-In	95.08	37.20	8,585

Table 15.3.2

Motor Application	Equipment[1,2,5]	Labor[1,5]	Total
Reach-in PMSM	$75.00	$18.30	$93.30
Walk-in ECM	$226.20	$42.81	$269.01
Reach-in ECM	$122.41	$18.30	$140.71
Walk-in PMSM	$50.00	$60.00	$110.00

References:

1. ECM baseline and efficient watts and hours are from monitored data from Custom Efficiency projects
2. ENERGY SAVINGS OF PERMANENT MAGNET SYNCHRONOUS FAN MOTOR ASSEMBLY REFRIGERATED CASE EVAPORATORS, Alternative Energy Systems Consulting, Inc., 2016
3. Q-Sync Motors in Commercial Refrigeration: Preliminary Test Results and Projected Benefits, ORNL/TM-2015/466
4. http://www.deeresources.com/files/DEER2016/download/2010-2012_WO017_Ex_Ante_Measure_Cost_Study_-_Final_Report.pdf
5. 2023 Illinois Statewide Technical Reference Manual for Energy Efficiency Version 11.0 - Volume 2: Commercial and Industrial Measures

Changes from Recent Filing:

Added PMSM for walk-in

15.4 Fan Efficiency (FEI)

Algorithms

$$Customer\ \ kW = \frac{HP\ \times\ LF \times Conversion}{Avg_Motor\ Efficiency} \times \left((1 - Control_{Factor}) \times \left(\frac{1}{FEI_{Baseline}} - \frac{1}{FEI} \right) \ + Int_VFD_Factor \right)$$

$$Baseline_Cost = \left(A \times \left(\frac{Fan_Diameter}{Size_Factor} \right) + \left(\frac{Fan_Diameter}{Size_Factor} \right)^{B} \right) \times (MSP_Min * Markup_Base + (MSP_Base - MSP_Min) \times Markup_Increm)$$

$$Proposed_Cost = (A \times Fan_Diameter + Fan_Diameter^{B}) \times (MSP_Min * Markup_Base + (MSP_Prop - MSP__Base) \times Markup_Increm)$$

$$Incremental\ Cost = Proposed_Cost - \ Baseline_Cost + VFD_Cost$$

$$Customer\ kWh = Customer\ kW \times Hours$$

$$Customer\ Coincident\ \ kW = Customer\ kW \times CF$$

Variables

Control_Factor	Table 15.9	Energy Savings Factor by Application
Int_VFD_Factor	Table 15.9	Energy Savings Factor by Application
FEI_Baseline	Table 15.4.1	Minimum Qualifying FEI[6]
Measure life	Table 15.4.2	Years. Integrated controls reduce the lifetime by 5 years.
MSP_Min, MSP_Base, MSP_Prop	Table 15.4.3	The factors to determine manufacturers selling price based on type of fan and efficiency level. These values can change based on the FEI of the fan, and must be calculated. These factors relate to the minimum markup (FEI=1), baseline FEI, and actual proposed FEI, respectively. [1]
Markup_Base	Table 15.4.3	Base cost markup occurring during distribution based on fan type from the DOE.[1]
Markup_Increm	Table 15.4.3	Incremental cost markup due to efficiency increase from distributors based on fan type from the DOE. Rounded to three decimal places. [1]
A	18.919	Constant in Manufacturers Production Cost equation from DOE. Rounded to three decimal places.[1]
B	2.105	Constant in Manufacturers Production Cost equation from DOE. Rounded to three decimal places.[1]
Hours	Table 15.1, 15.3	Based on Segment
LF	Table 15.2	Fan Motor Loading Factor
CF	Table 15.5	Coincidence factor
VFD_Cost	Table 15.7	Incremental cost due to integrated VFD, matches VFD prescriptive rebate.
Avg_Motor Efficiency	Table 15.8	Efficiency of NEMA premium efficient motor as a percentage. Value is a weighted average by HP based on customer past selections.
Conversion	0.746	Conversion from horsepower to kW
Size_Factor	110%	The average fan size increase to reach a qualifying FEI value. This was developed through conversations with MN Trade Partners.[2]

Customer Inputs	**M&V Verified**	
HP	Yes	Nominal Fan HP
Fan Diameter	Yes	Fan diameter, in inches
Fan Type	Yes	Fan type, available options are in Table 15.4.5
Fan Control	Yes	Fan control, available options are (constant speed or variable speed)
Integrated VFD	Yes	Yes/No option of if a VFD is integrated into fan.
FEI	Yes	Customer Fan Efficiency Index
Industry Segment	Yes	Available options are in tables 15.1 and 15.3
Selection Screenshot Provided	Yes	Selection nameplate showing provided values[4]

Table 15.4.1 FEI Baseline values[6]

Fan Type	Drive Type		
	Variable Speed - Belt	Constant Speed - Belt	Constant Speed - Direct
Axial Cylindrical Housed	0.88	0.88	0.97
Panel	0.95	0.95	0.88
Centrifugal Housed	0.92	0.92	0.92
Centrifugal Unhoused	0.94	0.94	1.03
Inline and mixed flow	0.79	0.79	0.77
Radial	0.82	0.81	0.94
Power Roof Ventilator	0.82	0.82	0.76
Other	0.95	1.00	1.00

Table 15.4.2 Measure Life based on control strategy

Measure Life	Value
Integrated VFD Measure Life	15
Fan-only Measure Life	20

Table 15.4.3 Incremental Cost Factors[1]

Fan Type	Baseline Markup	Incremental Markup	MSP Factor
Axial Cylindrical Housed	1.780	1.460	0.0101*FEI+1.5084
Panel	1.724	1.442	0.283
Centrifugal Housed	1.665	1.394	21.4022*FEI^3+-78.3942*FEI^2+96.0738*FEI+-38.1369
Centrifugal Unhoused	1.699	1.405	0.941
Inline and mixed flow	1.568	1.368	16.5886*FEI^3+-60.7626*FEI^2+74.3786*FEI+-29.0017
Radial	1.433	1.255	1.309
Power Roof Ventilator	1.551	1.361	0.844

References:

1. DOE NODA V3 LCC, Engineering, and NIA Supplemental Documents From FEI Working Group
2. 13,000 MN Fan Selections From Trade Partner
3. CEC Draft Staff Report - Analysis of efficiency Standards and Test Procedures for Commercial and Industrial Fans and Blowers
4. AMCA Standard 208-18
5. 2019 ASHRAE 90.1
6. MN TRM 4.0 C/I HVAC - Fan Energy Index

Changes from Recent Filing:

Updated FEI baseline values to reflect MN TRM 4.0

15.5 Well Pump VFDs

Algorithms

$$Customer\ kWh = (Base_{kW} - VFD_{kW}) x\ Well\ Hours$$

$$Customer\ Coincident\ kW = (Base_{kW} - VFD_{kW}) x\ CF$$

$$VFD_{kW} = (VFD_{\mathrm{BHP}} / Avg_Motor_Efficiency / \mathrm{VFD_{Eff}}) \times Conversion$$

$$Base_{kW} = (Base_{\mathrm{BHP}} / Avg_Motor_Efficiency) \times Conversion$$

Cost Factor b

$$VFD_{BHP} = \frac{(Flow\ x\ VFD_{Head})}{(Constant\ x\ Design_{Pump\ Eff})}$$

$$Base_{BHP} = \frac{(Flow\ x\ Base_{Head})}{(Constant\ x\ Base_{Pump\ Eff})}$$

$$Base_{Pump\ Eff} = -0.40205\ x\ (\%_{Flow})^2 + 1.00876\ x\ \%_{Flow} + 0.20113$$

$$VFD_{Head} = Static_{Head} + Flow_{Coeff}\ x\ (Flow)^2$$

$$Base_{Head} = \%_{Design\ Head}\ x\ Design_{Head}$$

$$Static_{Head} = \%_{Flow} x\ (Max_{Well\ Depth} - Average_{Well\ Depth}) + Average_{Well\ Depth}$$

$$Flow_{Coeff} = Peak\ Dynamic\ head\ * / (Design_{Flow})^2$$

$$\%_{Design\ Head} = -0.11656\ x\ (\%_{Flow})^2 - 0.34465\ x\ \%_{Flow} + 1.46170$$

$$\%_{Flow} = \frac{Flow}{Design_{Flow}}$$

$$Peak\ Dynamic\ head = Design_{Head} - Max\ Well\ Depth$$

Variables

Well Hours	See 15.5.1	Number of hours per year the well pump will operate. Deemed values are used for hours based on the well pump application that will be provided by the customer.
CF	Table 15.5	Coincidence factor[2]
Avg_Motor Efficiency	Table 15.8	Efficiency of NEMA premium efficient motor as a percentage. Value is a weighted average by HP based on customer past selections.
VFD_Eff	97%	Drive efficiency of a VFD, deemed to be 97% using a table of drive efficiency versus percent of rated power using the motor rated power.[1]
Constant	3960	Pump power equation constant used to convert units of feet of water and gallons per minute to HP.[6]
Base_Pump_Eff	Calculated	Percent efficiency of the water well pump at a given percent of design flow rate. The algorithm is defined above and comes from a linear regression of a second-order polynomial on pump curve data (normalized to design head and flow) from Xcel well pump custom rebate projects.[2]
Design_Pump_Eff	80.8%	Pumping efficiency at given conditions (%_Flow). This algorithm comes from a second-order polynomial curve fit of achievable pump efficiency versus flow rate from custom rebates and their associated pump curves. The design pump efficiency is a constant value used at all flow rates for VFD driven pumps.[2]
Conversion	0.746	HP to kW conversion
%_Design_Head	Calculated	Percent of design total pump head occurring at a given percent of design flow rate. The algorithm is defined above and comes from a linear regression of a second-order polynomial on pump curve data (normalized to design head and flow) from seven Xcel well pump custom rebate projects.[2]
Measure Life	15	Years[7]

Customer Inputs	**M&V Verified**
Pump Rated HP	Yes
Design Flow (GPM)	Yes
Design Head (ft)	Yes
Well Depth (ft)	No
Max Well Depth at design flow (ft)	No
Average Flow Rate (GPM)	No
Application of well pump (agriculture, golf co	Yes

Table 15.5.1: Operating Hours by Application for Well Pumps[2, 3, 4, 5]

Application	Operating Hours
Agricultural Irrigation	1,954
Golf & Landscape Irrigation	1,941
Municipal Water Supply	3,177
Other Water Well Pump	3,630

References:

1. US DOE Advanced Manufacturing Office Energy Tips, Motor Systems Tip Sheet #11, Adjustable Speed Drive Part-Load Efficiency,
2. Xcel Energy well pump and high static head custom motor rebates
3. Bonneville Power Association, Variable Frequency Drives, http://www.bpa.gov/EE/Sectors/agriculture/Pages/Variable-Frequency-Drives.aspx
4. Department of Energy (DOE) Guidelines for Estimating Unmetered Landscaping Water Use,
5. How Many Acres Are Needed for an 18 Hole Golf Course?, https://golftips.golfweek.com/many-acres-needed-18-hole-golf-course-1812.html
6. Water Distribution Formula Sheet https://www.heritagesystemsinc.com/Downloads/WhitePapers/CommonWaterConversion%20Fomulas.pdf
7. Efficiency Vermont's Technical Reference User Manual, 2004 - Source for operating hours for non-industrial motors (p.15) and source for measure life,

Changes from Recent Filing:

15.6 Pump Efficiency (PEI)

Algorithms

$$Customer\ kW = \frac{HP\ x\ Conversion \times ADj_Factor}{Avg_Motor_Efficiency} \times ((Baseline\ PEI\ -\ Proposed\ PEI)\ \times (1 - CTRL_{Factor})\ +\ VFD_{Factor})$$

$$Customer\ kWh\ Savings = Customer\ kW\ x\ Hours$$

$$Customer\ Coincident\ kW = Customer\ kW\ x\ CF$$

$$Pump\ Incremental\ Cost = (HP * \$/HP) + VFD\ Cost$$

Baseline_PEI	Table 15.6.1	Pumps manufactured after 2020 must meet the minimum performance standard for the style and size pump This varies for variable pumps, but is a deemed value of 1 for constant speed pumps.[1]
Adj_ Factor	Table 15.6.2	Adjustment Factors are derived from a sample of simulated pump installations, and varies with
VFD_{Eff}	Table 15.6.6	Efficiency of the integrated VFD
VFD_{Factor}	Table 15.9	Energy Savings Factor by Application
$CTRL_{Factor}$	Table 15.9	Energy Savings Factor by Application
Hours	Table 15.6.3	Hours of Operation per year or (hr/yr.) Hours are associated with customer provided market segments
$/HP	Table 15.6.4	Incremental cost calculation dependent on type of pump and motor hp range
CF	Table 15.5	Coincidence factor
VFD_Cost	Table 15.7	Incremental cost due to integrated VFD, matches VFD prescriptive rebate.
Avg_Motor Efficiency	Table 15.8	Efficiency of NEMA premium efficient motor as a percentage. Value is a weighted average by HP based on customer past selections.
Conversion	0.746	Conversion from HP to kW
Constant Speed Lifetime	20	Years[9]
Variable Speed Lifetime	15	Years[9]

Customer Inputs	**M&V Verified**	
Proposed_PEI	Yes	Pump efficiency level (PEI), which must be meet the minimum requirements in table below **must be at least .02 PEI below baseline**.
Integrated VFD	Yes	Does the p[proposed pump have an integrated VFD
Proposed Pump Speed Control	Yes	Identify if the proposed pump speed is constant speed or variable speed.
Horsepower	Yes	Nominal Pump Horsepower as identified on pump motor
Pumping Application	Yes	Check Pumping Application for Commercial HVAC and DHW, Agricultural or Industrial or Municipal
Percent Glycol	No	What percentage Glycol is the system
Pump Class	Yes	Identify type of pump and class

Table 15.6.1 Minimum PEI values

DOE Product Category	1-5 HP	7.5+ HP
All Constant Speed Pumps	1.00	1.00
Non-VT Variable Speed Pumps	0.54	0.50
VT Variable Speed Pumps	0.63	0.60

Table 15.6.2: Adjustment Factors for Pumps[4]

Pump Type	Variable Speed Pumps			Constant Flow Pumps (All Segments)
	Agricultural Irrigation	Industrial and Municipal	Commercial HVAC and DHW	
Non-Vertical Turbine Pump	1.13	1.13	1.22	0.85
Vertical Turbine Pump	1.50	1.50	1.60	1.15

Note: Commercial HVAC is assumed to have pumps with 40% BEP minimum. Agricultural and Industrial/Municipal are assumed to have 20% BEP minimum.
Source CIP_FR_LCC_2015-09-21_VL_VL_LoadFactor_v2.xlsm, taken and simplified from "lookups" tab and is calculated in excel file "ComIndAgPumps_1_1" on tab "Adj Factors"

Table 15.6.3: Pumping Application Data[3]

Application	Agricultural Irrigation	Industrial and Municipal	Commercial HVAC and DHW
Operating Hours (hrs/yr)	2,400	4,000	5,000

Table 15.6.4: Pump Cost factors[5]

Incremental Cost		
Type	Motor HP Range	Cost Calculation ($/HP)
Constant	1 - 4.9	20.43
	5 - 9.9	10.02
	10 - 24.9	5.24
	25 - 49.9	2.98
	50 - 99.9	1.76
	100 - 200	1.05
Variable Speed	1 - 1.9	33.75
	2 - 2.9	23.29
	3 - 4.9	16.62
	5 - 9.9	10.02
	10 - 24.9	5.24
	25 - 49.9	2.98
	50 - 99.9	1.76
	100 - 200	1.05

Table 15.6.5: Pump Types Considered

Type	HP Range
End Suction Frame Mount (ESFM)	1-200 HP
End Suction Close Coupled (ESCC)	1-200 HP
In-Line (IL)	1-200 HP
Radially Split multi-stage vertical in-line diffuser casing (RSV)	1-200 HP
Vertical Turbine Submersible (ST)	1-200 HP

Table 15.6.6: Integrated VFD Efficiencies[8]

VFD Efficiency	Value
No VFD	100%
Yes VFD	97%

References:

1: DOE pump equipment classes and nominal speed, defined in the Rulemaking
http://www.pumps.org/DOE_Pumps.aspx

2: These values were derived in CIP_FR_LCC_2015-09-21_CL_baselinePEI.xlsm as an estimate of the current market average efficiency level. This is based on the Table 8.3.4

3: Irrigation hours are taken from metering shown in the Green Motors Rewind UES workbook
Industrial hours are the average hours for pump applications in the NW Motor Database
Commercial water circulation hours are from the Circulator Pump Working Group
Municipal hours are based on assumed hours close to 8760 with redundant pumps
Other hours are from the DOE LCC calculator, combined with RTF pump subcommittee judgment

4: Work product is included a Utility titled "ComIndAgPumps_1_1" based upon CIP_FR_LCC_2015-09-21_CL_CL_LoadFactor.xlsm
5: Work product from utility work paper based upon CIP_FR_LCC_2015-09-21_Costs.xlsm
6: Supplyhouse.com shows variable speed 1 HP circulator pumps from $1400-$3100; non variable speed are under $1000, some data available at the following website
http://www.supplyhouse.com/Grundfos-Pumps-1838000

7: Pump Energy Index (PEI) based upon the Regional Technical Forum (RTF) approved Northwest Energy Efficiency Alliance (NEEA) pump ECS savings analysis from the Efficient Commercial and Industrial Pumps (ECIP) project, the Federal Standard is under Title 10 Section 431.462 for the Department of Energy (DOE) Energy Conservation Standard (ECS) for commercial, industrial and agricultural clean water pumps.

8. Office of Industrial Electric Motor Systems Market Opportunities Assessment : Department of Energy (assessment of 265 Industrial facilities in 1997) - Source for VSD opportunity in the US market along with load factors for fans and pumps along with average savings

9. Efficiency Vermont's Technical Reference User Manual, 2004 - Source for operating hours for non-industrial motors (p.15) and source for measure life, source for load factor

8: MN TRM 4.0 - C/I HVAC - Pump Energy Index - used for incremental costs and PEI baseline

Changes from Recent Filing:

Updated incremental cost and adjustment factors to reflect MN TRM 4.0

15.7 Fractional HP Circ. Pumps

Algorithms

$$Customer\ kWh = (kW_{BASE} - kW_{ECM}) \times Hours$$

$$Customer\ Coincident\ kW = (kW_{BASE} - kW_{ECM}) \times CF$$

$$kW_{ECM} = \frac{ECM_{wattage}}{1000}$$

$$kW_{BASE} = \frac{kW_{ECM}}{Baseline_Conversion}$$

$$Incrmental\ cost = ECM_{wattage} * Cost\ Factor_M + Cost\ Factor_b$$

Variables

Hours	Table 15.7.1	Annual operational hours per year of the motor. Deemed values are used for hours based on the type and use of the motor.
CF	Table 15.7.1	Deemed Coincident Factor
Incremental Cost	15.7.2	$/Nameplate Watt[1]
Cost Factor b	0.746	HP to kW conversion
Baseline_Conversion	0.18	Multiplier to convert the nameplate power of a proposed motor to the to the assumed baseline. [1]
Lifetime	15	The lifetime of an ECM circulator pump

Customer Inputs	**M&V Verified**	
ECM Wattage	Yes	If wattage isnt listed on the nameplate then convert the HP to Watts (ECM HP*746)
Application	Yes	DHW Circulator, Heating Water Circulator, or Cooling Water Circulator

Table 15.7.1 Operating hours and CF by application[1]

Type	Hours	CF
DHW Circulator	2190	100.0%
Heating Water Circulator	2582	0.0%
Cooling Water Circulator	1191	29.9%

Table 15.7.2 Incremental Cost Factor[2]

Cost Factor M	Cost Factor b
$ 0.1851	$ 135.34

Assumptions:

Domestic Hot water pumps are installed with on demand controls

References:

1. MN TRM Version 4.0, "C/I HVAC - ECM Circulators" p. 314
2. Xcel energy research into the cost difference between an ECM and PSC (September 2019)

Changes from Recent Filing:

15.8 Fractional HP Fan Motors

Algorithms

$$Customer\ kWh = (CFM\ \times\ Box_{Factor} \times LF \times Hours) / Conversion$$

$$Customer\ Coincident\ kW = (CFM \times Box_{Factor}\ \times\ LF \times CF) / Conversion$$

$$Incrmental\ cost = HP * Cost\ Factor_M + Cost\ Factor_b$$

Variables

LF	90%	Load Factor for Fractional ECM Fans per MN TRM[1]
Box Factor	Table 15.8.1	The savings factor in w/CFM based[1]
Cost Factor M	Table 15.8.2	Dollars Per HP
Cost Factor b	Table 15.8.2	Dollars
Hours	Table 15.8.3	Operating Hours for Fractional HP ECM Fans based on EFLH per MN TRM[1]
CF	90%	Coincident Factor for Fractional ECM Fans per MN TRM[1]
Conversion	1000	Watts to kW conversion
Lifetime	15	Lifetime of an ECM[1]

Customer Inputs	**M&V Verified**	
ECM HP	Yes	HP or Converted Wattage of ECM
Building Type	Yes	Building area the fan is Serving
CFM	Yes	The rated CFM of the ECM Fan

Table 15.8.1 Box Factor based on CFM[1]

CFM	Watts / CFM
<1000	0.31
>=1000	0.21

Table 15.8.2 Incremental Cost Factor[2]

Cost Factor M	Cost Factor b
$ 138.07	$ 135.34

Table 15.8.3 Fractional ECM Operating Hours[1]

Building Type	Average Hours
Office	1,940
Retail	1,595
Hospitals	3,073
Elementary/Secondary Schools	1,863
Restaurant	1,690
Warehouse	739
Hotels/Motels	2,799
Grocery	2,207
Health	2,983
College/University	2,474
Manufacturing	5,840
Other/Miscellaneous	2,136

Adapted from the CO HVAC Cooling and Heating TAs, Represents the average EFLH for heating and cooling in each segment.

Assumptions:

- Prescriptive rebates are only given for motors put into service, rebates are not given for backup motors.
- Rebates do not apply to rewound or repaired motors.
- Termainal ECM Fan Operating Hours are lower due to direct correlation to heating and cooling energy use.

References:

1. MN TRM Version 4.0, "C/I HVAC - ECM Fans" p. 317
2. Xcel energy research into the cost difference between an ECM and PSC (September 2019)

Changes from Recent Filing:

15.9 Integrated Drives

Algorithms

$$Customer\ kWh = HP \times LF_{Motors} \times Conversion \times Hours \times Refigeration_Factor \times \left(\frac{1 + \%\ Savings\ Drives}{Baseline_{Eff}} - \frac{1}{Proposed_{Eff}}\right)$$

$$Customer\ Coincident\ kW = HP \times LF_{Motors} \times Conversion \times CF \times Refigeration_Factor \times \left(\frac{1 + \%\ Savings\ Drives}{Baseline_{Eff}} - \frac{1}{Proposed_{Eff}}\right)$$

Variables

Hours	Table 15.1 and Table 15.3	Annual operational hours per year of the motor. Deemed values are used for hours based on the type and use of the motor. The customer provides the following information on the rebate form: HP, industrial/non-industrial, building type, and compressor/pump/fan/other.[1]
LF_Motors	Table 15.2	Motor load factor as a percentage.[2]
Refrigeration Factor	Table 15.3	Coefficient of Performance = Refrigeration/Cooling Capacity (BTU/hr) / Energy Input (BTU/hr)
CF	Table 15.5	Coincidence factor
Incremental Cost	Table 15.7	Incremental cost for integrated drives based on type[3]
Baseline_Eff	Table 15.8	Efficiency of NEMA premium efficient motor as a percentage. Value is a weighted average by HP based on customer past selections.
Proposed_Eff	Table 15.8	Peak Efficiency of the Motor and Drive combo. This is deemed for Switched Reluctance Motors, and provided by the customers for EC motors
% Savings Drives	33%	Average savings achieved by installing a VFD on a fan or pumping motor.[2]
Measure life	15	Years[1]
Conversion	0.746	Conversion from horsepower to kW.

Customer Inputs	**M&V Verified**	
HP	Yes	Rated motor horsepower.
Proposed Eff	Yes	Peak efficiency of Motor and Drive Combo
Facility Type	Yes	
Application	Yes	
Motor Type	No	Switched reluctance motor with controller or permanent magnet motor with integrated drive

Assumptions:

- Each integrated motors and drives is replaced with the same size on a 1 for 1 basis.
- Prescriptive rebates are only given for integrated motors and drives put into service, rebates are not given for backup integrated motors and drives.
- Prescriptive rebates are only given to integrated motors and drive's installed on centrifugal pump and fan applications.

References:

1. Efficiency Vermont's Technical Reference User Manual, 2004 - Source for operating hours for non-industrial motors (p.15) and source for measure life, source for load factor

2. Office of Industrial Electric Motor Systems Market Opportunities Assessment : Department of Energy (assessment of 265 Industrial facilities in 1997) - Source for VSD opportunity in the US market along with load factors for fans and pumps along with average savings

3. Costs are derived from customer invoices received through Xcel Energy's prescriptive program.

Changes from Recent Filing:

Opened measure to all permanent magnet motors with integrated drives

15.10 Indoor Agriculture Ventilation Fan

Algorithms

$$Customer\ kWh = Quantity \times \frac{\left(\frac{CFM_{Base}}{VER_{Base}} - \frac{CFM_{Eff}}{VER_{Eff}}\right)}{Conversion\ Factor} x\ Hours$$

$$Customer\ kW = \frac{Customer\ kWh}{Hours}$$

$$Customer\ Coincident\ kW = Customer\ kW \times CF$$

Variables

Fan Diameter	Customer Input	Diameter of ventilation fan (inches)
Quantity	Customer Input	Number of fans
CFM_{Base}	See Table 15.10.1	Airflow (CFM) of baseline unit @ 0.10" static pressure
VER_{Base}	See Table 15.10.1	Ventilating Efficiency Ratio (CFM/Watt) of baseline unit @ 0.10" static pressure
CFM_{Eff}	See Table 15.10.1	Airflow (CFM) of efficient unit @ 0.10" static pressure
VER_{Eff}	See Table 15.10.1	Ventilating Efficiency Ratio (CFM/Watt) of efficient unit @ 0.10" static pressure
Conversion Factor	1,000	Conversion constant (W/kW)
CF	100%	Coincidence Factor (Reference 1)
Hours	8,760	Annual operating hours of fans for indoor grow facilities (Reference 3)
Measure Life	7	Measure lifetime (Reference 1)
Incremental Cost	$150	Incremental Capital Cost per fan (Reference 1)

Customer Inputs	**M&V Verified**	
Fan Diameter	Yes	Diameter of ventilation fan (inches)
Quantity	Yes	Number of fans installed

Table 15.10.1 Average Fan Performance Characteristics [1, 2]

Fan Diameter	CFM_{Base}	VER_{Base} (cfm/W)	CFM_{Eff}	VER_{Eff} (cfm/W)	
10" through 23"	932	10.85	932	12.91	16.5
24" through 35"	5,647	11.90	5,647	15.00	24.5
36" through 47"	9,780	15.50	9,780	17.90	41.5
48" through 71"	21,130	17.70	21,130	22.80	59.5

References:

1. State of Minnesota Technical Reference manual for Energy Conservation Improvement Programs, Version 4.0 Final as of January 31, 2023. Effective January 1 2024 - December 31, 2024.
2. Extrapolation of MN TRM values for broader offering
3. Historical custom project participation

Changes from Recent Filing:

New measure

Table 15.1: Operating Hours by Motor Size, Industrial Applications[3]

HP	Fans	Pumps	Data Center	Case Fans	Air Compressor	Other
1	4550	3380	8760	8629	1257	2435
1.5	4550	3380	8760	8629	1257	2435
2	4550	3380	8760	8629	1257	2435
3	4550	3380	8760	8629	1257	2435
5	4550	3380	8760	8629	1257	2435
7.5	4316	4121	8760	8629	2131	2939
10	4316	4121	8760	8629	2131	2939
15	4316	4121	8760	8629	2131	2939
20	4316	4121	8760	8629	2131	2939
25	5101	4889	8760	8629	3528	3488
30	5101	4889	8760	8629	3528	3488
40	5101	4889	8760	8629	3528	3488
50	5101	4889	8760	8629	3528	3488
60	6151	5667	8760	8629	4520	5079
75	6151	5667	8760	8629	4520	5079
100	6151	5667	8760	8629	4520	5079
125	5964	5126	8760	8629	4685	5137
150	5964	5126	8760	8629	4685	5137
200	5964	5126	8760	8629	4685	5137
250	7044	5968	8760	8629	6148	6102
300	7044	5968	8760	8629	6148	6102
350	7044	5968	8760	8629	6148	6102
400	7044	5968	8760	8629	6148	6102
450	7044	5968	8760	8629	6148	6102
500	7044	5968	8760	8629	6148	6102

Table 15.2 Load Factors[3,4,5]

Application	Load Factor
Other	75%
Pump	75%
ECM Fan	90%
Fan	65%

Table 15.3: Operating Hours by Application for all products other than motor controllers, Non-Industrial[4]

Building Type	Pumps	Fans	Data Center	Case Fans	Air Compressor	Other
Office	2000	6192	8760	8629	4500	4500
Retail	2000	3261	8760	8629	4500	4500
Hospitals	2754	8374	8760	8629	4500	4500
Elementary/Secondary Schools	2190	3699	8760	8629	4500	4500
Restaurant	2000	4155	8760	8629	4500	4500
Warehouse	2241	6389	8760	8629	4500	4500
Hotels/Motels	4231	3719	8760	8629	4500	4500
Grocery	2080	6389	8760	8629	4500	4500
Health	2559	2000	8760	8629	4500	4500
College/University	3641	3631	8760	8629	4500	4500
Data Center	2241	6389	8760	8629	4500	4500

Table 15.4 COPs for different systems

Application	COP
Low Temperature	1.43
Medium Temperature	2.28
HVAC	3.00
Data Center	4.00

Table 15.5 Coincidence Factors[1,2,4,8]

Application	CF
Motors	78%
Well Pumps	38%
Pumps	90%
Fans	78%
Display Case Refrigeration Fans	99%
Walk-in Refrigeration Fans	98%

Table 15.6 Efficiencies by Motor Types

Motor Tag	HP	Speed	Type	EPACT Motor Efficiency	NEMA Premium Motor Efficiency	NEMA Premium +1% Motor Efficiency	NEMA Premium Cost	NEMA +1% Cost
1 HP 900 RPM ODP	1	900	ODP	74.0%	75.5%	76.5%	$ 683.54	$ 817.66
1.5 HP 900 RPM ODP	1.5	900	ODP	75.5%	77.0%	78.0%	$ 718.34	$ 866.89
2 HP 900 RPM ODP	2	900	ODP	85.5%	86.5%	87.5%	$ 726.88	$ 878.97
3 HP 900 RPM ODP	3	900	ODP	86.5%	87.5%	88.5%	$ 759.91	$ 925.69
5 HP 900 RPM ODP	5	900	ODP	87.5%	88.5%	89.5%	$ 802.06	$ 985.31
7.5 HP 900 RPM ODP	7.5	900	ODP	88.5%	89.5%	90.5%	$ 996.00	$ 1,259.65

10 HP 900 RPM ODP	10	900	ODP	89.5%	90.2%	91.2%	$ 1,117.02	$ 1,430.85
15 HP 900 RPM ODP	15	900	ODP	89.5%	90.2%	91.2%	$ 2,144.34	$ 2,585.56
20 HP 900 RPM ODP	20	900	ODP	90.2%	91.0%	92.0%	$ 2,369.70	$ 2,904.34
25 HP 900 RPM ODP	25	900	ODP	90.2%	91.0%	92.0%	$ 2,675.38	$ 3,336.74
30 HP 900 RPM ODP	30	900	ODP	91.0%	91.7%	92.7%	$ 2,921.91	$ 3,685.47
40 HP 900 RPM ODP	40	900	ODP	91.0%	91.7%	92.7%	$ 3,403.22	$ 4,366.31
50 HP 900 RPM ODP	50	900	ODP	91.7%	92.4%	93.4%	$ 3,728.24	$ 4,826.07
60 HP 900 RPM ODP	60	900	ODP	92.4%	93.0%	94.0%	$ 4,731.77	$ 6,245.61
75 HP 900 RPM ODP	75	900	ODP	93.6%	94.1%	95.1%	$ 5,507.32	$ 7,342.66
100 HP 900 RPM ODP	100	900	ODP	93.6%	94.1%	95.1%	$ 7,154.13	$ 9,373.68
125 HP 900 RPM ODP	125	900	ODP	93.6%	94.1%	95.1%	$ 8,514.50	$ 11,297.99
150 HP 900 RPM ODP	150	900	ODP	93.6%	94.1%	95.1%	$ 9,729.63	$ 13,016.85
200 HP 900 RPM ODP	200	900	ODP	93.6%	94.1%	95.1%	$ 11,653.55	$ 15,738.32
250 HP 900 RPM ODP	250	900	ODP	94.5%	95.0%	96.0%	$ 13,935.15	$ 18,965.76
300 HP 900 RPM ODP	300	900	ODP	94.5%	95.0%	96.0%	$ 16,722.72	$ 22,908.92
350 HP 900 RPM ODP	350	900	ODP	94.5%	95.0%	96.0%	$ 26,199.40	$ 36,314.14
400 HP 900 RPM ODP	400	900	ODP	94.9%	95.1%	96.1%	$ 29,656.70	$ 41,204.66
450 HP 900 RPM ODP	450	900	ODP	95.3%	95.5%	96.5%	$ 33,407.70	$ 46,510.64
500 HP 900 RPM ODP	500	900	ODP	95.3%	95.5%	96.5%	$ 34,526.40	$ 48,093.09
1 HP 1200 RPM ODP	1	1200	ODP	80.0%	82.5%	83.5%	$ 683.54	$ 817.66
1.5 HP 1200 RPM ODP	1.5	1200	ODP	84.0%	86.5%	87.5%	$ 718.34	$ 866.89
2 HP 1200 RPM ODP	2	1200	ODP	85.5%	87.5%	88.5%	$ 726.88	$ 878.97
3 HP 1200 RPM ODP	3	1200	ODP	86.5%	88.5%	89.5%	$ 759.91	$ 925.69
5 HP 1200 RPM ODP	5	1200	ODP	87.5%	89.5%	90.5%	$ 802.06	$ 985.31
7.5 HP 1200 RPM ODP	7.5	1200	ODP	88.5%	90.2%	91.2%	$ 996.00	$ 1,259.65
10 HP 1200 RPM ODP	10	1200	ODP	90.2%	91.7%	92.7%	$ 1,117.02	$ 1,430.85
15 HP 1200 RPM ODP	15	1200	ODP	90.2%	91.7%	92.7%	$ 2,144.34	$ 2,585.56
20 HP 1200 RPM ODP	20	1200	ODP	91.0%	92.4%	93.4%	$ 2,369.70	$ 2,904.34
25 HP 1200 RPM ODP	25	1200	ODP	91.7%	93.0%	94.0%	$ 2,675.38	$ 3,336.74
30 HP 1200 RPM ODP	30	1200	ODP	92.4%	93.6%	94.6%	$ 2,921.91	$ 3,685.47
40 HP 1200 RPM ODP	40	1200	ODP	93.0%	94.1%	95.1%	$ 3,403.22	$ 4,366.31
50 HP 1200 RPM ODP	50	1200	ODP	93.0%	94.1%	95.1%	$ 3,728.24	$ 4,826.07
60 HP 1200 RPM ODP	60	1200	ODP	93.6%	94.5%	95.5%	$ 4,731.77	$ 6,245.61
75 HP 1200 RPM ODP	75	1200	ODP	93.6%	94.5%	95.5%	$ 5,507.32	$ 7,342.66
100 HP 1200 RPM ODP	100	1200	ODP	94.1%	95.0%	96.0%	$ 7,154.13	$ 9,373.68
125 HP 1200 RPM ODP	125	1200	ODP	94.1%	95.0%	96.0%	$ 8,514.50	$ 11,297.99
150 HP 1200 RPM ODP	150	1200	ODP	94.5%	95.4%	96.4%	$ 9,729.63	$ 13,016.85
200 HP 1200 RPM ODP	200	1200	ODP	94.5%	95.4%	96.4%	$ 11,653.55	$ 15,738.32
250 HP 1200 RPM ODP	250	1200	ODP	95.4%	95.8%	96.8%	$ 13,935.15	$ 18,965.76
300 HP 1200 RPM ODP	300	1200	ODP	95.4%	95.8%	96.8%	$ 16,722.72	$ 22,908.92
350 HP 1200 RPM ODP	350	1200	ODP	95.4%	95.8%	96.8%	$ 26,199.40	$ 36,314.14
400 HP 1200 RPM ODP	400	1200	ODP	95.8%	95.9%	96.9%	$ 29,656.70	$ 41,204.66
450 HP 1200 RPM ODP	450	1200	ODP	96.2%	96.3%	97.3%	$ 33,407.70	$ 46,510.64
500 HP 1200 RPM ODP	500	1200	ODP	96.2%	96.3%	97.3%	$ 34,526.40	$ 48,093.09
1 HP 1800 RPM ODP	1	1800	ODP	82.5%	85.5%	86.5%	$ 683.54	$ 817.66
1.5 HP 1800 RPM ODP	1.5	1800	ODP	84.0%	86.5%	87.5%	$ 718.34	$ 866.89
2 HP 1800 RPM ODP	2	1800	ODP	84.0%	86.5%	87.5%	$ 726.88	$ 878.97
3 HP 1800 RPM ODP	3	1800	ODP	86.5%	89.5%	90.5%	$ 759.91	$ 925.69
5 HP 1800 RPM ODP	5	1800	ODP	87.5%	89.5%	90.5%	$ 802.06	$ 985.31
7.5 HP 1800 RPM ODP	7.5	1800	ODP	88.5%	91.0%	92.0%	$ 996.00	$ 1,259.65
10 HP 1800 RPM ODP	10	1800	ODP	89.5%	91.7%	92.7%	$ 1,117.02	$ 1,430.85
15 HP 1800 RPM ODP	15	1800	ODP	91.0%	93.0%	94.0%	$ 2,144.34	$ 2,585.56
20 HP 1800 RPM ODP	20	1800	ODP	91.0%	93.0%	94.0%	$ 2,369.70	$ 2,904.34
25 HP 1800 RPM ODP	25	1800	ODP	91.7%	93.6%	94.6%	$ 2,675.38	$ 3,336.74
30 HP 1800 RPM ODP	30	1800	ODP	92.4%	94.1%	95.1%	$ 2,921.91	$ 3,685.47
40 HP 1800 RPM ODP	40	1800	ODP	93.0%	94.1%	95.1%	$ 3,403.22	$ 4,366.31
50 HP 1800 RPM ODP	50	1800	ODP	93.0%	94.5%	95.5%	$ 3,728.24	$ 4,826.07
60 HP 1800 RPM ODP	60	1800	ODP	93.6%	95.0%	96.0%	$ 4,731.77	$ 6,245.61
75 HP 1800 RPM ODP	75	1800	ODP	94.1%	95.0%	96.0%	$ 5,507.32	$ 7,342.66
100 HP 1800 RPM ODP	100	1800	ODP	94.1%	95.4%	96.4%	$ 7,154.13	$ 9,373.68
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500 HP 1800 RPM ODP	500	1800	ODP	95.8%	96.2%	97.2%	$ 34,526.40	$ 48,093.09
1 HP 3600 RPM ODP	1	3600	ODP	76.3%	77.0%	78.0%	$ 683.54	$ 817.66
1.5 HP 3600 RPM ODP	1.5	3600	ODP	82.5%	84.0%	85.0%	$ 718.34	$ 866.89
2 HP 3600 RPM ODP	2	3600	ODP	84.0%	85.5%	86.5%	$ 726.88	$ 878.97
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1.5 HP 900 RPM TEFC	1.5	900	TEFC	77.0%	78.5%	79.5%	$ 718.34	$ 866.89
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250 HP 900 RPM TEFC	250	900	TEFC	94.5%	95.0%	96.0%	$ 13,935.15	$ 18,965.76
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400 HP 900 RPM TEFC	400	900	TEFC	95.0%	95.8%	96.8%	$ 29,656.70	$ 41,204.66
450 HP 900 RPM TEFC	450	900	TEFC	95.0%	95.8%	96.8%	$ 33,407.70	$ 46,510.64
500 HP 900 RPM TEFC	500	900	TEFC	95.0%	95.8%	96.8%	$ 34,526.40	$ 48,093.09
1 HP 1200 RPM TEFC	1	1200	TEFC	80.0%	82.5%	83.5%	$ 683.54	$ 817.66
1.5 HP 1200 RPM TEFC	1.5	1200	TEFC	85.5%	87.5%	88.5%	$ 718.34	$ 866.89
2 HP 1200 RPM TEFC	2	1200	TEFC	86.5%	88.5%	89.5%	$ 726.88	$ 878.97
3 HP 1200 RPM TEFC	3	1200	TEFC	87.5%	89.5%	90.5%	$ 759.91	$ 925.69
5 HP 1200 RPM TEFC	5	1200	TEFC	87.5%	89.5%	90.5%	$ 802.06	$ 985.31
7.5 HP 1200 RPM TEFC	7.5	1200	TEFC	89.5%	91.0%	92.0%	$ 996.00	$ 1,259.65
10 HP 1200 RPM TEFC	10	1200	TEFC	89.5%	91.0%	92.0%	$ 1,117.02	$ 1,430.85
15 HP 1200 RPM TEFC	15	1200	TEFC	90.2%	91.7%	92.7%	$ 2,144.34	$ 2,585.56
20 HP 1200 RPM TEFC	20	1200	TEFC	90.2%	91.7%	92.7%	$ 2,369.70	$ 2,904.34
25 HP 1200 RPM TEFC	25	1200	TEFC	91.7%	93.0%	94.0%	$ 2,675.38	$ 3,336.74
30 HP 1200 RPM TEFC	30	1200	TEFC	91.7%	93.0%	94.0%	$ 2,921.91	$ 3,685.47
40 HP 1200 RPM TEFC	40	1200	TEFC	93.0%	94.1%	95.1%	$ 3,403.22	$ 4,366.31
50 HP 1200 RPM TEFC	50	1200	TEFC	93.0%	94.1%	95.1%	$ 3,728.24	$ 4,826.07
60 HP 1200 RPM TEFC	60	1200	TEFC	93.6%	94.5%	95.5%	$ 4,731.77	$ 6,245.61
75 HP 1200 RPM TEFC	75	1200	TEFC	93.6%	94.5%	95.5%	$ 5,507.32	$ 7,342.66
100 HP 1200 RPM TEFC	100	1200	TEFC	94.1%	95.0%	96.0%	$ 7,154.13	$ 9,373.68
125 HP 1200 RPM TEFC	125	1200	TEFC	94.1%	95.0%	96.0%	$ 8,514.50	$ 11,297.99
150 HP 1200 RPM TEFC	150	1200	TEFC	95.0%	95.8%	96.8%	$ 9,729.63	$ 13,016.85
200 HP 1200 RPM TEFC	200	1200	TEFC	95.0%	95.8%	96.8%	$ 11,653.55	$ 15,738.32
250 HP 1200 RPM TEFC	250	1200	TEFC	95.0%	95.8%	96.8%	$ 13,935.15	$ 18,965.76
300 HP 1200 RPM TEFC	300	1200	TEFC	95.0%	95.8%	96.8%	$ 16,722.72	$ 22,908.92
350 HP 1200 RPM TEFC	350	1200	TEFC	95.0%	95.8%	96.8%	$ 26,199.40	$ 36,314.14
400 HP 1200 RPM TEFC	400	1200	TEFC	95.0%	95.8%	96.8%	$ 29,656.70	$ 41,204.66
450 HP 1200 RPM TEFC	450	1200	TEFC	95.0%	95.8%	96.8%	$ 33,407.70	$ 46,510.64
500 HP 1200 RPM TEFC	500	1200	TEFC	95.0%	95.8%	96.8%	$ 34,526.40	$ 48,093.09
1 HP 1800 RPM TEFC	1	1800	TEFC	82.5%	85.5%	86.5%	$ 683.54	$ 817.66
1.5 HP 1800 RPM TEFC	1.5	1800	TEFC	84.0%	86.5%	87.5%	$ 718.34	$ 866.89
2 HP 1800 RPM TEFC	2	1800	TEFC	84.0%	86.5%	87.5%	$ 726.88	$ 878.97
3 HP 1800 RPM TEFC	3	1800	TEFC	87.5%	89.5%	90.5%	$ 759.91	$ 925.69
5 HP 1800 RPM TEFC	5	1800	TEFC	87.5%	89.5%	90.5%	$ 802.06	$ 985.31
7.5 HP 1800 RPM TEFC	7.5	1800	TEFC	89.5%	91.7%	92.7%	$ 996.00	$ 1,259.65
10 HP 1800 RPM TEFC	10	1800	TEFC	89.5%	91.7%	92.7%	$ 1,117.02	$ 1,430.85
15 HP 1800 RPM TEFC	15	1800	TEFC	91.0%	92.4%	93.4%	$ 2,144.34	$ 2,585.56

20 HP 1800 RPM TEFC	20	1800	TEFC	91.0%	93.0%	94.0%	$ 2,369.70	$ 2,904.34
25 HP 1800 RPM TEFC	25	1800	TEFC	92.4%	93.6%	94.6%	$ 2,675.38	$ 3,336.74
30 HP 1800 RPM TEFC	30	1800	TEFC	92.4%	93.6%	94.6%	$ 2,921.91	$ 3,685.47
40 HP 1800 RPM TEFC	40	1800	TEFC	93.0%	94.1%	95.1%	$ 3,403.22	$ 4,366.31
50 HP 1800 RPM TEFC	50	1800	TEFC	93.0%	94.5%	95.5%	$ 3,728.24	$ 4,826.07
60 HP 1800 RPM TEFC	60	1800	TEFC	93.6%	95.0%	96.0%	$ 4,731.77	$ 6,245.61
75 HP 1800 RPM TEFC	75	1800	TEFC	94.1%	95.4%	96.4%	$ 5,507.32	$ 7,342.66
100 HP 1800 RPM TEFC	100	1800	TEFC	94.5%	95.4%	96.4%	$ 7,154.13	$ 9,373.68
125 HP 1800 RPM TEFC	125	1800	TEFC	94.5%	95.4%	96.4%	$ 8,514.50	$ 11,297.99
150 HP 1800 RPM TEFC	150	1800	TEFC	95.0%	95.8%	96.8%	$ 9,729.63	$ 13,016.85
200 HP 1800 RPM TEFC	200	1800	TEFC	95.0%	96.2%	97.2%	$ 11,653.55	$ 15,738.32
250 HP 1800 RPM TEFC	250	1800	TEFC	95.0%	96.2%	97.2%	$ 13,935.15	$ 18,965.76
300 HP 1800 RPM TEFC	300	1800	TEFC	95.4%	96.2%	97.2%	$ 16,722.72	$ 22,908.92
350 HP 1800 RPM TEFC	350	1800	TEFC	95.4%	96.2%	97.2%	$ 26,199.40	$ 36,314.14
400 HP 1800 RPM TEFC	400	1800	TEFC	95.4%	96.2%	97.2%	$ 29,656.70	$ 41,204.66
450 HP 1800 RPM TEFC	450	1800	TEFC	95.4%	96.2%	97.2%	$ 33,407.70	$ 46,510.64
500 HP 1800 RPM TEFC	500	1800	TEFC	95.8%	96.2%	97.2%	$ 34,526.40	$ 48,093.09
1 HP 3600 RPM TEFC	1	3600	TEFC	75.5%	77.0%	78.0%	$ 683.54	$ 817.66
1.5 HP 3600 RPM TEFC	1.5	3600	TEFC	82.5%	84.0%	85.0%	$ 718.34	$ 866.89
2 HP 3600 RPM TEFC	2	3600	TEFC	84.0%	85.5%	86.5%	$ 726.88	$ 878.97
3 HP 3600 RPM TEFC	3	3600	TEFC	85.5%	86.5%	87.5%	$ 759.91	$ 925.69
5 HP 3600 RPM TEFC	5	3600	TEFC	87.5%	88.5%	89.5%	$ 802.06	$ 985.31
7.5 HP 3600 RPM TEFC	7.5	3600	TEFC	88.5%	89.5%	90.5%	$ 996.00	$ 1,259.65
10 HP 3600 RPM TEFC	10	3600	TEFC	89.5%	90.2%	91.2%	$ 1,117.02	$ 1,430.85
15 HP 3600 RPM TEFC	15	3600	TEFC	90.2%	91.0%	92.0%	$ 2,144.34	$ 2,585.56
20 HP 3600 RPM TEFC	20	3600	TEFC	90.2%	91.0%	92.0%	$ 2,369.70	$ 2,904.34
25 HP 3600 RPM TEFC	25	3600	TEFC	91.0%	91.7%	92.7%	$ 2,675.38	$ 3,336.74
30 HP 3600 RPM TEFC	30	3600	TEFC	91.0%	91.7%	92.7%	$ 2,921.91	$ 3,685.47
40 HP 3600 RPM TEFC	40	3600	TEFC	91.7%	92.4%	93.4%	$ 3,403.22	$ 4,366.31
50 HP 3600 RPM TEFC	50	3600	TEFC	92.4%	93.0%	94.0%	$ 3,728.24	$ 4,826.07
60 HP 3600 RPM TEFC	60	3600	TEFC	93.0%	93.6%	94.6%	$ 4,731.77	$ 6,245.61
75 HP 3600 RPM TEFC	75	3600	TEFC	93.0%	93.6%	94.6%	$ 5,507.32	$ 7,342.66
100 HP 3600 RPM TEFC	100	3600	TEFC	93.6%	94.1%	95.1%	$ 7,154.13	$ 9,373.68
125 HP 3600 RPM TEFC	125	3600	TEFC	94.5%	95.0%	96.0%	$ 8,514.50	$ 11,297.99
150 HP 3600 RPM TEFC	150	3600	TEFC	94.5%	95.0%	96.0%	$ 9,729.63	$ 13,016.85
200 HP 3600 RPM TEFC	200	3600	TEFC	95.0%	95.4%	96.4%	$ 11,653.55	$ 15,738.32
250 HP 3600 RPM TEFC	250	3600	TEFC	95.4%	95.8%	96.8%	$ 13,935.15	$ 18,965.76
300 HP 3600 RPM TEFC	300	3600	TEFC	95.4%	95.8%	96.8%	$ 16,722.72	$ 22,908.92
350 HP 3600 RPM TEFC	350	3600	TEFC	95.4%	95.8%	96.8%	$ 26,199.40	$ 36,314.14
400 HP 3600 RPM TEFC	400	3600	TEFC	95.4%	95.8%	96.8%	$ 29,656.70	$ 41,204.66
450 HP 3600 RPM TEFC	450	3600	TEFC	95.4%	95.8%	96.8%	$ 33,407.70	$ 46,510.64
500 HP 3600 RPM TEFC	500	3600	TEFC	95.4%	95.8%	96.8%	$ 34,526.40	$ 48,093.09

Table 15.7 Incremental Costs for VFDs (Derived from customer invoices)

HP	VFDs	Switched Reluctance Motor[6]	EC Motor
1	$2,182.10	$1,034.00	$2,588.78
2	$2,493.50	$1,073.00	$2,752.19
2	$2,741.03	$1,132.00	$2,915.60
3	$3,132.19	$1,282.00	$3,388.43
5	$3,705.41	$2,271.00	$3,594.60
8	$4,234.18	$3,030.00	$4,592.88
10	$4,654.52	$3,500.00	$5,648.33
15	$5,318.74	$4,619.00	NA
20	$5,846.74	$5,409.00	NA
25	$6,292.12	NA	NA
30	$6,681.09	NA	NA
40	$7,344.33	NA	NA
50	$7,903.80	NA	NA
60	$8,392.40	NA	NA
75	$9,031.71	NA	NA
100	$9,928.29	NA	NA
125	$10,684.59	NA	NA
150	$11,345.11	NA	NA
200	$12,471.35	NA	NA

Table 15.8 Average Motor Efficiency (Derived From Past Participation)

HP	EPACT	NEMA	NEMA +1%	Switched Reluctance[6]
1	81.4%	84.1%	85.1%	86.7%
1.5	83.7%	86.1%	87.1%	87.7%
2	84.1%	86.4%	87.4%	89.6%
3	86.5%	88.9%	89.9%	91.5%
5	87.4%	89.2%	90.2%	92.6%
7.5	88.7%	90.9%	91.9%	93.8%
10	89.4%	91.4%	92.4%	93.6%
15	90.8%	92.4%	93.4%	93.6%
20	90.9%	92.8%	93.8%	94.0%
25	91.8%	93.3%	94.3%	NA
30	92.2%	93.5%	94.5%	NA
40	92.8%	93.8%	94.8%	NA
50	92.9%	94.3%	95.3%	NA
60	93.5%	94.6%	95.6%	NA
75	93.9%	95.0%	96.0%	NA
100	94.2%	95.2%	96.2%	NA
125	94.4%	95.3%	96.3%	NA
150	94.9%	95.6%	96.6%	NA
200	94.9%	95.8%	96.8%	NA
250	95.0%	95.8%	96.8%	NA
300	95.4%	95.8%	96.8%	NA
350	95.4%	96.0%	97.0%	NA
400	95.4%	96.2%	97.2%	NA
450	95.6%	96.2%	97.2%	NA
500	95.8%	96.2%	97.2%	NA

Table 15.9 VFD Energy Savings Factors [7,8]

Application	ESF
Pumps	
Hot Water Pump	0.482
Chiller Water or Condensor Water Pump	0.432
Industrial	0.333
Other	0.333
Fans	
HVAC Fan	0.535
Cooling Tower Fan	0.249
Industrial	0.333
Other	0.333

References
1. NYSERDA (New York State Energy Research and Development Authority), Energy $mart Programs Deemed Savings Database - Source for coincidence factor and useful life
2. Xcel Energy well pump and high static head custom motor rebates
3. Office of Industrial Electric Motor Systems Market Opportunities Assessment : Department of Energy (assessment of 265 Industrial facilities in 1997) - Source for VSD opportunity in the US market along with load factors for fans and pumps along with average savings
4. Efficiency Vermont's Technical Reference User Manual, 2004 - Source for operating hours for non-industrial motors (p.15) and source for measure life, source for load factor
5. MN TRM Version 3.0, "C/I HVAC - ECM Fans" p. 274
6. Information provided by manufacturer
7. MN TRM Version 4.0, "C/I HVAC - Variable Speed Drives" p.367
8. MN TRM Version 4.0, "C/I HVAC - Pump Energy Index" p.381

15.1 Modeled Residential New Construction

Algorithms

$$Customer\ kWh = kWh_{Reference\ Home} - kWhAs_{Built\ Home}$$

$$Summer\ Peak\ kW = Summer\ Peak\ kWReference_{Home} - Summer\ Peak\ kWAs_{Built\ Home}$$

$$WinterPeak\ kW = Winter\ Peak\ kWReference_{Home} - Winter\ Peak\ kWAs_{Built\ Home}$$

$$Customer\ Dth = DthReference_{Home} - DthAs_{Built\ Home}$$

$$Customer\ Dth\ /\ hr = Reference\ Home\ Design\ Gas\ Load$$

$$\%\ Better\ Than\ Code = \frac{(MMBTU_{Reference\ Home} - MMBTUAs_{Built\ Home})}{MMBTU_{Reference\ Home}}$$

$$MMBTU_{Reference\ Home} =$$
$$\{(Heating\ kWh_{Reference\ Home} + Cooling\ kWhReference_{Home} + Water\ Heating\ kWhReference_{Home} + Lighting\ and\ Appliance\ kWh_{Reference\ Home}) \times \frac{3{,}412}{1{,}000{,}000}\}$$
$$+$$
$$\{(Heating\ thReference_{Home} + Water\ Heating\ thReference_{Home} + Lighting\ and\ Appliance\ th_{Reference\ Home}) \times \frac{1}{10}\}$$

$$MMBTU_{As\ Built\ Home} =$$
$$\{(Heating\ kWh_{As\ Built\ Home} + Cooling\ kWhAs_{Built\ Home} + Water\ Heating\ kWhAs_{Built\ Home} + Lighting\ and\ Appliance\ kWh_{As\ Built\ Home}) \times \frac{3{,}412}{1{,}000{,}000}\}$$
$$+$$
$$\{(Heating\ thAs_{Built\ Home} + Water\ Heating\ thAs_{Built\ Home} + Lighting\ and\ Appliance\ th_{As\ Built\ Home}) \times \frac{1}{10}\}$$

$$ICC\ As\ Built\ Home = (ICC\ Home\ Size + ICC\ Adjustment)$$

$$ICC\ Home\ Size = \left(\frac{ICC}{SFa} \times (Home\ Size)2 + \frac{ICC}{SFb} \times (Home\ Size) + \frac{ICC}{SFc}\right)$$

$$ICC\ Adjustment = (\ ICCAdj_{a} \times \ln(Home\ Size) + ICCAdj_{b}\ )$$

Variables

Incremental Cost	Tables 15.1.1	Difference in cost between home built to a greater performance or certification and the jurisdictional baseline energy code (Reference 2)
ICC Home Size	Table 15.1.1	Average incremental cost per square foot to reach program requirements. These costs are variable based on the size of the home. Data collected by Residential Science Resources (Reference 2)
ICC Adjustment	Table 15.1.2	Average incremental cost per square foot to achieve the envelope requirements for each tier level. Adjustment for use in calculating an Incremental Cost. The adjustment is based on the average incremental costs to achieve the equipment requirements in each tier level and home size. Data collected by Residential Science Resources
Lifetime	30	Deemed lifetime

Modeler Inputs	**M&V Verified**	
Percent Better Than Code	Yes	Calculated percent better than baseline code
Baseline Energy Code	Yes	IECC 2015 thru IECC 2021
Home Size	Yes	Total modeled conditioned space of home (sqft)
Final HERS Index NoPV	Yes	As-Built Home's HERS Index Score calculated by the Home Rater using a software modeling tool and provided under HERS Index
Ref Home Design Gas Load	Yes	Reference home design gas heating load as calculated by model
Ref Home Heat Therms	Yes	Reference home gas heating energy
Ref Home Heat kWh	Yes	Reference home electric heating energy
Ref Home Cool kWh	Yes	Reference home electric cooling energy
Ref Home Water Heat Therms	Yes	Reference home gas water heating energy
Ref Home Water Heat kWh	Yes	Reference home electric water heating energy
Ref Home LightApp Therms	Yes	Reference home gas lights & appliance energy
Ref Home LightApp kWh	Yes	Reference home electric lights & appliance energy
As Built Home Heat Therms	Yes	As-built home gas heating energy
As Built Home Heat kWh	Yes	As-built home electric heating energy
As Built Home Cool kWh	Yes	As-built home electric cooling energy
As Built Home Water Heat Therms	Yes	As-built home gas water heating energy
As Built Home Water Heat kWh	Yes	As-built home electric water heating energy
As Built Home LightApp Therms	Yes	As-built home gas lights & appliance energy
As Built Home LightApp kWh	Yes	As-built home electric lights & appliance energy
Ref Home Peak kW Winter	Yes	Reference home winter demand
Ref Home Peak kW Summer	Yes	Reference home summer demand
As Built Home Peak kW Winter	Yes	As-built home winter demand
As Built Home Peak kW Summer	Yes	As-built home summer demand

Table 15.1.1 Incremental Cost per Square Foot Adjustment Factor Constants

Savings Tier	Cost / SF Adjustment Factor Constants	ICC/SF_a	ICC/SF_b	ICC/SF_c
Energy Star NextGen + DOE Zero Energy Ready v2	Tier 1	0.00061256	-1.65356240	10787.58735569
10% - 25% Better than 2021 UA	Tier 2	0.00061256	-1.65356240	10787.58735569
Greater than 25% Better than 2021 UA	Tier 3	0.00061256	-1.65356240	10787.58735569

Table 15.1.2 Incremental Cost per Square Foot Formula Constants

Savings Tier	Cost / SF Adjustment Factor Constants	$ICC_{ADJ\ a}$	$ICC_{ADJ\ b}$
Energy Star NextGen + DOE Zero Energy Ready v2	Tier 1	-0.04682	0.61689
10% - 25% Better than 2021 UA	Tier 2	-0.19913	2.39041
Greater than 25% Better than 2021 UA	Tier 3	0.19932	0.99742

References:

1. California Measurement Advisory Committee (CALMAC) Protocols, Appendix F (www.calmac.org/events/APX_F.pdf).
2. RSR (Residential Science Resources) Energy Saving and Incremental Cost modeling
3. NEEP QPL Data Sheets

Changes from Recent Filing:

1. Removed homes with natural gas from program
2. Updated to multiple iterative reference homes for the same measure to calculate energy efficiency savings and beneficial electrification savings, all iterations use the same algorithms

Table 17.0.1

COP_{Cooler}	2.28	Medium Temperature COP for Coolers
$COP_{Freezer}$	1.43	Low Temperature COP for Freezers
Door HF	0.35	Door Residual Heat Fraction
Ref Hours	8,760	Annual hours for commercial refrigeration systems
MT Load Factor	62%	Compressor Duty Cycle - Medium Temp. (Reference 2)
LT Load Factor	80%	Compressor Duty Cycle - Low Temp. (Reference 2)

References

1. Energy Savings Potential and R&D Opportunities for Commercial Refrigeration, Final Report; Submitted to: U.S. Department of Energy, Energy Efficiency and Renewable Energy Building Technologies Program; Navigant Consulting, Inc.; September 23, 2009
2. PSC of Wisconsin, Focus on Energy Evaluation, Business Programs: Deemed Savings Manual V1.0
3. NREL/TP-550-46101 "Grocery Store 50% Energy Savings Technical Support Document" September 2009
4. State of Illinois Energy Efficiency Technical Reference Manual, Page 131. July 18, 2012.
5. Average of multiple vendor products
8. State of Illinois Energy Efficiency Technical Reference Manual, June 1st, 2012. Pages 109-113.
11. 2008 Database for Energy-Efficient Resources, EUL/RUL (Effective/Remaining Useful Life) Values. http://www.deeresources.com/deer2008exante/downloads/DEER%200607%20Measure%20Update%20Report.pdf
14. Efficiency Vermont Technical Reference User Manual, 2/19/2010.
15. Monitored data from Custom Efficiency projects
16. Northwest Regional Technical Forum
17. Comprehensive Process and Impact Evaluation of the (Xcel Energy) Colorado Motor and Drive Efficiency Program, FINAL, March 28, 2011, TetraTech
19. New York Standard Approach for Estimating Energy Savings from Energy Efficiency Measures in Commercial and Industrial Programs, Sept 1, 2009.
21. http://www.deeresources.com/files/DEER2016/download/2010-2012_WO017_Ex_Ante_Measure_Cost_Study_-_Final_Report.pdf
22. A Study of Energy Efficient Solutions for Anti-Sweat Heaters. Southern California Edison RTTC. December 1999
23. Pennsylvania PUC Technical Reference Manual, June 2011
24. SCE Workpaper WPSCNRRN0009, Revision 0, Anti-Sweat Heat (ASH) Controls, October 15, 2007
25. Wisconsin Focus on Energy Anti-Sweat Heater Controls Technical Data Sheet, 2004.
26. Energy Use of Doored and Open Vertical Refrigerated Display Cases, Fricke and Becker; Presented at 2010 International Refrigeration and Air Conditioning Conference
27. Infiltration Modeling Guidelines for Commercial Building Energy Analysis, US Department of Energy Sept 2009
28. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant. CF and hours
29. HVAC Interactive Factors developed based on the Rundquist Simplified HVAC Interaction Factor method for Minnesota, presented on page 28 of the 11/93 issue of the ASHRAE Journal - "Calculating lighting and HVAC interactions".
30. Technical Reference User Manual No. 2004-31, Efficiency Vermont, 12/31/04. CF and Hours
31. Deemed Savings Database, Minnesota Office of Energy Security, 2008. CF, Hours, kW, Costs, Measure life
32. Net-to-Gross factor from 2008 Xcel Energy Lighting Efficiency Program Evaluation
33. Wisconsin Focus on Energy Technical Reference Manual 2015, pg. 238-241
34. Costs calculated and derived from four open-to-closed refrigerated case custom rebate projects.
35. Work Paper PECIREF_PGE604 Vertical Refrigerated Case, Medium Temperature: Open to Closed (Retrofit)
36. ENERGY STAR
38. 2015 International Energy Conservation Code (IECC)
39. State of Illinois Energy Efficiency Technical Reference Manual, Pages 60-63 & Pages 90-97. February 8th, 2017.
40. State of Wisconsin, Public Service Commission of Wisconsin, Focus on Energy Evaluation, Business Programs Deemed Savings Manual, March 22, 2010.
41. The minimum value calculated on Forecast Weather Data Analysis or Forecast Door Openings
42. Illinois Statewide TRM 2015
43. Efficiency Maine Commercial TRM 2015
44. California Energy Commission and California Public Utilities Commission. Database for Efficient Resources (DEER) 2008, Effective/Remaining Useful Life Values.
45. Custom Project History of Medium Temperature Cases
46. Energy Analysis of KE2 Controllers for Walk-in Freezers; Michaels Energy; January 20, 2015
47. Custom project history of Defrost Controls
48. Custom M&V project energy consumption, operation, and savings on Floating Head Pressure Controls
49. History of Completed Custom project costs for Floating Head Pressure Controls
50. Data from Illinois TRM 2019

17.1 Anti-Sweat Heater Controls

Algorithms

$$Customer\ kW = kW_{Door} \times \left(1 + \left(\frac{Door\ HF}{COP}\right)\right) \times\ PAF\ \times\ Doors\ Controlled$$

$$Customer\ kWh = Customer\ kW\ \times\ Ref\ Hours$$

$$Customer\ Coincident\ kW\ =\ Customer\ kW\ \times\ \ Coincidence\ Factor$$

Variables

Doors Controlled	Customer Input	Number of doors being controlled
kW_Door	See Table 17.1.1	Average anti-sweat heater kW per door without controls
Door HF	0.35	Residual Heat fraction; estimated percentage of the heat produced by the heaters that remains in the freezer or cooler case and must be removed by the refrigeration unit. (Reference 24)
PAF	See Table 17.1.1	Percent of time the anti-sweat heaters are turned off by the controller (References 25, 26, & 41)
Ref Hours	8,760	Annual hours for commercial refrigeration systems
Lifetime	12	Measure Lifetime (Reference 11)
Incremental Cost per Door	See Table 17.1.1	Incremental cost of efficient measures; See Table 1.1.1
Coincidence Factor	See Table 17.1.1	Coincidence Factor (Reference 15)

Customer Inputs	**M&V Verified**	
Application temperature (medium or low temperature case)	Yes	
Number of doors controlled	Yes	

Table 17.1.1	**Eq. kW Door (Reference 24)**	**Eq. PAF**	**ASH Incremental Cost**	**Eq. Coincidence Factor**
Anti-Sweat Heater - Med Temp	0.105	90%	$180.00	90%
Anti-Sweat Heater - Low Temp	0.191	90%	$180.00	90%

References:

11. 2008 Database for Energy-Efficient Resources, EUL/RUL (Effective/Remaining Useful Life) Values.
15. Monitored data from Custom Efficiency projects
24. SCE Workpaper WPSCNRRN0009, Revision 0, Anti-Sweat Heat (ASH) Controls, October 15, 2007
25. Wisconsin Focus on Energy Anti-Sweat Heater Controls Technical Data Sheet, 2004.
26. Energy Use of Doored and Open Vertical Refrigerated Display Cases, Fricke and Becker; Presented at 2010 International Refrigeration and Air Conditioning Conference
40. State of Wisconsin, Public Service Commission of Wisconsin, Focus on Energy Evaluation, Business Programs Deemed Savings Manual, March 22, 2010.
41. The minimum value calculated on Forecast Weather Data Analysis or Forecast Door Openings
42. Illinois Statewide TRM 2015
43. Efficiency Maine Commercial TRM 2015

Changes from Recent Filing:

No Changes

17.2 No Heat Doors

Algorithms

$$Customer\ kW = (kW_{Baseline} - kW_{Proposed}) \times \left(1 + \left(\frac{Door\ HF}{COP}\right)\right) \times Quantity$$

$$Customer\ kWh = Customer\ kW \times Ref\ Hours$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

Variables

Quantity	Customer Input	Quantity of proposed equipment installed
kW Baseline	See Table 17.2.1	Average kW for a standard case door (Reference 23 and 24)
KW Proposed	See Table 17.2.1	Average kW for a no heat case door (Reference 2)
Door HF	0.35	Estimated percentage of the heat produced by the heaters that remains in the freezer or cooler case and must be removed by the refrigeration unit. (Reference 24)
Ref Hours	8,760	Annual hours for commercial refrigeration systems
Lifetime	12.00	Measure Lifetime (Reference 44)
NHD Incremental Cost	See Table 17.2.1	Incremental cost per door
Coincidence Factor	100%	Peak Coincidence, based on 8,760 annual hours and average kW used

Customer Inputs	**M&V Verified**	
Application temperature (medium or low temperature case)	Yes	
Quantity (# of doors)	Yes	

Table 17.2.1	**kW Baseline**	**kW Proposed**	**NHD Incremental Cost**
No Heat Case Door - Medium Temp.	0.105	0.000	$275.00
No Heat Case Door - Low Temp.	0.191	0.000	$800.00

References:

2. PSC of Wisconsin, Focus on Energy Evaluation, Business Programs: Deemed Savings Manual V1.0
20. Energy Savings Potential and R&D Opportunities for Commercial Refrigeration, Final Report; Submitted to: U.S. Department of Energy, Energy Efficiency and Renewable Energy Building Technologies Program; Navigant Consulting, Inc.; September 23, 2009
23. Pennsylvania PUC Technical Reference Manual, June 2012
24. SCE Workpaper WPSCNRRN0009, Revision 0, Anti-Sweat Heat (ASH) Controls, October 15, 2007
44. California Energy Commission and California Public Utilities Commission. Database for Efficient Resources (DEER) 2008, Effective/Remaining Useful Life Values.

Changes from Recent Filing:

No Changes

17.3 Medium Temperature Reach-in Case

Algorithms

$$Customer\ kW = Savings\ Factor \times (Load_{Baseline} - Load_{Proposed}) \times MT\ Load\ Factor \times \left(\left(\frac{1}{COP_{Cooler}}\right)/3412\right) \times Linear\ Feet$$

$$Customer\ kWh = Customer\ kW \times Ref\ Hours$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

Variables

Linear Feet	Customer Input	Proposed linear feet of equipment installed
Savings Factor	1.00	Amount of time doors are active
TDA	5.5	Total Display area per linear foot. Assumed to be 5.5 square feet based on a 5.5 foot tall glass door.
Baseline Load	1,652	Btuh/ft load of the standard efficiency refrigerated case (Reference 38)
Proposed Load	262	Btuh/ft load of the high efficiency refrigerated case. (Reference 5)
MT Load Factor	62.0%	Duty cycle of compressor for Medium Temperature (Reference 2)
Ref Hours	8,760	Annual hours for commercial refrigeration systems
Lifetime	15.00	Measure Lifetime
Incremental Cost	$337.58	Incremental cost per linear feet of efficient measure (References 21 & 45).
Coincidence Factor	100%	Peak Coincidence, based on 8,760 annual hours and average kW used

Customer Inputs	**M&V Verified**	
Application temperature (medium temperature)	Yes	
Linear feet installed	Yes	

References:

2. PSC of Wisconsin, Focus on Energy Evaluation, Business Programs: Deemed Savings Manual V1.0, p. 4-103 to 4-106.
3. NREL/TP-550-46101 "Grocery Store 50% Energy Savings Technical Support Document" September 2010
5. Average of multiple vendor products
21. http://www.deeresources.com/files/DEER2016/download/2010-2012_WO017_Ex_Ante_Measure_Cost_Study_-_Final_Report.pdf
38. 2015 International Energy Conservation Code (IECC)
45. Custom Project History of Medium Temperature Cases

Changes from Recent Filing:

No Changes

17.4 Close The Case

Algorithms

$$kWh\ Open = (Load \times FI\ Open) \times Load\ Factor \times \left(\frac{\left(\frac{1}{COP}\right)}{3412}\right) \times RefHours - HVAC\ kWh\ Open$$

$$kWh\ Closed = (Load \times FI\ Closed) \times Load\ Factor \times \left(\frac{\left(\frac{1}{COP}\right)}{3412}\right) \times RefHours - HVAC\ kWh\ Closed$$

$$HVAC\ kWh\ Open = (Load \times FI\ Open) \times \left(\frac{\left(\frac{1}{COP\ hvac}\right)}{3412}\right) \times Cooling\ Hours \times Cooling\ Duty\ Cycle$$

$$HVAC\ kWh\ Closed = (Load \times FI\ Closed) \times \left(\frac{\left(\frac{1}{COP\ hvac}\right)}{3412}\right) \times Cooling\ Hours \times Cooling\ Duty\ Cycle$$

$$Customer\ Dth = (Load \times (FI\ Closed - FI\ Open)) \times Heating\ Hours \times 1/1000000 \times \frac{1}{Heating\ Eff}$$

$$Customer\ Dth/hr = (Load \times (FI\ Closed - FI\ Open)) \times 1/1000000 \times \frac{1}{Heating\ Eff}$$

$$Customer\ kWh = (kWh\ Open - kWh\ Closed) \times LinearFeet$$

$$Customer\ kW = \frac{Customer\ kWh}{Ref\ Hours}$$

$$Customer\ Coincident\ kW\ =\ Customer\ kW\ \times\ Coincidence\ Factor$$

Variables

Linear Feet	Customer Input	Proposed linear feet of equipment installed.
Load	See Table 17.4.1	Total refrigeration load per linear foot for Medium and Low Temp. Cases based on typical cases from past Custom projects.
FI Open	See Table 17.4.1	Calculated Fraction of Refrigerated Case Load that is infiltration for open cases.
FI Closed	See Table 17.4.1	Calculated Fraction of Refrigerated Case Load that is infiltration for closed cases.
FCR	13%	Fraction of Refrigerated Case Load that is conduction and radiation (Reference 33).
Cooling Hours	2908	Number of hours per year that facility is in cooling mode, assuming facility balance point of 60 F (Base on Denver Weather Bin Data).
Cooling Duty Cycle	70%	Cooling compressor duty cycle, typical assumption confirmed with metered data from a grocery store on two summer days.
COP hvac	3.2	Coefficient of Performance for facility HVAC system (Reference 33). This assumes a DX rooftop unit or similar.
Heating Hours	5155	Number of hours per year that facility is in heating mode, assuming facility balance point of 60 F, with a 5 degree economizing dead band before heating starts at 55 F (Base on Denver Weather Bin Data).
Heating Eff	78%	Efficiency of heating system from (Reference 33).
Lifetime	12.00	Measure Lifetime (Reference 11).
Incremental Cost	$497.82	Incremental cost of efficient measures per linear foot (Reference 34) The incremental cost is split by avoided revenue requirements between gas and electric cost.
Coincidence Factor	100%	Peak Coincidence, based on 8,760 annual hours and average kW used

Customer Inputs	**M&V Verified**	
Application temperature (medium or low	Yes	
Linear feet installed	Yes	

Table 17.4.1	**Load (Btu/hr/ft)**	**FI Open**	**FI Closed**
Medium Temp. Cases	1500	81.77%	13.77%
Low Temp. Cases	1850	82.76%	14.76%

References:

11. 2008 Database for Energy-Efficient Resources, EUL/RUL (Effective/Remaining Useful Life) Values.
21. http://www.deeresources.com/files/DEER2016/download/2010-2012_WO017_Ex_Ante_Measure_Cost_Study_-_Final_Report.pdf
26. Energy Use of Doored and Open Vertical Refrigerated Display Cases, Fricke and Becker; Presented at 2010 International Refrigeration and Air Conditioning Conference
27. Infiltration Modeling Guidelines for Commercial Building Energy Analysis, US Department of Energy Sept 2009
29. HVAC Interactive Factors developed based on the Rundquist Simplified HVAC Interaction Factor method for Minnesota, presented on page 28 of the 11/93 issue of the ASHRAE Journal - "Calculating lighting and HVAC interactions".
33. Wisconsin Focus on Energy Technical Reference Manual 2015, pg. 238-241
34. Costs calculated and derived from four open-to-closed refrigerated case custom rebate projects.
35. Work Paper PECIREF_PGE604 Vertical Refrigerated Case, Medium Temperature: Open to Closed (Retrofit)

Changes from Recent Filing:

No Changes

17.5 Walk-in Freezer Defrost Controls

Algorithms

$$Customer\ kWh = (((Baseline\ Duration/(60 \times Baseline\ Interval)) - (Proposed\ Duration/(60 \times Proposed\ Interval))) \times Defrost\ Wattage/1000\ \times Hours \times (1 + 1/COPFreezer)$$

$$Customer\ Coincident\ kW = \frac{Customer\ \ kWh\ \times Coincidence\ Factor}{Ref\ Hours}$$

Variables

Ref Hours	8,760	Annual hours for commercial refrigeration systems
Baseline Interval	6.0	Baseline hours between defrost cycles (Reference 46).
Proposed Interval	24.0	Proposed hours between defrost cycles (Reference 46).
Baseline Duration	40.0	Baseline defrost duration with timer control (Reference 46).
Proposed Duration	27.0	Proposed defrost duration with demand controls (Reference 46).
Lifetime	15	Assumed lifetime for commercial controls
Incremental Cost	$1,695.00	Average cost from Custom projects (Reference 47).
Coincidence Factor	100%	Savings coincidence with summer hours 2pm-6pm.

Customer Inputs	**M&V Verified**	
Defrost Wattage	Yes	Defrost coil wattage being controlled

References:

46. Energy Analysis of KE2 Controllers for Walk-in Freezers; Michaels Energy; January 20, 2015
47. Custom project history of Defrost Controls

Changes from Recent Filing:

Updated Incremental Cost with invoice history.

17.6 Floating Head Pressure Controls

Algorithms

$$Avg\ LT\ kW\ = LT\ Tons\ \times LT\ \%Load \times (LT\ Eff\ Baseline\ - \text{LT Eff Proposed})$$

$$Avg\ MT\ kW\ =\ MT\ Tons\ \times MT\ \%Load \times (MT\ Eff\ Baseline\ - \text{MT Eff Proposed})$$

$$Customer\ kW\ =\ Avg\ LT\ kW + Avg\ MT\ kW$$

$$Customer\ kWh\ =\ (Avg\ LT\ kW + Avg\ MT\ kW) \times \text{Ref Hours}$$

$$Customer\ Coincident\ kW\ = Customer\ kW\ \times Coincidence\ Factor$$

Variables

Ref Hours	8,760	Annual hours for commercial refrigeration systems
LT %Load	75%	Low Temperature Load Factor (Reference 48).
MT %Load	50%	Medium Temperature Load Factor (Reference 48).
LT Eff Baseline	2.21	Low Temperature Baseline Average kW/Ton (Reference 48).
LT Eff Proposed	2.00	Low Temperature Proposed Average kW/Ton (Reference 48).
MT Eff Baseline	1.14	Medium Temperature Baseline Average kW/Ton (Reference 48).
MT Eff Proposed	0.98	Medium Temperature Proposed Average kW/Ton (Reference 48).
Lifetime	15	Assumed lifetime for commercial controls.
Incremental Cost	$4,185.00	Average cost from completed Custom projects (Reference 49).
Coincidence Factor	0%	Savings coincidence with summer hours 2pm-6pm.

Customer Inputs	**M&V Verified**	
LT Tons	Yes	Design evaporator load on low temperature racks
MT Tons	Yes	Design evaporator load on medium temperature racks

References:

48. Custom M&V project energy consumption, operation, and savings on Floating Head Pressure Controls
49. History of Completed Custom project costs for Floating Head Pressure Controls

Changes from Recent Filing:

Corrected to use DIA weather data

17.7 DI Strip Curtains

Algorithms

$$Customer\ kW = Quantity \times \frac{Customer\ kWh}{Ref\ Hours}$$

$$Customer\ kWh = Quantity \times kWh\ Per\ SF \times Area\ SF$$

$$Customer\ Coincident\ kW = Customer\ kW \times Coincidence\ Factor$$

Variables

Area SF	See Table 17.7.1	Door area in square feet (Reference 50)
kWh Per SF	See Table 17.7.2	kWh saved per square foot of curtain installed (Reference 50)
Ref Hours	8,760	Annual hours for commercial refrigeration systems
Lifetime	4	Measure Lifetime in years (Reference 50)
Total Cost*	$270.83	Incremental cost of efficient measures (Reference 50) *Costs are re-evaluated throughout the year and updated to account for the evolving market.
Coincidence Factor	100%	Coincidence factor for medium and low temperature applications. (Reference 50)

Customer Inputs

	M&V Verified	
Facility Type	Yes	Facility and its temperature application
Quantity	Yes	
Pre Existing Curtains	No	

Table 17.7.1

Facility Type	**Doorway Area Sq Ft**
Supermarket - Cooler	35
Supermarket - Freezer	35
Convenience Store - Cooler	21
Convenience Store - Freezer	21
Restaurant - Cooler	21
Restaurant - Freezer	21
Refrigerated Warehouse	80

Table 17.7.2

Facility Type	**Pre-Existing Curtains**	**kWh Savings/Sq Ft**
Supermarket - Cooler	Yes	37
	No	108
Supermarket - Freezer	Yes	119
	No	349
Convenience Store - Cooler	Yes	5
	No	20
Convenience Store - Freezer	Yes	8
	No	27
Restaurant - Cooler	Yes	8
	No	30
Restaurant - Freezer	Yes	34
	No	119
Refrigerated Warehouse	Yes	254
	No	729

References:

50. Data from Illinois TRM 2019. Efficient equipment is a strip curtain at least 0.06 inches thick and covers entire doorway. A doorway area of 26.5 sq ft was assumed based on the weighted average of estimated customer participants by customer type.

Changes from Recent Filing:

No Changes

17.8 DI Auto Close Doors

Algorithms

$$Customer\ kW = Quantity\ \times PCkW$$

$$Customer\ kWh = Quantity \times kWh$$

$$Customer\ Coincident\ kW\ = Quantity \times PCkW$$

Variables

kWh	See Table 17.8.1	kWh saved per door. (Reference 50)
PCkW	See Table 17.8.1	PCkW saved per door. (Reference 50)
Lifetime	8	Measure Lifetime in years (Reference 50)
Total Cost*	$156.82	Incremental cost of efficient measures (Reference 50) *Costs are re-evaluated throughout the year and updated to account for the evolving market.

Customer Inputs	**M&V Verified**	
Application	Yes	Walk-in Cooler or Freezer
Quantity	Yes	
Pre Existing Curtains	No	

Table 17.8.1

Application	**Annual kWh**	**PCkW**
Walk-in Cooler	943	0.137
Walk-in Freezer	2,307	0.309

References:

50. Data from Illinois TRM 2019. Baseline assumes no auto closers.

Changes from Recent Filing:

No Changes

21.1 Residential Codes & Standards

Algorithms

$$Customer\ kW =$$

$$\sum_{0}^{8760} \frac{\sum_{0}^{Foundation\ Type}((Single\ Family\ Previous\ Code\ kW_{Foundation\ Type,hr} - Single\ Family\ New\ Code\ kW_{Foundation\ Type,hr}) * \%\ Foundation\ Type)}{\%\ Gas\ Furnace}$$

$$Customer\ Coincident\ kW = average\ (Customer\ kW\ at\ 16{:}00\ or\ 17{:}00)$$

Variables

Customer kWh	488	Value for annual electric savings for each customer in the 2024 Program Year (References 1,2) Description 21.1.1
Customer DTh	3.2	Value for annual gas savings for each customer in the 2024 Program Year (References 1, 2) Description 21.1.1
Customer kWh	679	Value for annual electric savings for each customer in the 2025-2026 Program Year (References 1,2) Description 21.1.1
Customer DTh	4.0	Value for annual gas savings for each customer in the 2025-2026 Program Year (References 1, 2) Description 21.1.1
Construction Adjustment Factor	Description 21.1.4	An adjustment factor applied to program unit participation. The residential Construction Adjustment Factor will be the ratio of actual to forecasted permitted units as of October 1 based on jurisdictional census data. (References 1, 3) Description 21.1.4
Compliance Rate	Table 21.1.1	Assumed compliance rate for each year after a new code is adopted. This value is included in the NTG for this measure. (Reference 2)
Annual Utility Attribution	Table 21.1.3	24% This value is included in the NTG for this measure (Reference 1)
Single Family Previous Code kW	Description 21.5	Previous code kW for a single family home for each hour of each day for a year (Reference 1)
Single Family New Code kW	Description 21.5	New code kW for a single family home for each hour of each day for a year (Reference 1)
Lifetime	30	Measure Lifetime.
Incremental Cost	$0.00	Difference in cost between the baseline product and the more efficient product.

Customer Inputs	**M&V Verified**	
None		

Table 21.1.1 Compliance Rates By Number of Years Since Code Adoption

Program Year	Compliance Rate	Range from Other Utilities
Year 1	55%	50% (AZ) - 80% (MA)
Year 2	65%	
Year 3	75%	
Year 4 and Beyond	85%	83% (MA) - 100% (AZ)

Table 21.1.2 Assumed Code Adoption Schedule By County Group

Group	Current IECC Code	Program Year 4 (2024)	Program Year 5 (2025)	Program Year 6 (2026)
1	2015	2015	2015	2015
2	**2015***	2015	2015	2015
3	2015	2015	2015	2015
4	2015	2015	2015	2015
5	2015	2015	2015	2015
6	**2015***	2015	2015	2015
7	**2015***	2015	2015	2015
8	**2018***	2018	2018	2018
9	2018	2018	**2021***	**2021***
10	2018	2018	**2021***	**2021***
11	**2018***	2018	2018	2018
12	2021	2021	2021	2021
13	**2021***	2021	2021	2021
14	2021	**2021***	2021	2021
15	2021	2018	2018	2018

Table 21.1.3 Code Compliance Activities in Colorado & Xcel Energy Proportion

Activity/Budget Item	Colorado Energy Office	SWEEP	Xcel Energy	Portion Attributable to Xcel Energy
Total Budget($)	$80,000	$30,000	$47,000	30%
In-person trainings, university training, lunch and learns	20	1	29	58%
Webinars	10	4	12	46%
Code tools, videos, and other training materials	30	20	5	9%
Committed jurisdiction assistance (hours)	146	Engaged	0	0%
Collaborative work (hours)	0	20	0	0%
Total				24%

Description 21.1.1 Program Gross Potential Annual Therms/Program Gross Potential Annual kWh

Gross potential savings was calculated by comparing the difference between a building's energy use intensity (EUI) that just meets a jurisdictions current energy code and a building's EUI that just meets the previous code. The gross potential savings calculation assumes that all buildings are 100% compliant with code and that there is no over- or under-performance of buildings relative to code, which prevents double counting of savings relative to new construction programs. EUI data was obtained from the Pacific Northwest National Laboratory (PNNL) Residential Prototype Building Models (https://www.energycodes.gov/development/residential/iecc_models) for single family detached houses and multifamily low-rise detached apartment buildings in ASHRAE climate zones 5B and 6B for for 2006 IECC, 2009 IECC, 2012 IEC, 2015 IECC, and 2018 IECC. For the purposes of this analysis, Xcel Energy assumed a conservative assumption of 8% improvement for residential 2021 IECC. See Reference 2 Appendix E page E-4.

As Colorado is a home rule state where each jurisdiction can adopt its own code, Xcel Energy utilized Arizona's approach of calculating gross potential savings at the jurisdiction level (Navigant Consulting. “APS MER Verification Report: Program Year 2013.” February 28, 2014). For the purposes of this analysis, Xcel Energy performed the analysis for all counties within Xcel Energy’s Colorado territory, aggregated into 15 groups. (Refer to Table 21.4.) The savings calculated for each group was adjusted to account for the energy supply mix (e.g., gas only, electricity only, or gas and electricity) in each group, as defined in Xcel Energy’s 2019 list of communities served (https://www.xcelenergy.com/staticfiles/xe-responsive/Energy%20Portfolio/Colorado-Communities-Served-Information-Sheet.pdf). The methodology for how the groups were determined, as well as additional details on the energy supply mix in each, is explained in detail in Reference 2, refer to Appendix E pages E-1 through E-3 and the end result is shown in Table 2. Definition of County Groups (Appendix E page E-2) and Table 3. Energy Supply Mix by County Group (Appendix E page E-3).

Xcel Energy created a code adoption schedule for each jurisdiction for each year of the program, as show in Reference 2, Table 1.4 Assumed Code Adoption Schedule By County Group (See Appendix E PAGE E-7 OF REPORT APPENDICES) of this workbook. This was created through investigating the code adoption schedule of the jurisdictions within Xcel Energy’s service territory and with stakeholder feedback received in the interviews and discussed in Chapter 4.2 of the report (reference 2) page 39. The details supporting the assumptions are discussed in Reference 2, Appendix E pages E-5 and E-6.

Savings were calculated for each year of the program using the EUI for each building type within each county group and the code adoption schedule. For example, in Program Year 1, for Group 1, the previous code EUI was derived from 2006 IECC, and the current code EUI used 2009 IECC. For Program Year 2, the previous code EUI was derived from 2009 IECC, and the current code EUI used 2015 IECC. For these calculations, codes are assumed to be effective at the start of the calendar year. To calculate savings, the EUI is multiplied by the total square footage of residential new construction in a jurisdiction. Historical construction square footage was obtained from the Census Building Permit Survey and from the Census Survey of Construction for the residential sector. Detailed information, data sources, and assumptions for construction data is discussed in the gross potential savings section of the Reference #2 report (Chapter 4.2 pages 40-41) and Appendix E pages E-7 through E-11.

Description 21.1.2 Compliance Rate

The gross potential savings assumes buildings are 100% compliant with code. However, in practice, not all buildings are 100% compliant with code. While compliance snapshots have been conducted in Colorado in the past, these did not provide an estimate of broad compliance rates. The city of Ft. Collins conducted a compliance study through City Energy Project, Institute for Market Transformation, and Natural Resources Defense Council for projects permitted to the 2015 IECC code. While the report was not publicly available, a presentation by the city indicated compliance ranged from 64%–75% (https://www.energycodes.gov/sites/default/files/documents/NECC2018_07_Smith.pdf). Since compliance data specific to Colorado was not found, estimates of compliance from other regions at various points throughout a code cycle were used to estimate compliance for Xcel Energy’s Colorado territory. Given the range of compliance values found in other states (Table 10. Compliance Rate Estimates and Sources in Reference 2 - Appendix E page E-14), the fact that other utilities’ programs are well established, the Ft. Collins study found compliance rates of 64%–75%, and the other home rule state (AZ) assumes a low initial compliance rate of 50%, the compliance rates outlined in Reference 2 -Table 1.3 Compliance Rates By Number of Years Since Code Adoption (See CHAPTER 4.3 AND PAGE 42 OF REPORT) were utilized. The program design includes a compliance study in year 1 to determine actual compliance rates specific to Xcel Energy's service territory.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Description 21.1.3 Annual Utility Attribution

Attribution refers to the portion of code savings that can be credited to the utility's program efforts for increasing code compliance or assisting with the adoption of codes and standards (Cadmus. "California Statewide Codes and Standards Program Impact Evaluation Phase Two Volume Two: 2013 T24." June 23, 2017). Xcel Energy already supports the code compliance market in Colorado through trainings, lunch and learns, webinars, videos, and training materials. To capture the influence of these activities, Xcel Energy gathered detailed information on activities performed by Xcel Energy and other key market actors within the state, namely the Colorado Energy Office and SWEEP, as shown in Table 21.1.5 Code Compliance Activities in Colorado & Xcel Energy Proportion (See CHAPTER 4.3 PAGE 44 OF REPORT) in this workbook. Additional details regarding the information collected is available in the section "Attribution & Claimable Savings" of the Reference #2 report page 42-44. Xcel Energy then determined the proportion of each activity Xcel Energy was responsible for relative to other actors, and took an unweighted average of these activities to determine the total proportion of code activities for which Xcel Energy is currently responsible, which is shown in Reference #2 - Table 1.5 Code Compliance Activities in Colorado & Xcel Energy Proportion (See CHAPTER 4.3 PAGE 44 OF REPORT). Due to the construction lag discussed in Reference #2 - Chapter 4.2 page 40, the activities conducted now will result in savings in 2021 and 2022 for the commercial program. Thus, the attribution of 19% was used in the analysis for the 2021 and 2022 program years.

The program activities were designed specifically to meet current market gaps and complement and build upon existing support activities. States with published attribution rates include Arizona, Massachusetts, Rhode Island, and Illinois. Their attribution rates range from 33%–46%.

Description 21.1.4 Construction Adjustment Factor

To estimate future construction growth or contraction, several sources that regularly evaluated construction data were used, all which suggested construction starts will experience a downturn in 2020 and beyond due to existing construction trends and the COVID-19 pandemic (https://www.ecmweb.com/construction/article/21119974/2020-construction-outlook, https://www.aia.org/articles/6096562-though-signs-point-to-a-slowdown-growth-in, https://www.construction.com/news/Construction-Starts-Slip-back-2020-Dodge-Data-Analytics). Therefore, the calculation assumed a contraction of -1%.

Given actual construction starts may differ from the forecast, the Construction Adjustment Factor will be applied to account for differences between anticipated and observed construction activity.

Description 21.1.5 Previous and new code kW

The hourly meter outputs from PNNL's 2015 IECC and the 2018 IECC Prototype models (https://www.energycodes.gov/development/residential/iecc_models). The PNNL models use TMY3 data as an input in their modeling (https://www.nrel.gov/docs/fy08osti/43156.pdf). As TMY3 uses 30-year historical averages to create hourly weather data, it is not possible to create weekday and weekend profiles because the data is not specific to a calendar year or day of week.

References:

1. Modeled hourly outputs obtained from 1. Detailed reporting of methodology and assumptions available from PNNL: https://www.energycodes.gov/sites/default/files/documents/2015_IECC_Commercial_Analysis.pdf

2. 2020 Codes & Standards report authored by TRC (formerly EMI).

3. 2021 Census Permit Data

Changes from Recent Filing:

Customer kWh and Customer Dth have been revised to reflect the Code Adoption schedule for Program Years 4-6

21.2 Residential Windows Standards

Algorithms

$$Customer\ Gross\ kW = UES_kW * CO_Qty_Units_Shipped * (1 - NOMAD) * Compliance_Factor$$

$$Customer\ Coincident\ Gross\ kW = Coincidence\ Factor * Customer\ kW$$

$$Customer\ Gross\ kWh = UES_kWh * CO_Qty_Units_Shipped * (1 - NOMAD) * Compliance_Factor$$

$$Customer\ Gross\ Therms = UES_Therms * CO_Qty_Units_Shipped * (1 - NOMAD) * Compliance_Factor$$

$$CO_Qty_Units_Shipped = E_STAR_Units_Shipped / E_STAR\ Market\ Share * State\ Scaling\ Factor$$

Variables

NOMAD	0.11%	Rate of normally occurring market adoption (NOMAD) without intervention. (Reference 1)
Compliance Rate	Table 21.2.1	Utility Influenced compliance rate after a new code is adopted. Specifically for 2026 and as developed in the TRC research report. This will be updated every three years as part of the compliance report. (Reference 1)
Annual Utility Attribution	Table 21.2.1	Assuming no other outside agency influencing the market. This will be incorporated as a NTG Factor. (Reference 1)
UES_kWh	Table 21.2.2	kWh saved per Window or Storm Window. Derived from modelling of homes with IECC 2021 Baseline vs. Proposed ENERGY STAR v7 Compliant windows. (Reference 1)
UES_Therms	Table 21.2.2	Therms saved per Window or Storm Window. Derived from modelling of homes with IECC 2021 Baseline vs. Proposed ENERGY STAR v7 Compliant windows. (Reference 1)
UES_kW	Table 21.2.2	kW saved per Window or Storm Window. Derived from modelling of homes with IECC 2021 Baseline vs. Proposed ENERGY STAR v7 Compliant windows. (Reference 1)
State Scaling Factor	1.78%	No. of CO Households divided by No. of US Households. Data from the 2015-2019 Census Quickfacts. (Reference 2, Reference 3)
E_STAR Units Shipped	Table 21.2.3	The Quantity of ENERGY STAR units shipped in 2020 (Reference 4) or in 2021 (Reference 5).
E_STAR Market Share	Table 21.2.3	The percent of the market represented by ENERGY STAR units in 2020 (Reference 4) or in 2021 (Reference 5).
CO_Qty_Units_Shipped	Calculated	Total Quantity window units shipped in the state of Colorado. Derived from ENERGY STAR shipping information each year as data is available. Most current year data available will be used to estimate market influence.
Coincidence Factor	100%	Envelope improvement measures influence the peak demand 100% of the time.
Lifetime	20	Measure Lifetime.
Incremental Cost	$0.00	Difference in cost between the baseline product and the more efficient product.

Customer Inputs	**M&V Verified**	
E_STAR Units Shipped	Yes	The Quantity of units shipped for the forecast are derived from EnerySTAR shipping data and scaled to Colorado.
E_STAR Market Share	Yes	The Quantity of units shipped for the forecast are derived from EnerySTAR shipping data and scaled to Colorado.
Compliance Factor	Yes	Sampling of home construction permits to investigate the percent of windows that are compliant with ENERGY STAR v7. This will be gathered and analyzed for the first year claimed savings and every 3 years subsequently.

Table 21.2.1 Compliance Rates for 2026

	Compliance Rate No Above Code and No Econ Development Activity	**Annual Utility Attribution Rate**
Windows/Doors/Skylights	5.11%	90%

Table 21.2.2 Unit Energy Savings Model Results

	Annual kWh Saved	**Annual Therms Saved**	**Annual Peak kW Saved**
Windows/Doors/Skylights	2.9	0.64	0.002

Table 21.2.3 Quantity of Units Shipped (Reference 4 and Reference 5)

	ENERGY STAR Units	**Market Share Percent**
Windows/Doors/Skylights	54,533,000	84%

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

References:

1. Xcel Energy: *Exploring Window, Doors, and Skylights Standards in Colorado* by TRC dated September 29, 2023 including Appendices.

2. https://www.census.gov/quickfacts/CO
3. https://www.census.gov/quickfacts/fact/table/US/PST045221

4. ENERGY STAR Window Unit Shipment and Market Penetration Report Calendar Year 2020 Summary.
https://www.energystar.gov/sites/default/files/asset/document/2020%20USD%20Summary%20Report_Lighting%20%20EVSE%20Update_0.pdf

5. ENERGY STAR Storm Window unit shiopment and market penetration report Calendar Year 2021 Summary.
https://www.energystar.gov/sites/default/files/asset/document/2021%20Unit%20Shipment%20Data%20Summary%20Report_0.pdf

Changes from Recent Filing:

This is a new product for 2024.

18.0 Residential HVAC Deemed Tables

Table 18.0.1: Effective Full Load Hours, Altitude	EFLH Cooling		EFLH Heat		EFLH_Heating_HP (Heat Pump Impacted heating hours) ****			
	Single Family	Multi-Family	Single Family	Multi-Family	Single Family	Multi-Family	Altitude Adjustment Factor	HSPF Climate Zone Adjustment Factor
Zone 1 - CO Front Range *	590	699	1,825	1,409	750	579	0.177	100%
Zone 2 - CO Western Slope **	837	992	1,971	1,522	779	601	0.163	100%
Zone 3 - CO Mountain Areas ***	210	249	2,104	1,625	536	414	0.244	85%
Zone 4 - CO Very High Altitude Areas *****	2	2	2,739	2,115	673	520	0.303	85%

* Zone 1 (Front Range as represented by Denver International Airport TMY3 data);
** Zone 2 (Western Slope as represented by Grand Junction TMY3 Data)
*** Zone 3 (Mountain Areas as represented by Alamosa TMY3 Data)
**** the heat pump impacted hours are determined at a cutoff temperature of 35 F.
*** Zone 4 (Very High Altitude Areas as represented by Lake CO Airport TMY3 Data)

Table 18.0.1a: Effective Full Load Hours Cold Climate Heat Pumps	Cold Climate Heat Pump Full Load Hours w/ 5 F Cutover *****		Cold Climate Heat Pump Full Load Hours w/ 10 F Cutover *****		Cold Climate Heat Pump Full Load Hours w/ 15 F Cutover *****		Cold Climate Heat Pump Full Load Hours w/ 20 F Cutover *****		Cold Climate Heat Pump Full Load Hours w/ 25 F Cutover *****	
	Single Family	Multi-Family	Single Family	Multi-Family	Single Family	Multi-Family	Single Family	Multi-Family	Single Family	Multi-Family
Zone 1 - CO Front Range	1,809	1,397	1,776	1,371	1,714	1,323	1,566	1,209	1,409	1,088
Zone 2 - CO Western Slope	1,971	1,522	1,963	1,515	1,925	1,486	1,835	1,417	1,495	1,154
Zone 3 - CO Mountain Areas	1,748	1,349	1,589	1,227	1,381	1,066	1,216	939	920	710
Zone 4 - CO Very High Altitude Areas	2,521	1,946	2,384	1,840	2,145	1,656	1,908	1,473	1,360	1,050

**** All Cutover Temperatures are defined as the Outdoor Ambient Temperature where Backup Heat or Supplemental heat is needed to meet the load ~~takes over the load~~.

Table 18.0.2: Minimum Qualifying Efficiency	for units manufactured after 1/1/2023					
Measure	Minimum Qualifying SEER2	Minimum Qualifying EER2	Minimum qualifying HSPF2	Minimum qualifying Heating COP	Minimum Qualifying COP at 5 F	Capacity Maintenance (5 F Max / 47 F Rated)
~~Air Source Heat Pump - Split System - Quality Install Only~~	~~14.20~~	~~8.00~~	~~7.50~~	~~N/A~~	~~N/A~~	~~N/A~~
~~Air Source~~ Ducted Heat Pump and Partially Ducted Heat Pump - Split System	15.20	11.70	7.80	N/A	N/A	N/A
~~Air Source Heat Pump - Packaged System~~	~~15.20~~	~~10.60~~	~~7.20~~	~~N/A~~	~~N/A~~	~~N/A~~
~~Mini-Split & Multi~~ Non-Ducted -Split Heat Pumps	15.20	11.70	7.80	N/A	N/A	N/A
Ducted cold climate ~~Air Source~~ Heat Pumps and Partially Ducted cold climate Heat Pumps ~~(Ducted & Mixed- Ducted / Non-Ducted)~~ ++	15.20	10.00	8.10	N/A	1.75	70%
Non-Ducted cold climate ~~Mini-Split & Multi-Split~~ Heat Pumps ~~(Non-Ducted)~~ ++	16.00	9.00	9.50 ~~8.50~~	N/A	1.75	70%
Gorund Source Heat Pump **	N/A	16.00	N/A	3.30	N/A	N/A

** Ground Loop Brine to Air with entering temperatures of 77 F cooling mode and 32 F heating mode.
++ Cold climate air source heat pumps and mini-split heat pumps must have a low temp heating efficiency (COP at 5 F) that is >= 1.75.

Table 18.0.3: Baseline Efficiencies	BASELINE Efficiency units manufactured after 1/1/2023			
Measure	SEER2	EER2	HSPF2	Heating COP2
High Efficiency Air Conditioner - Split System	13.40	11.42	N/A	N/A
~~High Efficiency Air Conditioner - Packaged System~~	~~13.40~~	~~11.42~~	~~N/A~~	~~N/A~~
Ducted ~~Air Source~~ Heat Pump - Split System - Gas Backup *	13.40	11.42	0.00	0.95
Ducted ~~Air Source~~ Heat Pump - Split System - Elec Resist. Backup *	13.40	11.42	3.412	1.00
Partially Ducted Heat Pump - Split System - Gas Backup *	13.40	11.42	0.00	0.95
Partially Ducted Heat Pump - Split System - Elec Resist. Backup *	13.40	11.42	3.412	1.00
Non-Ducted ~~Mini-Split & Multi-Split~~ Heat Pumps - Gas Backup *	13.40	11.42	0.00	0.95
Non-Ducted ~~Mini-Split & Multi-Split~~ Heat Pumps - Elec Resist. Backup *	13.40	11.42	3.412	1.00
Ducted cold climate ~~Air Source~~ Heat Pumps - Gas Backup *	13.40	11.42	0.00	0.95
Ducted cold climate ~~Air Source~~ Heat Pumps - Elec Resist. Backup *	13.40	11.42	3.412	1.00
Partially Ducted cold climate Heat Pump - Split System - Gas Backup *	13.40	11.42	0.00	0.95
Partially Ducted cold climate Heat Pump - Split System - Elec Resist. Backup *	13.40	11.42	3.412	1.00
Non-Ducted cold climate ~~Mini-Split & Multi-Split~~ Heat Pumps - Gas Backup *	13.40	11.42	0.00	0.95
Non-Ducted cold climate ~~Mini-Split & Multi-Split~~ Heat Pumps - Elec Resist. Backup *	13.40	11.42	3.412	1.00
Gorund Source Heat Pump w/ Furance & AC Baseline**	13.40	11.42	N/A	0.80
Gorund Source Heat Pump w/ ER in Air Handler & AC Baseline**	13.40	11.42	N/A	1.00
Gorund Source Heat Pump w/ Boiler + Air Handler & AC Baseline**	13.40	11.42	N/A	0.84

* ASHP & MSHP baseline case is a Standard AC with Condensing Furnace, Boiler, or Electric Resistance Heat
** Ground Loop Brine to Air with entering temperatures of 77 F cooling mode and 32 F heating mode. This GSHP equipment not subject to the new SEER2 / EER2 requirements.

Table 18.0.4: Coincidence Factors, Baseline Efficiencies and Lifetimes

Equipment Type	Deemed Equipment Coincidence Factor	Lifetime	Notes
Ducted ~~Air Source~~ Heat Pump ~~- Split System - with Gas Backup~~	90%	18	(Reference 17)
~~Air Source Heat Pump - Split System - with Elec Resist. Backup~~	~~90%~~	~~18~~	~~(Reference 17)~~
Partially Ducted Heat Pump	90%	15	
Non-Ducted ~~Mini-Split & Multi-Split~~ Heat Pumps	90%	15	
Ducted cold climate ~~Air Source~~ Heat Pump - Split System	90%	18	(Reference 17)
Partially Ducted cold climate Heat Pump	90%	15	
Non-Ducted cold climate ~~Mini-Split & Multi-Split~~ Heat Pumps	90%	15	
Gorund Source Heat Pump **	90%	20	

** Baseline for GSHP is Code minimum AC and Gas Fired Furnace.

Table 18.0.5: QI Factors (Reference 4, Reference 6, Reference 7, Reference 14)

Home Type - equipment type	Sizing Loss	Refrigeration Charge	Improper Airflow	Duct Leakage	Loss NO Field QI	Loss_Uncorr
~~New Home - AC/ASHP Ducted Heat Pumps~~	~~0%~~	~~7.0%~~	~~2.0%~~	~~0.0%~~	~~9.00%~~	~~0.0%~~
Existing Home - ~~AC/ASHP~~ Ducted Heat Pumps	2.0%	7.0%	2.0%	8.3%	17.30%	3.7%
Existing Home - Partially Ducted Heat Pumps	0.0%	7.0%	2.0%	8.3%	17.30%	3.7%
Existing Home - AC & Furnace BASELINE for All Heat Pumps	2.0%	7.0%	2.0%	8.3%	17.30%	3.7%
~~New Home - GSHP~~	~~0%~~	~~0.0%~~	~~2.0%~~	~~0.0%~~	~~2.00%~~	~~0.0%~~
Existing Home - GSHP	2.0%	0.0%	2.0%	8.3%	10.30%	3.7%
~~New Home - Non-Ducted Heat Pumps MSHP *~~	~~0.0%~~	~~0.0%~~	~~0.0%~~	~~0.0%~~	~~0.00%~~	~~0.0%~~
Existing Home - Non-Ducted Heat Pumps ~~MSHP~~ *	0.0%	0.0%	0.0%	0.0%	0.00%	0.0%

* The ~~MSHP and ccMSHP~~ Non-Ducted Heat Pump and cold climate Non-Ducted Heat Pump cases use the AC as the baseline case. And the AC equipment's QI Factors will be applied to their part of the savings calculations

Table 18.0.6: Conversion Factors and Constants

Conversion Factor from BTUH to kW	3,412	BTU/kW-hr
Btu to Dth	1,000,000	BTU/Dth
Therm to Dth	10	Therm/Dth
Btu to Therm	100,000	Btu/Therm
Convert from Btu/wh to kW/ton	12	Btu/wh per kW/ton
Conversion between Watts and kiloWatts	1,000	watts/kilowatt
Conversion between BTU/h and tons	12,000	BTUh / ton
Water Lb/gallon	8.34	lb/gal
Water_h_fg	1,059	BTU/lb (Evaporative energy / lb water)

Table 18.0.7: Cooling & Heating Weather Data for Load Estimates	Maximum Outside Air Temperature (F)	Mimimum Outside Air Temperature (F)	~~Balance~~ No Load Point OSA Temperature (F)	~~Balance Point~~ No Load Point (BTUH)
Zone 1 - CO Front Range	104	-3	60	0
Zone 2 - CO Western Slope	99	7	60	0
Zone 3 - CO Mountain Areas	87	-26	60	0
Zone 4 - CO Mountain Areas	81	-17	60	0

Table 18.0.8: Heating Type Deemed Efficiency	Heating Efficinecy
Condensing Furnace	0.95
Non-Condensing Furnace	0.8
Condensing Boiler	0.95
Non-Condensing Boiler	0.84
Electric Resistance	1

Table 18.0.9 Incremental Capital Costs - Quality Install (Reference 6)

Measures	New Home	Existing Home
Quality Installation	$ 103.56	$ 259.80

References:

1. Building America, Research Benchmark Definitions, 2010. (see p. 10) http://www.nrel.gov/docs/fy10osti/47246.pdf
2. ASHRAE, 2019, Applications Handbook, Ch. 38, table 4, Comparison of Service Life Estimates
3. DOE Appliance Standards Website, Residential Central Air Conditioners and Heat Pumps. https://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/75
4. Neme, Proctor, Nadel, ACEEE, 1999. Energy Savings Potential From Addressing Residential Air Conditioner and Heat Pump Installation
5. State of Minnesota Technical reference Manual For Energy Conservation Improvement Programs, Version 3.1
6 ENERGY STAR Quality Installation standards (ESVI). https://www.energystar.gov/index.cfm?c=hvac_install.hvac_install_index
7. NREL 2011 Measure Guideline Sealing and Insulating Ducts in Existing Homes. http://www.nrel.gov/docs/fy12osti/53494.pdf
8. State of Illinois Technical Reference Manual Version 8, dated 2020
9. For explanation of duct sealing requirements for new homes see "Significant Changes to the 2015 Minnesota Residential Codes (MR
10. Incremental costs for MSHPs were determined from the NEEP Incremental Cost Study Phase 2 Report
11. MSHP equipment life is from Measure Life Report Residential and Commercial/Industrial Lighting and HVAC Measures;
12. For estimated life of GSHP see http://www.energysavers.gov/your_home/space_heating_cooling/index.cfm/mytopic=12640 (indoor
14.For assumptions on losses related to overcharge or undercharge on refrigerant see "Sensitivity Analysis of Installation Faults on Heat
16. Code of Federal Regulations Title 10: Energy PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS
17: "Measure Life Report - Residential and Commercial/Industrial Lighting and HVAC Measures", dated June 2007 for The New England
18. Assumptions on EC fan operating modes. Center for Energy and Environment Comments to Docket Number EERE-2010-BT-STD-0011-
19. ECM Furnace Impact Assessment Report
20. Xcel Energy, January 2019. Typical MN Residential Smart Switch Load Relief 2011-2015.
21. Xcel Energy, January 2019. Saver's Switch Control History.
22. Xcel Energy. January 2006. Residential Saver's Switch 2005 Impact Evaluation.
23. http://wpb-radon.com/radon_fan_performance.html33:5032:50A33:50
24. Information from manufacturer and contractors (Radonaway)
25. https://www.radonaway.com/products/radon-fans/rp140-pro.php
26. Energy Information Administration's (EIA) 2009 Residential Energy Consumption Survey (RECS)
27. Bin analysis using RECS data for thermostat operation and typical CO home cooling and heating conditions.
28. Analysis of Invoices from Xcel Energy Rebated systems in 2022

Changes from Recent Filing:

Included Minimum Qualifying levels for SEER2, EER2, and HSPF2 for all AC and Heat Pump equipment based on IECC2021 where
Modified the application of QI Sizing Loss factors.
Clarified baseline efficiencies to reflect actual baseline equipment, which may be different than Proposed Efficient equipment.
Added a flexible cutover temperature for cold climate ASHP and cold climate MSHP equipment.
Edited language describing heat pumps as Ducted, Non-Ducted, or Partially Ducted

18.1 Residential Ducted cold climate ~~Air Source~~ Heat Pumps

Algorithms

$Customer\ kW\ Savings = ~~Customer\ kW_{EqCooling} + Customer\ kW_{QICooling}~~\ Customer\ kW_{Cooling}$

$Customer\ Coincident\ kW\ Savings = Customer\ Coincident\ kW_{Equipment} + Customer\ Coincident\ kW_{QI}$

$Customer\ Rebate = Rebate/Heating\ ton\ x\ \frac{Size_{Heat_5}}{12{,}000}$

Electric Resistance Heat Baseline:

$Customer\ kWh\ Savings = Customer\ kWh_{Cooling}\ ~~Customer\ kWh_{EqCooling} + Customer\ kWh_{QICooling}~~ + Customer\ kWh_{EQHeating} + Customer\ kWh_{QIHeating}$

Dual Fuel Gas Heat Baseline EE Savings:

$Customer\ kWh\ Cooling\ Savings = Customer\ kWh_{Cooling}\ ~~Customer\ kWh_{EqCooling} + Customer\ kWh_{QICooling}~~$

$EE\ Incremental\ Cost = EE\text{-}BE\ Cost\ Split\ x\ (Incremental\ Capital\ Cost_{Equipment} + Incremental\ Capital\ Cost_{QI})$

$EE\ Rebate = EE\text{-}BE\ Cost\ Split\ x\ Customer\ Rebate$

Dual Fuel Gas Heat Baseline BE Savings:

Customer kWh Heating Savings = Customer kWh_Heating Penalty + Customer kWh_Heating Full Electrification

Customer Dtherm Savings = Customer DTherms_EQ Heating + Customer DTherm_QI Heating + Customer Remaining Dtherms_Full Electrification

$BE\ Incremental\ Cost = (Incremental\ Capital\ Cost_{Equipment} + Incremental\ Capital\ Cost_{QI})$ *- EE Incremental Cost*

Calculation Details:

$$Customer\ kW_{Cooling} = \frac{Full\ Load\ Cool}{12{,}000} \times \left(\left(\frac{12}{EER_{baseline} * (1 - Loss_{NoQI})}\right) - \left(\frac{12}{EER_{proposed} * (1 - Loss_{Uncorr})}\right)\right)$$

$$Customer\ kWh_{Cooling} = \frac{Full\ Load\ Cool}{12{,}000} * EFLH_{cooling} * \left(\left(\frac{12}{SEER_{baseline} * (1 - Loss_{NoQI})}\right) - \left(\frac{12}{SEER_{proposed} * (1 - Loss_{Uncorr})}\right)\right)$$

$$Customer\ Coincident\ kW_{Cooling} = Coincidence\ Factor * \frac{Full\ Load\ Cool}{12{,}000} * \left(\left(\frac{12}{EER_{baseline} * (1 - Loss_{NoQI})}\right) - \left(\frac{12}{EER_{proposed} * (1 - Loss_{Uncorr})}\right)\right)$$

$Incremental\ Capital\ Cost_{Equipment} = ASHP\ Cost\ per\ Ton_{EQ} * \frac{Size_Cool}{12{,}000}$ *- Cost Per Ton Baseline* $* \frac{Full_Load_Cool}{12{,}000}$ *- Cost per kBTUH heat * (Full_Load_Heat/COP_Baseline)/1000 - Baseline_Air_Handler*

$Incremental\ Capital\ Cost_{QI}\ New\ Home = Inc\ Cost_{QI}$

$$Incremental\ Capital\ Cost_{QI}\ E\ Home = MAX\left(75, Inc\ Cost_{QI} - \frac{Size_Cool}{12{,}000} * \left(\left(\frac{1}{1 - Sizing\ Loss}\right) - 1\right) * Cost\ per\ Ton_{baseline}\right)$$

Note: All formulas using SEER, EER, and HSPF are valid with SEER2, EER2, HSPF2 substitutions.

ccASHP Heating Energy Savings

*Load_Heat = -1 * Size_Heat * 1/(1 + Oversize_Factor)*

m_load_profile = (balance pt load - Load_Heat) / (balance pt temp - Des_OAT)

*b_load_profile = Load_Heat - (m_load_profile * Des_OAT)*

*Full Load Cool = m_load_profile * Max_OAT + b_load_profile*

*Full_Load_Heat = m_load_profile * Min_OAT + b_load_profile*

Electric Resistance Heat Baseline:

$Customer\ kWh_{EQHeating}$ *= -1 * Full_Load_Heat * EFLH_cc_HP_Heat ~~EFLH_Heating_HP~~ * (1 / (HSPF_Baseline * HSPF_Adj_Factor) - 1 / (HSPF_Proposed * HSPF_Adj_Factor)) / 1000*

$Customer\ kWh_{QIHeating}$ *= -1 * Full_Load_Heat * EFLH_cc_HP_Heat ~~EFLH_Heating_HP~~ * 1 / (HSPF_Proposed * HSPF_Adj_Factor) * (1 / (1 - loss_No_QI) - 1/Loss_uncorr) / 1000*

Dual Fuel Gas Heat Baseline

*Customer DTherms_EQ Saved = (-1 * Full_Load_Heat * EFLH_cc_HP_Heat)/ COP_Baseline / 1,000,000*

*Customer DTherms_QI = (-1 * Full_Load_Heat * EFLH_cc_HP_Heat)/ COP_Baseline / 1,000,000 * (1 / 1 - Loss_DuctLeakage - 1) +*
-1 Full_Load_Heat * (EFLH_Heat - EFLH_cc_HP_Heat) / COP_Baseline * (1 / (1 - Loss_DuctLeakage) - 1 / (1 - Uncorr_Loss)) / 1,000,000*

*Customer DTherms/Hr_QI = -1*Full_Load_Heat / COP_Backup_Heat * (1 / (1 - Loss_DuctLeakage) - 1 / (1 - Uncorr_Loss)) / 1,000,000*

Customer Remaining Dtherms_Full Electrification = -1 Full_Load_Heat * (EFLH_Heat - EFLH_cc_HP_Heat ~~EFLH_Heating_HP~~) / COP_Baseline * (1 / (1 - Uncorr_Loss)) / 1,000,000*

*Customer kWh_Heating Penalty = Furnace_Fan_kW * EFLH_cc_HP_Heat - Full_Load_Heat * EFLH_cc_HP_Heat * (0 - (1 / (HPSF_Proposed*HSPF_Adj_Factor))) / 1000*

*Customer kWh_Heating Full Electrification = Customer kWh_Heating Penalty + Furnace_Fan_kW * (EFLH_Heat - EFLH_cc_HP_Heat) - Full_Load_Heat * (EFLH_Heat - EFLH_cc_HP_Heat) * (0 - 1 /(~~COP_Backup_Heat * 3.412~~ HPSF_Proposed*HSPF_Adj_Factor) * (1 / (1- Uncorr_Loss))) / 1000*

Customer DTherms/Hr_Full Electrification = -1 Full_Load_Heat / COP_Baseline / 1,000,000*

*Customer Winter Peak kW = -1 * Full_Load_Heat / 3412*

Variables

ASHP Cost per Ton_EQ	See Table 18.1.1	Capital Cost per Ton of new ccASHP.
Cost per Ton_baseline	See Table 18.1.1	Baseline capital cost per ton for new AC equipment.
EER baseline	See Table 18.0.3	Baseline EER as calculated for residential equipment from the code required SEER baseline AC unit.
SEER baseline	See Table 18.0.3	IECC 2021 identified code minimum AC unit SEER
COP_Baseline	See Table 18.0.8	Baseline heating efficiency. Based on the type of backup heat selected. Condensing will be 0.95, Non-Condensing will be 0.8, and Electric Resistance will be 1.0. A COP of 1 and does not require climate zone correction.
COP_Backup_Heat	See Table 18.0.8	Backup heating efficiency. Based on the type of backup heat selected. Condensing will be 0.95, Non-Condensing will be 0.8, and Electric Resistance will be 1.0. A COP of 1 and does not require climate zone correction.
Sizing Loss	See Table 18.0.5	
Loss_DuctLeakage	See Table 18.0.5	The loss factor associated with leaky ductwok for the baseline system
Loss_No_QI	See Table 18.0.5	
Loss_Uncorr	See Table 18.0.5	
Inc_Cost_QI	See Table 18.0.~~5~~ 9	Incremental Cost for QI in an Existing Home system retrofit
Coincidence Factor_EQ	See Table 18.0.4	
Coincidence Factor_QI	See Table 18.0.4	
Oversize_Factor__c	0%	Deemed Oversize Safety Factor for heating equipment. - there is no oversize factor for the heat pump. A backup heating system will provide the supplemental of backup heat required on the extreme days.
EFLH cooling	See Table 18.0.1	Effective Full Load Hours for cooling load energy savings
EFLH_Heat	See Table 18.0.1	Effective Full Load Hours for heating load QI energy savings
EFLH_ccHP_Heat	See Table 18.0.1a	Effective Full Load Hours for Cold Climate Heat Pump above customer provided Operating Cutover Temperature.
Balance Pt Temp	See Table 18.0.7	Outdoor Ambient Temperature at which residential cooling and heating loads are zero BTUH
Max_OAT	See Table 18.0.7	Maximum Outdoor Ambient Temperature used in building load profile
Min_OAT	See Table 18.0.7	Minimum Outdoor Ambient Temperature used in building load profile
Des OAT	5	Low Outdoor Ambient Temperature for caluclating heating load Profile. Based on Low Temp Rating from NEEP QPL Data Sheets. Deemed to be 5 F.
Electric Resistance Heat HSPF	3.412	Electric resistance heat assumed heating season performance factor based on a COP of 1. no climate zone correction required.
Balance Pt Load	See Table 18.0.7	Heating and cooling loads are zero at the balance point outdoor ambient temperature
Furnace_Fan_kW	0.257	Furnace Fan EC Motor kW demand for baseline energy calculations for ASHP.
Cost / kBTUh Heat - Baseline Furnace	$ 59.72	Average High Efficiency Furnace Cost / kBTUH; installed costs
Cost / kBTUh Heat - Baseline Boiler	$ 89.77	Average High Efficiency Boiler Cost / kBTUH; installed costs
Cost / kBTUh Heat - Baseline Electric Resistance	$ 40.00	Average Cost for air handler and electric duct heater / kBTUH; installed costs
Baseline Air Handler	$ 1,200.00	Average Cost for Baseline Air Handler for use with ER Heat or Boiler Heat associated with Air Conditioning; installed costs
HSPF_Adj_Factor	See Table 18.0.1	Adjustment factor for correcting HSPF from published data in AHRI's Climate Zone IV to AHRI's Climate Zone V. The HSPF_Adjustment_Factor for Electric Resistance Heat will be 1.
HSPF_Basline	See Table 18.0.3	Heating season performance factor of baseline equipment. For electric resistance heat baseline, a COP of 1 is assumed with no climate zone correction required.
Measure Life - Matched Split-System Air -Source Heat Pump	See Table 18.0.3	Reference 16
Measure Life - Quality Installation	18	Reference 16
Conversion Factors	See Table 18.0.6	
EE-BE Cost Split	50.0% ~~4.4%~~	The total incremental cost and the rebate for each new heat pump measure will be divided using this split into a Beneficial Electrification (BE) portion for heating and an Energy Efficiency (EE) portion for Cooling.

Customer Inputs	**M&V Verified**	
Size_Cool	Yes	NEEP QPL Data Sheet Rated Cooling Capacity at 95 F
Size_Heat_5	Yes	NEEP QPL Data Sheet Max Heating Capacity at 5 F
Size_Heat_47	Yes	NEEP QPL Data Sheet Rated Heating Capacity at 47 F
EER2 proposed	Yes	AHRI Certification for units manufactured after 1/1/2023
SEER2 proposed	Yes	AHRI Certification for units manufactured after 1/1/2023
HSPF2 Proposed	Yes	AHRI Certification for units manufactured after 1/1/2023
Home Type	Yes	Single Family or Multi-Family home
Baseline Heat Efficiency	Yes	baseline heating Eff; Condensing, Non-Condensing, Electric Resistance
Backup Heat Efficiency	Yes	backup heating Eff; Condensing, Non-Condensing, Electric Resistance
~~Operating Cutover~~ Balance Point Temperature	Yes	Outdoor Ambient Temperature below which supplemental heating is required to meet the home heating needs. ~~heat pump operation ceases and~~ Gas backup or electric resistance backup heating begins.

Table 18.1.1. Capital Costs - Reference 28

SEER	ccASHP Cost per Ton	Baseline Cost per Ton (Res AC) Installed
13.4 SEER2 Baseline Air Conditioner	N/A	$ 2,507.42
15.2+ SEER2 Ducted Cold Climate Heat Pump w/ Furnace	$ 8,717.48	N/A
15.2+ SEER2 Ducted Cold Climate Heat Pump w/out Furnace	$ 5,912.94	N/A

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

References:

1. Building America, Research Benchmark Definitions, 2010. (see p. 10) http://www.nrel.gov/docs/fy10osti/47246.pdf
2. ASHRAE, 2019, Applications Handbook, Ch. 38, table 4, Comparison of Service Life Estimates
3. DOE Appliance Standards Website, Residential Central Air Conditioners and Heat Pumps. https://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/75
4. Neme, Proctor, Nadel, ACEEE, 1999. Energy Savings Potential From Addressing Residential Air Conditioner and Heat Pump Installation Problems, http://aceee.org/research-report/a992
5. State of Minnesota Technical reference Manual For Energy Conservation Improvement Programs, Version 3.1 https://mn.gov/commerce/industries/energy/utilities/cip/technical-
6 ENERGY STAR Quality Installation standards (ESVI). https://www.energystar.gov/index.cfm?c=hvac_install.hvac_install_index
7. NREL 2011 Measure Guideline Sealing and Insulating Ducts in Existing Homes. http://www.nrel.gov/docs/fy12osti/53494.pdf
8. State of Illinois Technical Reference Manual Version 8, dated 2020
9. For explanation of duct sealing requirements for new homes see "Significant Changes to the 2015 Minnesota Residential Codes (MR 1303, 1309 and 1322)". http://www.ci.minneapolis.mn.us/www/groups/public/@regservices/documents/webcontent/wcms1p-142763.pdf
10. Incremental costs for MSHPs were determined from the NEEP Incremental Cost Study Phase 2 Report
11. MSHP equipment life is from Measure Life Report Residential and Commercial/Industrial Lighting and HVAC Measures; http://library.cee1.org/content/measure-life-report-residential-and-commercialindustrial-lighting-and-hvac-measures
12. For estimated life of GSHP see http://www.energysavers.gov/your_home/space_heating_cooling/index.cfm/mytopic=12640 (indoor components up to 25 years; ground loop =50 years)
13. Costs obtained from "2010-2012 WO017 Ex Ante Measure Cost Study Final Report", by Itron, May 2014. These are used in the DEER 2016 database.

14.For assumptions on losses related to overcharge or undercharge on refrigerant see "Sensitivity Analysis of Installation Faults on Heat Pump Performance", by P. Domanski, et. al., Sept 2014, http://www.acca.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=f02c1f61-4d1d-4a24-971d-cc9ea3e626b2&forceDialog=0

15. ENERGY STAR Connected Thermostat Key Product Criteria, Version 1.0, Rev. Jan 2017 -
16. Code of Federal Regulations Title 10: Energy PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS Subpart C—Energy and Water Conservation
17: "Measure Life Report - Residential and Commercial/Industrial Lighting and HVAC Measures", dated June 2007 for The New England State Program Working Group prepared by
18. Assumptions on EC fan operating modes. Center for Energy and Environment Comments to Docket Number EERE-2010-BT-STD-0011-0022, July 27, 2010
19. ECM Furnace Impact Assessment Report https://focusonenergy.com/sites/default/files/emcfurnaceimpactassessment_evaluationreport.pdf
20. Xcel Energy, January 2019. Typical MN Residential Smart Switch Load Relief 2011-2015.
21. Xcel Energy, January 2019. Saver's Switch Control History.
22. Xcel Energy. January 2006. Residential Saver's Switch 2005 Impact Evaluation.
23. http://wpb-radon.com/radon_fan_performance.html33:5032:50A33:50
24. Information from manufacturer and contractors (Radonaway)
25. https://www.radonaway.com/products/radon-fans/rp140-pro.php
26. Energy Information Administration's (EIA) 2009 Residential Energy Consumption Survey (RECS)
27. Bin analysis using RECS data for thermostat operation and typical CO home cooling and heating conditions.
28. Analysis of Invoices from Xcel Energy Rebated systems in 2022

Changes from Recent Filing:

Modified calculation of Incremental Cost to include the following items in the baseline costs: AC in lieu of ASHP, Baseline HE Furnace or Boiler or ER Heat, and Baseline air moving equipment when the baseline is electric resistance w/ AC or Boiler w/ AC.
Updated Proposed and Baseline Costs
Included Minimum Qualifying levels for SEER2, EER2, and HSPF2 for all AC and Heat Pump equipment based on IECC2021 where applicable. See Deemed Tables tab.
Removed QI Sizing Loss factors from full load cooling. Sizing should have been heating load basis.

18.2 Residential Ground Source Heat Pump

Algorithms

$Customer\ kW\ Savings = Customer\ kW_{EqCooling} + Customer\ kW_{QICooling}$

$Customer\ Coincident\ kW\ Savings = Customer\ Coincident\ kW_{Equipment} + Customer\ Coincident\ kW_{QI}$

AC Cooling with Gas Heat Baseline EE Savings:

$Customer\ kWh\ Cooling\ Savings = Customer\ kWh_{EqCooling} + Customer\ kWh_{QICooling}$

$Customer\ Rebate = Rebate/Heating\ ton\ x\ \frac{Size_{Heat}}{12{,}000}$

$EE\ Incrmenetal\ Capital\ Cost = EE\text{-}BE\ Cost\ Split\ x\ (\ Incremental\ Capital\ Cost_{Equipment} + Incremental\ Capital\ Cost_{QI}\ )$

$EE\ Rebate = Customer\ Rebate\ x\ EE\text{-}BE\ Cost\ Split$

AC Cooling with Gas Heat Baseline BE Savings:

$Customer\ kWh\ ~~Cooling~~\ Heating\ Savings = Customer\ kWh_{EQ}\&_{QIHeating}\ Penalty + Customer\ Furnace\ Fan\ kWh$

$BE\ Incremental\ Cost = (\ Incremental\ Capital\ Cost_{Equipment} + Incremental\ Capital\ Cost_{QI}\ )\ -\ EE\ Incremental\ Cost$

$BE\ Rebate = Customer\ Rebate\ -\ EE\ Rebate$

$Customer\ DTherms\ Savings = Customer\ GSHP\ DTh_{EQ}\&_{QIHeating}$

AC Cooling with Electric Resistance Heat Baseline:

$Customer\ kWh\ Savings = Customer\ kWh_{EqCooling} + Customer\ kWh_{QICooling} + Customer\ kWh_{EQHeating} + Customer\ kWh_{QIHeating}$

Detailed Caluculations:

$$Customer\ kW_{EqCooling} = \frac{Full_Load_Cool}{12{,}000} \times \left(\left(\frac{12}{EER_{baseline}}\right) - \left(\frac{12}{EER_{proposed}}\right)\right)$$

$$Customer\ kW_{QICooling} = \frac{Full_Load_Cool}{12{,}000} * 12/(EER_proposed\ ) * ((\frac{1}{1 - Loss_{NoQI}}) - \left(\frac{1}{1 - Loss_{Uncorr}}\right))$$

$$Customer\ Coincident\ kW_{Equipment} = Coincidence\ Factor * \frac{Full_Load_Cool}{12{,}000} * (\left(\frac{12}{EER_{baseline}}\right) - \left(\frac{12}{EER_{Cooling}}\right))$$

$$Customer\ Coincident\ kW_{QI} = Coincidence\ Factor * \frac{12}{EER_{Cooling}} * \frac{Full_Load_Cool}{12{,}000} * ((\frac{1}{1 - Loss_{NoQI}}) - \left(\frac{1}{1 - Loss_{Uncorr}}\right))$$

$$Customer\ kWh_{EqCooling} = \frac{Full_Load_Cool}{12{,}000} * EFLH_{cooling} * ((\frac{12}{SEER_{baseline}}) - \left(\frac{12}{SEER_{proposed}}\right))$$

$$Customer\ kWh_{QICooling} = \frac{Full_Load_Cool}{12{,}000} * EFLH_{cooling} * \frac{12}{SEER_{proposed}} * ((\frac{1}{1 - Loss_{NoQI}}) - \left(\frac{1}{1 - Loss_{Uncorr}}\right))$$

$$Incremental\ Capital\ Cost_{Equipment} = \frac{Size_{Heat}}{12{,}000} * (\ GSHP_Cost_per_Heat_Ton\ ) - Full_{Load_{Cooling}}/12000 * Base_AC_Cost_per_Ton - Base_Furnace_Cost$$

$$Incremental\ Capital\ Cost_{QI}\ New\ Home = Inc\ Cost_{QI}$$

$$Incremental\ Capital\ Cost_{QI}\ E\ Home = MAX(75, Inc\ Cost_{QI} - \frac{Size_Heat}{12{,}000} * (\left(\frac{1}{1 - Sizing\ Loss}\right) - 1) * Cost\ per\ Ton_{baseline}))$$

$$load\ profile\ slope\ (m) = \frac{(-1 * Size_{Heat} - - ~~balance\ pt~~\ No\ load\ Point)}{(\ Min\ OAT\ - ~~balance~~\ NoLoad\ \ pt\ Temp\ )}$$

*load profile y intercept (b) = (-1 * Size_Heat) - (m * Min OAT)*

*Full_Load_Cooling = m * Max OAT + b*

$Customer\ kWh_{EQ}\&_{QIHeating}\ Penalty = Size_Heat * EFLH_Heat * (1 / (COP_Eff * 3.412\ ) / 1000 * (\ (\ 0\ -\ 1/(\ 1 - Loss_uncorr)\ )$

$Customer\ GSHP\ DTh_{EQ}\&_{QIHeating} = Size_Heat * 1/(1 - Loss_No_QI_Duct_Leakage\ ) * EFLH_Heat * (\ 1 / Baseline\ Gas\ Eff\ ) / 100000$

*Customer Furnace Fan kWh = Furnace_Fan_kW * EFLH_Heat*

$Customer\ kWh_{EQHeating} = Size_Heat * EFLH_Heat * (\ (\ 1 / (COP_baseline * 3.412\ ) - (1 / (COP_Eff * 3.412)\ )/1000$

$$Customer\ kWh_{QIHeating} = Size_{Heat} * EFLH_{Heat} * (\ 1 / (COP_baseline * 3.412\ )/1000 * \left(\frac{1}{1 - Sizing\ Loss} - 1\right) + \frac{1}{(\ COP_{Eff} * 3.412\ )}/1000 * \left(\frac{1}{1 - loss_{No_{QI}}} - \frac{1}{1 - Loss_{uncorr}}\right))$$

Variables

m_load_profile	Calculated	load profile slope (m)
b_load_profile	Calculated	load profile y intercept (b)
Full Load Cooling	Calculated	calculated full load cooling BTUH required to serve the home or space at the maximum Outside Air Temperature
COP_Baseline	See Table 18.0.3	Baseline COP for Ground Source Heat Pump system with Electric Resistance Baseline
Baseline Gas Eff	See Table 18.6.2	Efficinecy of the baseline gas furnace
EER_Base	See Table 18.0.3	Efficinecy of the baseline Air Condtioner
GSHP_Cost_per_Heat_Ton	See Table 18.2.1	Cost per heating ton of a ground source heat pump system including wells
Base_AC_Cost_per_Ton	See Table 18.2.1	Cost per cooling ton of a baseline AC unit sized to meet cooling load
Base_Furnace_Cost	See Table 18.2.1	Cost of a furnace sized to meet GSHP heating load including oversize and altitude adjustment factors.
EFLH cooling	See Table 18.0.1	Effective Full Load Hours for cooling load energy savings
EFLH_Heat	See Table 18.0.1	Effective Full Load Hours for heating load energy savings
~~Balance~~ No Load Pt Temp	See Table 18.0.7	Outdoor Ambient Temperature at which residential cooling and heating loads are zero BTUH
Max OAT	See Table 18.0.7	Maximum Outdoor Ambient Temperature used in building ASHP load profile
Min OAT	See Table 18.0.7	Minimum Outdoor Ambient Temperature for caluclating full load heating.
~~Balance Pt~~ No Load Point	See Table 18.0.7	BTUH - Heating and cooling loads are zero at the balance point outdoor ambient temperature
Furnace_Fan_kW	0.257	Furnace Fan EC Motor kW demand for baseline energy calculations
Electric Resistance Heat HSPF	3.412	Electric resistance heat assumed heating season performance factor based on a COP of 1. no climate zone correction required.
EE-BE Cost Split	50.0% ~~21.4%~~	The total incremental cost and the rebate for each new heat pump measure will be divided using this split into a Beneficial Electrification (BE) portion for heating and an Energy Efficiency (EE) portion for Cooling.
Minimum Qualifying Efficiency	See Table 18.0.2	
Lifetime	See Table 18.0.4	

Customer Inputs	**M&V Verified**	
Size_Heat	Yes	AHRI rated Heating Capacity
COP_Eff	Yes	AHRI rated Heating COP
Size_Cool	Yes	AHRI rated Cooling Capacity
EER_Eff	Yes	AHRI rated Cooling Efficiency
Home Type	Yes	Existing ~~or New home~~
Baseline Heat Type	No	For Existing Homes there is a choice of Electric Resistance or Gas Heat. For New Homes the baseline will be Electric Resistance.
~~County~~	~~No~~	~~Location of the home for determining weather zones.~~

Table 18.2.1 Incremental Capital Costs - Reference 8

	Baseline AC Cost per Ton w/ Labor	Baseline Cost of Heat / kBTUH	Baseline Air Handler	Proposed Cost per Heat Ton Including Wells
GSHP - w/ Gas Furance & AC Baseline	$ 2,507.42	$ 48.37		$ 6,960.00
GSHP - w/ ER Heat & Air Handler & AC Baseline	$ 2,507.42	$ 40.00	$ 1,200.00	$ 6,960.00
GSHP - w/ Boiler Heat & Air Handler & AC Baseline	$ 2,507.42	$ 74.22	$ 1,200.00	$ 6,960.00

References:

See 18.0 Residential HVAC Deemed Tables for all References listed

Changes from Recent Filing:

modified application of QI Sizing Loss factors to apply to size heat in lieu of full load size cool (which is a calculated value).

18.3 Residential ~~Air Source~~ Ducted Heat Pumps

Algorithms

$Customer\ kW\ Savings = Customer\ kW_{Cooling}$

$Customer\ Coincident\ kW\ Savings = Customer\ Coincident\ kW_{Cooling}$

Customer Rebate = Rebate/Heating ton x $\frac{Size_Cool}{12{,}000}$

~~*Non-Ducted*~~ *Electric Resistance Heat Baseline:*

$Customer\ kWh\ Savings = Customer\ kWh_{Cooling} + Customer\ kWh_{EQHeating} + Customer\ kWh_{QIHeating}$

Dual Fuel Gas Heat Baseline Energy Efficiency (EE) Portion:

$Customer\ Coincident\ kW\ Savings = Customer\ Coincident\ kW_{Cooling}$

EE Incremental Capital Cost = $EE\text{-}BE\ Cost\ Split\ x\ (\ Incremental\ Capital\ Cost_{Equipment} + Incremental\ Capital\ Cost_{QI}\ )$

EE Rebate = Customer Rebate x EE-BE Cost Split

Dual Fuel Gas Heat Baseline BE Portion:

Customer kWh Heating Savings = $Customer\ kWh_Heating\ Penalty$

BE Incrmental Capital Cost = $(\ Incremental\ Capital\ Cost_{Equipment} + Incremental\ Capital\ Cost_{QI}\ )$ *- EE Incrmental Capital Cost*

BE Rebate = Customer Rebate - $EE\ Rebate$

Customer Dtherm Savings = Customer DTherms_EQ Heating + Customer DTherm_QI Heating

Detailed Calculations:

$EER2_{baseline} = iCoef0 * (SEER2_{baaseline}^{2}) + iCoef1 * SEER2_{baseline} + iCoef2$

$Customer\ kW_{Cooling} = \frac{Size_{Cool} * (1/(1-Sizing\ Loss)) * 1/(1+AC\ Oversize\ Factor)}{12{,}000} * \left(\frac{12}{EER_{baseline} * (1-Loss_{NoQI})}\right) - \frac{Size_{Cool} * 1/(1+AC\ Oversize\ Factor)}{12{,}000} * \left(\frac{12}{EER_{proposed} * (1-Loss_{Uncorr})}\right)$

$Customer\ kWh_{Cooling} = EFLH_{cooling} * \left(\frac{Size_{Cool} * (1/(1-Sizing\ Loss)) * 1/(1+AC\ Oversize\ Factor)}{12{,}000} * \left(\frac{12}{SEER_{baseline} * (1-Loss_{NoQI})}\right) - \frac{Size_{Cool} * 1/(1+AC\ Oversize\ Factor)}{12{,}000} * \left(\frac{12}{SEER_{proposed} * (1-Loss_{Uncorr})}\right)\right)$

$Customer\ Coincident\ kW_{Cooling} = Coincidence\ Factor * Customer\ kW_{Cooling}$

$Incremental\ Capital\ Cost_{Equipment} = Cost\ per\ Ton_{Proposed} * \frac{Size_{Cool}}{12{,}000} - Cost\ per\ Ton_{baseline} * \frac{Size_{Cool}}{12{,}000}$ *- Cost / kBTUh_Heat * Full_Load_Heat / 1000 - Baseline Air Handling*

$Incremental\ Capital\ Cost_{QI}\ New\ Home = Inc\ Cost_{QI}$

$Incremental\ Capital\ Cost_{QI}\ E\ Home = MAX(75, Inc\ Cost_{QI} - \frac{Size_Cool}{12{,}000} * \left(\left(\frac{1}{1-Sizing\ Loss}\right) - 1\right) * Cost\ per\ Ton_{baseline})$

QI Only Measures:

$Customer\ kW_{Cooling_QI} = \frac{Size_{Cool} * (1/(1-Sizing\ Loss)) * 1/(1+AC\ Oversize\ Factor)}{12{,}000} * \left(\frac{12}{EER_{proposed} * (1-Loss_{NoQI})}\right) - \frac{Size_{Cool} * 1/(1+AC\ Oversize\ Factor)}{12{,}000} * \left(\frac{12}{EER_{proposed} * (1-Loss_{Uncorr})}\right)$

$Customer\ kWh_{Cooling} = EFLH_{cooling} * \left(\frac{Size_{Cool} * (1/(1-Sizing\ Loss)) * 1/(1+AC\ Oversize\ Factor)}{12{,}000} * \left(\frac{12}{SEER_{proposed} * (1-Loss_{NoQI})}\right) - \frac{Size_{Cool} * 1/(1+AC\ Oversize\ Factor)}{12{,}000} * \left(\frac{12}{SEER_{proposed} * (1-Loss_{Uncorr})}\right)\right)$

ASHP Heating Energy Savings

m_load_profile = (~~*balance pt*~~ *No load Point -* $Size_Cool * 1/(1 + AC\ Oversize\ Factor))$ */ (* ~~*balance*~~ *No Load* No Load pt temp - Max OAT)

b_load_profile = $Size_Cool * 1/(1 + AC\ Oversize\ Factor)$ *- (m_load_profile * Max OAT)*

*Full Load Heat = m_load_profile * Min OAT + b_load_profile*

Non-Ducted Electric Resistance Heat Baseline:

$Customer\ kWh_{ER_Base_Heating}$ *= -1 * Full_Load_Heat * EFLH_Heating_HP * (1 / (HSPF_Baseline * HSPF_Adj_Factor) - 1 / (HSPF_Proposed * HSPF_Adj_Factor * (1 - Uncorr_Loss))) / 1000*

Dual Fuel Gas Heat Baseline Including QI Only Measures:

*Customer DTherms_EQ Saved = (-1 * Full_Load_Heat * EFLH_Heating_HP * (1 / (1 - Loss_DuctLeakage)))/ COP_Baseline / 1,000,000*

Customer Remaining DTherms_QI = -1 Full_Load_Heat * (EFLH_Heat - EFLH_Heating_HP) * (1/ COP_Baseline * 1 / (1 - Loss_DuctLeakage) - 1/ COP_Backup_Heat * 1 / (1 - Uncorr_Loss)) / 1,000,000*

Customer Remaining Dtherms_Full Electrification = -1 Full_Load_Heat * (EFLH_Heat - EFLH_Heating_HP) / COP_Baseline * (1 / (1 - Loss_DuctLeakage)) / 1,000,000*

*Customer kWh_Heating Penalty = Furnace_Fan_kW * EFLH_Heating_HP * (1 / (1 - Loss_DuctLeakage)) - Full_Load_Heat * EFLH_Heating_HP * (1 / (1 - Uncorr_Loss)) * (0 - (1 / (HPSF_Proposed*HSPF_Adj_Factor))) / 1000*

*Customer kWh_Heating Full Electrification = Customer kWh_Heating Penalty + Furnace_Fan_kW * (EFLH_Heat - EFLH_Heating_HP) - Full_Load_Heat * (EFLH_Heat - EFLH_Heating_HP) * (0 - 1 /(COP_Backup_Heat * 3.412)* (1 / (1- Uncorr_Loss))) / 1000*

Customer DTherms/Hr_Full Electrification = -1 Full_Load_Heat / COP_Baseline / 1,000,000*

*Customer Winter Peak kW = -1 * Full_Load_Heat / 3412*

Note: All formulas using SEER, EER, and HSPF are valid with SEER2, EER2, HSPF2 substitutions.

Variables

Cost per Ton_Proposed	See Table 18.3.1	Proposed Capital Cost per Ton for new ASHP.
Cost per Ton_Baseline	See Table 18.3.1	Baseline capital cost per ton for AC equipment
EER baseline	See Table 18.0.3	Baseline EER as calculated for residential equipment from the code required SEER.
SEER baseline	See Table 18.0.3	IECC 2012 identified code minimum SEER
COP_Baseline	See Table 18.0.3	Baseline heating efficiency. Based on the type of backup heat selected. Condensing will be 0.95, Non-Condensing will be 0.8, and Electric Resistance will be 1.0. A COP of 1 and does not require climate zone correction.
COP_Backup_Heat	See Table 18.0.3	Backup heating efficiency. Based on the type of backup heat selected. Condensing will be 0.95, Non-Condensing will be 0.8, and Electric Resistance will be 1.0. A COP of 1 and does not require climate zone correction.
Sizing Loss	See Table 18.0.5	
Loss_NoQI	See Table 18.0.5	
Loss_Uncorr	See Table 18.0.5	
Inc Cost_QI	See Table 18.0.5 9	Incremental Cost for QI in an Existing Home system retrofit
Coincidence Factor_EQ	See Table 18.0.4	
Coincidence Factor_QI	See Table 18.0.4	
EFLH cooling	See Table 18.0.1	Effective Full Load Hours for cooling load energy savings
EFLH_Heat	See Table 18.0.1	Effective Full Load Hours for heating load QI energy savings
EFLH_Heating_HP	See Table 18.0.1	Effective Full Load Hours for Heat Pump impacted energy savings
Balance Pt Temp	See Table 18.0.7	Outdoor Ambient Temperature at which residential cooling and heating loads are zero BTUH
Max OAT	See Table 18.0.7	Maximum Outdoor Ambient Temperature used in building ASHP load profile
Min OAT	See Table 18.0.7	Minimum Outdoor Ambient Temperature for caluclating full load heating.
Electric Resistance Heat HSPF	3.412	Electric resistance heat assumed heating season performance factor based on a COP of 1.
~~Balance Pt~~ No Load Point	See Table 18.0.7	Heating and cooling loads are zero at the ~~balance~~ No Load point outdoor ambient temperature
Furnace_Fan_kW	0.257	Furnace Fan EC Motor kW demand for baseline energy calculations
ASHP / MSHP operating temperature cutoff	35	Outdoor Ambient Temperature below which heat pump operation ceases and gas furnace or
Cost / kBTUh Heat - Baseline Furnace	$ 59.72	Average High Efficiency Furnace Cost / kBTUH; installed costs
Cost / kBTUh Heat - Baseline Boiler	$ 89.77	Average High Efficiency Boiler Cost / kBTUH; installed costs
Cost / kBTUh Heat - Baseline Electric Resistance	$ 40.00	Average Cost for electric duct heater / kBTUH; installed costs
Baseline Air Handler	$ 1,200.00	Conditioning; installed costs
HSPF_Adj_Factor	See Table 18.0.1	Adjustment factor for correcting HSPF from published data in AHRI's Climate Zone IV to AHRI's Climate Zone V. The HSPF_Adjustment_Factor for Electric Resistance Heat will be 1.
HSPF_Basline	See Table 18.0.3	Heating season performance factor of baseline equipment. For electric resistance heat baseline, a COP of 1 is assumed with no climate zone correction required.
AC Oversize Factor	10%	Air Conditioning Oversize factor to account for safety factors in load calculations and rounding to available equipment sizes.
Measure Life - Matched Split-System Air -Source Heat Pump	See Table 18.0.3	Reference 16
Measure Life - Quality Installation	18	Reference 16
Conversion Factors	See Table 18.0.5	
EE-BE Cost Split	50.0% ~~28.1%~~	The total incremental cost and the rebate for each new heat pump measure will be divided using this split into a Beneficial Electrification (BE) portion for heating and an Energy Efficiency (EE) portion for Cooling.

Customer Inputs	**M&V Verified**	
Size Cool	Yes	AHRI rated Cooling Capacity at 95 F
Size Heat_47	Yes	AHRI rated Heating Capacity at 47 F
~~Quantity proposed equipment~~	~~Yes~~	
EER proposed	Yes	AHRI rated full load Cooling Efficiency
SEER proposed	Yes	AHRI rated part load Cooling Efficiency
Home Type	Yes	Single Family, Multi-Family
~~County~~	~~Yes~~	~~Location of the home for determining weather zones.~~
Baseline Heat Efficiency	Yes	baseline heating Eff; Condensing, Non-Condensing, Electric Resistance
Backup Heat Efficiency	Yes	backup heating Eff; Condensing, Non-Condensing, Electric Resistance
HSPF Proposed	Yes	AHRI rated Heating HSPF (Region IV)

Table 18.3.1. Capital Costs - Reference 28

	ASHP Cost per Ton	AC Cost per Ton
13.4 SEER2 Baseline Air Conditioner	N/A	$ 2,507.42
14.2+ SEER2 ~~Non-Cold Climate~~ Ducted Heat Pump	$ 3,065.00	N/A
15.2+ SEER2 ~~Non-Cold Climate~~ Ducted Heat Pump with Furnace	$ 7,962.61	N/A
15.2+ SEER2 ~~Non-Cold Climate~~ Ducted Heat Pump w/out Furnace	$ 5,360.52	N/A

Assumptions:

Deemed Cutover temperature to Backup Heat source set to 35 F.

References:

1. Building America, Research Benchmark Definitions, 2010. (see p. 10) http://www.nrel.gov/docs/fy10osti/47246.pdf
2. ASHRAE, 2019, Applications Handbook, Ch. 38, table 4, Comparison of Service Life Estimates
3. DOE Appliance Standards Website, Residential Central Air Conditioners and Heat Pumps.
4. Neme, Proctor, Nadel, ACEEE, 1999. Energy Savings Potential From Addressing Residential Air Conditioner and Heat Pump Installation Problems, http://aceee.org/research-report/a992
5. State of Minnesota Technical reference Manual For Energy Conservation Improvement Programs, Version 3.1 https://mn.gov/commerce/industries/energy/utilities/cip/technical-reference-manual/
6 ENERGY STAR Quality Installation standards (ESVI). https://www.energystar.gov/index.cfm?c=hvac_install.hvac_install_index
7. NREL 2011 Measure Guideline Sealing and Insulating Ducts in Existing Homes. http://www.nrel.gov/docs/fy12osti/53494.pdf
8. State of Illinois Technical Reference Manual Version 8, dated 2020
9. For explanation of duct sealing requirements for new homes see "Significant Changes to the 2015 Minnesota Residential Codes (MR 1303, 1309 and 1322)".
10. Incremental costs for MSHPs were determined from the NEEP Incremental Cost Study Phase 2 Report
11. MSHP equipment life is from Measure Life Report Residential and Commercial/Industrial Lighting and HVAC Measures; http://library.cee1.org/content/measure-life-report-
12. For estimated life of GSHP see http://www.energysavers.gov/your_home/space_heating_cooling/index.cfm/mytopic=12640 (indoor components up to 25 years; ground loop =50 years)
13. Costs obtained from "2010-2012 WO017 Ex Ante Measure Cost Study Final Report", by Itron, May 2014. These are used in the DEER 2016 database.
14.For assumptions on losses related to overcharge or undercharge on refrigerant see "Sensitivity Analysis of Installation Faults on Heat Pump Performance", by P. Domanski, et. al., Sept 2014, http://www.acca.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=f02c1f61-4d1d-4a24-971d-cc9ea3e626b2&forceDialog=0
15. ENERGY STAR Connected Thermostat Key Product Criteria, Version 1.0, Rev. Jan 2017 - https://www.energystar.gov/products/heating_cooling/smart_thermostats/key_product_criteria
16. Code of Federal Regulations Title 10: Energy PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS Subpart C—Energy and Water
17: "Measure Life Report - Residential and Commercial/Industrial Lighting and HVAC Measures", dated June 2007 for The New England State Program Working Group prepared
18. Assumptions on EC fan operating modes. Center for Energy and Environment Comments to Docket Number EERE-2010-BT-STD-0011-0022, July 27, 2010
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23. http://wpb-radon.com/radon_fan_performance.html33:5032:50A33:50
24. Information from manufacturer and contractors (Radonaway)
25. https://www.radonaway.com/products/radon-fans/rp140-pro.php
26. Energy Information Administration's (EIA) 2009 Residential Energy Consumption Survey (RECS)
27. Bin analysis using RECS data for thermostat operation and typical CO home cooling and heating conditions.
28. Analysis of Invoices from Xcel Energy Rebated systems in 2022

Changes from Recent Filing:

Modified calculation of Incremental Cost to include the following items in the baseline costs: AC in lieu of ASHP, Baseline HE Furnace or Boiler or ER Heat, and Baseline air Updated Proposed and Baseline Costs

Included Minimum Qualifying levels for SEER2, EER2, and HSPF2 for all AC and Heat Pump equipment based on IECC2021 where applicable.

Modified QI Sizing Loss Factor formula applications.

18.4 ~~Mini-Split~~ Non-Ducted Heat Pumps AND Partially Ducted Heat Pumps

Algorithms

$Customer\ kW\ Savings = Customer\ kW_{EqCooling}$

$Customer\ Coincident\ kW\ Savings = Customer\ Coincident\ kW_{Equipment}$

$Customer\ Rebate = Rebate/Cooling\ ton\ x\ \frac{Size_Cool}{12{,}000}$

Electric Resistance Heat Baseline:

$Customer\ kWh\ Savings = Customer\ kWh_{EqCooling} + Customer\ kWh_{EQHeating}$

Dual Fuel Gas Heat Baseline EE Savings:

$Customer\ kWh\ Cooling\ Savings = Customer\ kWh_{EqCooling}$

$Incremental\ EE\ Cost = EE\text{-}BE\ Cost\ Split\ x\ Incremental\ Capital\ Cost_{Equipment}$

$EE\ Rebate = EE\text{-}BE\ Cost\ Split\ x\ Customer\ Rebate$

Dual Fuel Gas Heat Baseline BE Savings:

$Customer\ kWh\ Heating\ Savings = Customer\ kWh_Heating\ Penalty$

$Customer\ Dtherm\ Savings = Customer\ DTherms_EQ\ Heating$

$Incremental\ BE\ Cost = Incremental\ Capital\ Cost_{Equipment} - Incremental\ EE\ Cost$

$BE\ Rebate = Customer\ Rebate - EE\ Rebate$

$EER_{baseline} = iCoef0_c * SEER_Base\ ^2 + iCoef1_c * SEER_Base + iCoef2_c$

$$Customer\ kW_{EqCooling} = Qty_{prop} * \frac{Size_{Cool}}{12{,}000} * \left(\left(\frac{12}{EER_{baseline} * (1 - Loss_{NoQI})}\right) - \left(\frac{12}{EER_{proposed}}\right)\right)$$

$$Customer\ kWh_{EqCooling} = Qty_{Prop} * \frac{Size_Cool}{12{,}000} * EFLH_{cooling} * \left(\left(\frac{12}{SEER_{baseline} * (1 - Loss_{NoQI})}\right) - \left(\frac{12}{SEER_{proposed}}\right)\right)$$

$$Customer\ Coincident\ kW_{equipment} = Qty_{Prop} * Coincidence\ Factor * \frac{Size_Cool}{12{,}000} * \left(\left(\frac{12}{EER_{baseline} * (1 - Loss_{NoQI})}\right) - \left(\frac{12}{EER_{Proposed}}\right)\right)$$

$NOTE: \quad (1 - Loss_{NoQI})$ *is based on the Baseline AC QI Factor*

$$Incremental\ Capital\ Cost_{Equipment} = Qty_{Prop} * (Qty_Indoor_Heads * Cost/Eff_Indoor_Head - Cost\ Per\ Ton\ Baseline * \frac{Size_Cool}{12{,}000} - Cost\ per\ kBTUh\ heat * (Full_Load_Heat/COP_Baseline)/1000 - Baseline_Air_Handler)$$

MSHP Heating Energy Savings

m_load_profile = (balance pt load - Size_Cool) / (balance pt temp - Max OAT)

*b_load_profile = Size_Cool - (m_load_profile * Max OAT)*

*Full Load Heat = m_load_profile * Min OAT + b_load_profile*

*HSPF_Baseline_Adj = HSPF_Baseline * HSPF_Adjustment_Factor*

*HSPF_Proposed_Adj = HSPF_Proposed * HSPF_Adjustment_Factor*

$Customer\ kWh_{EQHeating} = Qty_{Prop} * (-1 * Full_Load_Heat * EFLH_Heating_HP * (1 / HSPF_Baseline_Adj - 1 / HSPF_Proposed_Adj) / 1000$

$Customer\ DTherms_EQ\ Saved = (-1 * Full_Load_Heat * EFLH_Heating_HP * (1/* (1 - Loss_{DuctLeakage}))) / COP_Baseline / 1{,}000{,}000$

*Customer kWh_Heating Penalty = Furnace_Fan_kW * EFLH_Heating_HP * (1 / (1 - Loss_DuctLeakage)) + (- 1) * Full_Load_Heat * EFLH_Heating_HP * (0 - (1 / (HPSF_Proposed*HSPF_Adj_Factor))) / 1000*

Note: All formulas using SEER, EER, and HSPF are valid with SEER2, EER2, HSPF2 substitutions.

Variables

$Inc\ Cost\ per\ Ton_EQ$	See Table 18.4.2	Deemed Plan A Incremental Capital Cost per Ton, Based On Unit Efficiency (New Construction)
$Cost\ per\ Ton_baseline$	See Table 18.4.2	Baseline capital cost per ton for equipment
EER baseline	See Table 18.0.3	Baseline EER or EER2 for the Proposed Equipment as selected in the table.
SEER baseline	See Table 18.0.3	Baseline SEER or SEER2 for the Proposed Equipment as selected in the table.
HSPF_Baseline	See Table 18.0.3	Baseline HSPF or HSPF2 for the Proposed Equipment as selected in the table. For Electric Resistance Heat Baseline the HSPF will be 3.412 based on a Heating COP of 1 and does not require climate zone correction.
COP_Baseline	See Table 18.0.8	Baseline heating efficiency. Based on the type of backup heat selected. Condensing will be 0.95, Non-Condensing will be 0.8, and Electric Resistance will be 1.0. A COP of 1 and does not require climate zone correction.
COP_Backup_Heat	See Table 18.0.8	Backup heating efficiency. Based on the type of backup heat selected. Condensing will be 0.95, Non-Condensing will be 0.8, and Electric Resistance will be 1.0. A COP of 1 and does not require climate zone correction.
$Loss_NoQI$	See Table 18.0.5	Loss Factor associated with the baseline AC.
Coincidence Factor	See Table 18.0.4	
iCoef0	See Table 18.4.1	MSHP SEER2 to EER2 Conversion Coefficient
iCoef1	See Table 18.4.1	MSHP SEER2 to EER2 Conversion Coefficient
iCoef2	See Table 18.4.1	MSHP SEER2 to EER2 Conversion Coefficient

EFLH_Cooling	See Table 18.0.1	Effective Full Load Hours for cooling load energy savings
EFLH_Heating_HP	See Table 18.0.1	Effective Full Load Hours for Heat Pump impacted energy savings
ASHP / MSHP operating temperature cutoff	35	Outdoor Ambient Temperature below which heat pump operation ceases and backup heating (either electric resistance or gas fired) begins.
~~Balance~~ No Load Pt Temp	See Table 18.0.7	Outdoor Ambient Temperature at which residential cooling and heating load profiles equal zero BTUH
Max OAT	See Table 18.0.7	Maximum Outdoor Ambient Temperature used in building ASHP load profile; TMY3 basis
Min OAT	See Table 18.0.7	Minimum Outdoor Ambient Temperature for caluclating full load heating; TMY3 Basis.
HSPF_Adj_Factor	See Table 18.0.1	Adjustment factor for correcting HSPF from published data in climate zone IV to Minnesota Climate zone V. The HSPF_Adjustment_Factor for Electric Resistance Heat will be 1.
~~Balance Pt~~ No Load Point	See Table 18.0.7	BTUH - Heating and cooling loads are zero at the ~~balance~~ No Load point outdoor ambient temperature
m_load_profile	Calculated	load profile slope (m)
b_load_profile	Calculated	load profile y intercept (b)
Full Load Heat	Calculated	calculated full load heating BTUH required to serve the home or space at the minimum Outside Air Temperature
Cost / kBTUh Heat - Baseline Furnace	$ 59.72	Average High Efficiency Furnace Cost / kBTUH; installed costs
Cost / kBTUh Heat - Baseline Boiler	$ 89.77	Average High Efficiency Boiler Cost / kBTUH; installed costs
Cost / kBTUh Heat - Baseline Electric Resistance	$ 40.00	Average Cost for air handler and electric duct heater / kBTUH; installed costs
Baseline Air Handler	$ 1,200.00	Average Cost for Baseline Air Handler for use with ER Heat or Boiler Heat associated with Air Conditioning; installed costs
Lifetime	See Table 18.0.4	Measure Lifetime for MSHPs.
Minimum Qualifying Efficiency	See Table 18.0.2	
EE-BE Cost Split	50.0% ~~31.5%~~	The total incremental cost and the rebate for each new heat pump measure will be divided using this split into a Beneficial Electrification (BE) portion for heating and an Energy Efficiency (EE) portion for Cooling.

Customer Inputs	**M&V Verified**	
Size Cool	Yes	AHRI rated Cooling Capacity
~~Quantity proposed equipment~~	~~Yes~~	~~The Quantity of Outdoor Units. Only applies if the Outdoor Unit's Size AND the quantity and size of the Indoor Units served by each outdoor unit are identical.~~
Quantity Indoor Heads	Yes	The Quantity of Indoor Heads + Coils served by a single Outdoor Unit.
EER proposed	Yes	AHRI rated full load Cooling Efficiency
SEER proposed	Yes	AHRI rated part load Cooling Efficiency
Home Type	Yes	Single Family, Multi-Family
~~County~~	~~Yes~~	~~Location of the home for determining weather zones.~~
Baseline Heat Type	Yes	Baseline heating type; gas furnace or electric resistance backup heat
Baseline Heat Efficiency	Yes	baseline heating Eff; Condensing, Non-Condensing, Electric Resistance
Backup Heat Efficiency	Yes	backup heating Eff; Condensing, Non-Condensing, Electric Resistance
HSPF Proposed	Yes	AHRI rated Heating HSPF

Table 18.4.1: SEER Conversion Coefficients

Equpiment type	Coef0	Coef1	Coef2
MSHP - SEER2 to EER2	-0.0088000	0.8828200	-2.2811300

Table 18.4.2 Incremental Capital Costs - Mini-Split Heat Pump

Mini-Split Heat Pump	Baseline AC Cost per Cooling Ton	Cost/Efficient Indoor Head or Coil
~~Mini-Split Heat Pump (15+ SEER, 11.5+ EER, 9+ HSPF)~~	~~$ 2,507.42~~	~~$ 5,291.23~~
~~Multi-Split Heat Pump (15+ SEER, 11.5+ EER, 9+ HSPF)~~	~~$ 2,507.42~~	~~$ 4,508.69~~
~~Mini-Split Heat Pump (15.2+ SEER2, 11.5+ EER2, 7.8+ HSPF2)~~ Non-Ducted Heat Pump - Single Head/Coil	$ 2,507.42	$ 5,291.23
~~Multi-Split Heat Pump (15.2+ SEER2, 11.5+ EER2, 7.8+ HSPF2)~~ Non-Ducted Heat Pump - Multi-Head	$ 2,507.42	$ 4,508.69
Partially Ducted Heat Pump * ~~- Multi-Split~~	$ 2,507.42	$ 4,508.69

* Partially ducted systems assume a minimum of 2 indoor coils (one ducted and one non-ducted)

References:

~~See 18.1 Residential AC references~~
See 18.0 Residential HVAC Deemed Tables for all References listed

Changes from Recent Filing:

Modified calculation of Incremental Cost to include the following items in the baseline costs: AC in lieu of MSHP, Baseline HE Furnace or Boiler or ER Heat, and Baseline air moving equipment when the baseline is electric resistance w/ AC or Boiler w/ AC.
Modified Deemed Cutover temperature to Backup Heat source from 25 F to 35 F.
Updated Proposed and Baseline Costs
Included Minimum Qualifying levels for SEER2, EER2, and HSPF2 for all AC and Heat Pump equipment based on IECC2021 where applicable. See Deemed Tables tab.

18.5 Non-Ducted cold climate ~~Mini-Split~~ Heat Pumps AND Partially Ducted cold climate Heat Pumps

Algorithms

$Customer\ kW\ Savings = Customer\ kW_{EqCooling}$

$Customer\ Coincident\ kW\ Savings = Customer\ Coincident\ kW_{Equipment}$

$Customer\ Rebate = Rebate/Heating\ ton\ x\ \frac{Size_{Heat_5}}{12{,}000}$

Electric Resistance Heat Baseline:

$Customer\ kWh\ Savings = Customer\ kWh_{EqCooling} + Customer\ kWh_{EQHeating}$

Dual Fuel Gas Heat Baseline EE Savings:

$Customer\ kWh\ Cooling\ Savings = Customer\ kWh_{EqCooling}$

$Incremental\ EE\ Captial\ Cost = \ EE\text{-}BE\ Cost\ Split\ x\ Incremental\ Capital\ Cost_{Equipment}$

EE Rebate = Customer Rebate x EE-BE Cost Split

Dual Fuel Gas Heat Baseline BE Savings:

Customer kWh Heating Savings = Customer kWh_Heating Penalty

Customer Dtherm Savings = Customer DTherms_EQ Heating

$Incremental\ BE\ Capital\ Cost = Incremental\ Capital\ Cost_{Equipment}$ *- Incremental EE Captial Cost*

BE Rebate = Customer Rebate - EE Rebate

Caluclation Details:

$$Customer\ kW_{EqCooling} = Qty_{prop} * \frac{Full_Load_Cool}{12{,}000} * \left(\left(\frac{12}{EER_{baseline} * (1 - Loss_{NoQI})}\right) - \left(\frac{12}{EER_{proposed}}\right)\right)$$

$$Customer\ kWh_{EqCooling} = Qty_{Prop} * \frac{Full_Load_Cool}{12{,}000} * EFLH_{cooling} * \left(\left(\frac{12}{SEER_{baseline} * (1 - Loss_{NoQI})}\right) - \left(\frac{12}{SEER_{proposed}}\right)\right)$$

$$Customer\ Coincident\ kW_{equipment} = Qty_{Prop} * Coincidence\ Factor * \frac{Full_Load_Cool}{12{,}000} * \left(\left(\frac{12}{EER_{baseline} * (1 - Loss_{NoQI})}\right) - \left(\frac{12}{EER_{Proposed}}\right)\right)$$

$Incremental\ Capital\ Cost_{Equipment} = Qty_Indoor_Heads * Cost/Eff_Indoor_Head$ *- Cost Per Ton Baseline* $* \frac{Size_Cool}{12{,}000}$ *- Cost per kBTUh heat * (Full_Load_Heat/COP_Baseline)/1000 - Baseline_Air_Handler*

~~*ccMSHP*~~ $Heating\ Energy\ Savings$

*Load_Heat = -1 * Size_Heat_5 * 1/(1 + Oversize_Factor)*

m_load_profile = (balance pt load - Load_Heat) / (balance pt temp - Des_OAT)

*b_load_profile = Load_Heat - (m_load_profile * Des_OAT)*

*Full Load Heat = m_load_profile * Min OAT + b_load_profile*

*Full Load Cool = m_load_profile * Max OAT + b_load_profile*

*HSPF_Baseline_Adj = HSPF_Baseline * HSPF_Adjustment_Factor*

*HSPF_Proposed_Adj = HSPF_Proposed * HSPF_Adjustment_Factor*

Electric Resistance Heating Baseline:

$Customer\ kWh_{EQHeating}$ *= Qty_{Prop} * (-1 * Full_Load_Heat * EFLH_ccHP_Heat * (1 / HSPF_Baseline_Adj - 1 / HSPF_Proposed_Adj) / 1000*

Gas Heating Baseline:

*Customer DTherms_EQ Saved = (-1 * Full_Load_Heat * EFLH_ccHP_Heat * (1 / (1 −* $Loss_{DuctLeakage}$ *))) / COP_Baseline / 1,000,000*

*Customer kWh_Heating Penalty = Furnace_Fan_kW * EFLH_ccHP_Heat * (1 / (1 - Loss_DuctLeakage)) + (- 1)* Full_Load_Heat * EFLH_ccHP_Heat * (0 - (1 / (HPSF_Proposed*HSPF_Adj_Factor))) / 1000*

Customer Dtherm/Hr _Full Electrification = -1 Full_Load_Heat / COP_Baseline / 1,000,000*

Customer Remaining DTherm Full Electrification = -1 Full_Load_Heat * (EFLH_Heat - EFLH_cc_HP_Heat) / COP_Baseline * (1 / (1 - Uncorr_Loss)) / 1,000,000*

*Customer Remaining kWh_Heating Full Electrificaiton = Furnace_Fan_kW * (EFLH_Heat - EFLH_cc_HP_Heat) * (1 / (1 - Loss_DuctLeakage)) + (- 1)* Full_Load_Heat * (EFLH_Heat - EFLH_cc_HP_Heat) * (0 - (1 / (HPSF_Proposed*HSPF_Adj_Factor))) / 1000*

Note: All formulas using SEER, EER, and HSPF are valid with SEER2, EER2, HSPF2 substitutions.

Variables

$Cost/Eff_Indoor_Head$	See Table 18.5.1	Deemed Cost per Indoor Head or Coil, Based On Mini-Split vs. Multi-Split
$Cost\ per\ Ton_baseline$	See Table 18.5.1	Baseline capital cost per ton for new AC equipment
EER baseline	See Table 18.0.3	Baseline EER as calculated for residential equipment from the code required SEER.
SEER baseline	See Table 18.0.3	IECC 2012 identified code minimum SEER

HSPF_Baseline	See Table 18.0.3	Baseline heating season performance factor for code minimum MSHP. For Electric Resistance Heat Baseline the HSPF will be 3.412 based on a COP of 1 and does not require climate zone correction.
COP_Baseline	See Table 18.0.3	Baseline heating efficiency. Based on the type of backup heat selected. Condensing will be 0.95, Non-Condensing will be 0.8, and Electric Resistance will be 1.0. A COP of 1 and does not require climate zone correction.
COP_Backup_Heat	See Table 18.0.3	Backup heating efficiency. Based on the type of backup heat selected. Condensing will be 0.95, Non-Condensing will be 0.8, and Electric Resistance will be 1.0. A COP of 1 and does not require climate zone correction.
Coincidence Factor	See Table 18.0.3	
EFLH_Cooling	See Table 18.0.1	Effective Full Load Hours for cooling load energy savings
EFLH_Heat	See Table 18.0.1	Effective Full Load Hours for heating load energy savings
~~EFLH_Heating_HP~~	~~See Table 18.0.1~~	~~Effective Full Load Hours for Heat Pump impacted energy savings~~
EFLH_ccHP_Heat	See Table 18.0.1a	Effective Full Load Hours for Cold Climate Heat Pump at ~~and above~~ customer provided cutover / Balance Point temperature.
Balance Point Temperature	Customer Provided	Outdoor Ambient Temperature below which supplemental heating is required to meet the home heating needs. Gas backup or electric resistance backup heating begins.
~~Balance~~ No Load Pt Temp	See Table 18.0.7	Outdoor Ambient Temperature at which residential cooling and heating load profiles equal zero BTUH
Max OAT	See Table 18.0.7	Maximum Outdoor Ambient Temperature used in building ASHP load profile; TMY3 basis
Min OAT	See Table 18.0.7	Minimum Outdoor Ambient Temperature for caluclating full load heating; TMY3 Basis.
Des OAT	5	Low Outdoor Ambient Temperature for caluclating heating load Profile. Based on Low Temp Rating from NEEP QPL Data Sheets. Deemed to be 5 F.
HSPF_Adj_Factor	See Table 18.0.1	Adjustment factor for correcting HSPF from published data in climate zone IV to Minnesota Climate zone V. The HSPF_Adjustment_Factor for Electric Resistance Heat will be 1.
Balance Point Load	See Table 18.0.7	BTUH - Heating and cooling loads are zero at the balance point outdoor ambient
m_load_profile	Calculated	load profile slope (m)
b_load_profile	Calculated	load profile y intercept (b)
Full Load Heat	Calculated	Calculated full load heating BTUH based on the calculated load profile using the minimum Outside Air Temperature for the selected ccMSHP equipment. The load served is assumed to not be the whole load for the home.
Full Load Cool	Calculated	Calculated full load cooling BTUH based on the calculated load profile using the maximum Outside Air Temperature for the selected ccMSHP equipment. The load served is assumed to not be the whole load for the home.
Cold Climate Heat Maintenace Ratio	70%	The Max Heating Capacity at 5 ºF must be at least 70% of the Rated Heating Capacity at 47 ºF
~~Furnace Eff~~	~~95%~~	~~Furnace efficiency for backup heating deemed to be condensing type furnace with 95% efficiency~~
Oversize_Factor__c	0% ~~10%~~	Deemed Oversize Safety Factor for heating equipment.
Cost / kBTUh Heat - Baseline Furnace	$ 59.72	Average High Efficiency Furnace Cost / kBTUH; installed costs
Cost / kBTUh Heat - Baseline Boiler	$ 89.77	Average High Efficiency Boiler Cost / kBTUH; installed costs
Cost / kBTUh Heat - Baseline Electric Resistance	$ 40.00	Average Cost for air handler and electric duct heater / kBTUH; installed costs
Baseline Air Handler	$ 1,200.00	Average Cost for Baseline Air Handler for use with ER Heat or Boiler Heat associated with
Lifetime	See Table 18.0.4	Measure Lifetime for ccMSHPs are the same as for MSHPs found in referenced table.
Minimum Qualifying Efficiency	See Table 18.0.2	
EE-BE Cost Split	50.0% ~~3.7%~~	The total incremental cost and the rebate for each new heat pump measure will be divided using this split into a Beneficial Electrification (BE) portion for heating and an Energy Efficiency (EE) portion for Cooling.

Customer Inputs	**M&V Verified**	
Size_Cool	Yes	NEEP QPL Data Sheet Rated Cooling Capacity at 95 ºF
Size_Heat_5	Yes	NEEP QPL Data Sheet Max Heating Capacity at 5 ºF
Size_Heat_47	Yes	NEEP QPL Data Sheet Rated Heating Capacity at 47 ºF
EER proposed	Yes	NEEP QPL Data Sheet rated full load Cooling Efficiency
SEER proposed	Yes	NEEP QPL Data Sheet rated part load Cooling Efficiency
HSPF Proposed	Yes	NEEP QPL Data Sheet rated Heating HSPF
~~Quantity proposed equipment~~	~~Yes~~	~~The Quantity of Outdoor Units. Only applies if the Outdoor Unit's Size AND the quantity and size of the Indoor Units served by each outdoor unit are identical.~~
Quantity Indoor Heads	Yes	The Quantity of Indoor Heads + Coils served by a single Outdoor Unit.
Home Type	Yes	Single Family or Multi-Family home
~~County~~	~~Yes~~	~~Location of the home for determining weather zones.~~
Baseline Heat Type	Yes	Baseline heating type; gas furnace, gas boiler or electric resistance ~~backup heat~~
Baseline Heat Efficiency	Yes	baseline heating Eff; Condensing, Non-Condensing, Electric Resistance
Backup Heat Efficiency	Yes	backup heating Eff; Condensing, Non-Condensing, Electric Resistance
~~Operating Cutover~~ Balance Point Temperature	Yes	Outdoor Ambient Temperature below which supplemental heating is required to meet the home heating needs. ~~heat pump operation ceases and~~ Gas backup or electric resistance backup heating begins.

Table 18.5.1: Baseline and Proposed Capital Costs - Cold Climate Mini-Split Heat Pump (Reference 8)

	Baseline AC cost / ton	**Cost/Efficient Indoor Head or Coil**
~~ccMSHP~~ Non-Ducted cold climate Heat Pump Single Head System ~~Costs~~	$ 2,507.42	$ 6,670.00
~~ccMSHP~~ Non-Ducted cold climate Heat Pump Multi-Head System ~~Costs~~	$ 2,507.42	$ 6,010.00

References:

~~See 18.1 Residential AC references~~
See 18.0 Residential HVAC Deemed Tables for all References listed

Changes from Recent Filing:

Modified calculation of Incremental Cost to include the following items in the baseline costs: AC in lieu of MSHP, Baseline HE Furnace or Boiler or ER Heat, and Baseline air moving equipment when the baseline is electric resistance w/ AC or Boiler w/ AC.
Updated Proposed and Baseline Costs
Included Minimum Qualifying levels for SEER2, EER2, and HSPF2 for all AC and Heat Pump equipment based on IECC2021 where applicable. See Deemed Tables tab.
updated Heating Oversize Factor from 10% to 0%. No oversize for heat pump equipment to make it consistent with the Ducted cold climate heat pump

18.6 Residential Furnaces & Boilers

Algorithms

$$Customer\ DTh = Qty_Prop_Equip * \left(\left(Size_{Heat} \times \frac{EFF_{proposed}}{EFF_{baseline}}\right) - Size_{Heat}\right) \times 1/(1 + Oversize\ Factor) \times (1 - Altitude\ Factor) \times \frac{EFLH_{heating}}{1{,}000{,}000}$$

$$Customer\ \frac{DTh}{Hr} = Qty_Prop_Equip * \left(\left(Size_{Heat} \times \frac{EFF_{proposed}}{EFF_{baseline}}\right) - Size_{Heat}\right) \times 1/(1 + Oversize\ Factor) \times (1 - Altitude\ Factor)/1{,}000{,}000$$

Variables

EFLH Heating	See Table 18.0.1	Equivalent Full Load Heating Hours assumed for installed high efficiency furnace and boiler equipment
Incremental Cost	See Table 18.6.1	Incremental costs of efficient equipment
Baseline Efficiency	See Table 18.6.2	Efficiency of baseline code minimum boiler (Reference 10) or furnace (Reference 1) Efficiency of Existing Equipment receiving Tune-up.
Proposed Efficiency	See Table 18.6.2	Proposed Efficiency of existing equipment after Tune-up.
Altitude_Factor	See Table 18.0.1	Deemed Altitude adjustment factor for derating sea level rated equipment (4% / 1000 Feet above sea level)
Boiler Oversize Factor	25%	Deemed Oversize Safety Factor for all new boiler heating equipment and all Income Qualified Single Family Weatherization Boiler Tune-up products
Furnace Oversize Factor	20%	Deemed Oversize Safety Factor for all new furnace heating equipment and all Income Qualified Single Family Weatherization Furnace Tune-up products
Lifetime	See Table 18.6.1	
Conversion from Btu to Dth	1,000,000	1 Dth = 1,000,000 Btuh
Conversion from Btu to Therms	100,000	1 Therm = 100,000 Btuh

Customer Inputs	**M&V Verified**	
Qty Prop Equip	Yes	Quantity of units of the same size
$Size_Heat$ *	Yes	For new furnace or boiler AHRI rated Input BTUH. Provide data on customer rebate form. For Tune-up Measure on existing furnace or boiler Nameplate Input BTUH rating for existing equipment getting the tune-up measure. Provided data on customer rebate form.
Proposed Efficiency *	Yes	AHRI rated efficiency of the proposed new equipment.
County	Yes	County where the new equipment is installed or Tune-up is being performed.

* See table 18.5.3 for Income Qualified SF Weatherization Customer Input Assumptions

Table 18.6.1	**Measure Life (Reference 2)**	**Incremental Cost**	**Notes**
High Efficiency Furnace 95% AFUE	18	$1,293.85	(Reference 4)
IQ-SFW Boiler	20	$1,446.00	(Reference 4)
IQ-SFW Boiler/Furnace Tune-up	2	$300.00	(Reference 4)
High Efficiency Boiler 95% AFUE	20	$1,330.61	(Reference 7)

Table 18.6.2	**Baseline EFF**	**Proposed EFF**	**Lifetime**
High Efficiency Furnace	80%	Customer Input	18
High Efficiency Boiler	84%	Customer Input	20
IQ SFW - Furnace Tune-up	75%	80%	2
IQ SFW - Boiler Tune-up	75%	80%	2

Table 18.6.3 Income Qualified SF Weatherization Customer Input Assumptions

	CO1 - Front Range	**CO2 - Western Slope**	**CO3 - Mountain Areas**	**CO4 - Very High Altitude Areas**
Furnace Input BTUh	62,000	53,000	88,000	87,000
Furnace Minimum Proposed Efficiency	95%	95%	95%	95%
Boiler Input BTUh	64,000	55,000	92,000	90,000
Boiler Minimum Proposed Efficiency	95%	95%	95%	95%

References:

1. US Department of Energy; Residential Furnaces and Boilers; http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/72

2. 2015 ASHRAE Handbook - HVAC Applications; Comparison of Service Life Estimates; Page 37.3, Table 4
3. ECM Furnace Impact Assessment Report https://focusonenergy.com/sites/default/files/emcfurnaceimpactassessment_evaluationreport.pdf
4. Xcel program data from 2017 program year
5. Cost information from "2010 - 2012 W0017 Ex Ante Measure Cost Study Final Report.", Itron, May 2014.
6. DOE incremental cost for EC motors https://www.regulations.gov/document?D=EERE-2010-BT-STD-0011-0117
7. Xcel Minnesota Program Cost Data

Changes from Recent Filing:

Updated Proposed and Baseline Costs

18.7 Residential Programmable Thermostats

Algorithms

Primary Thermostat:

$$Customer\ kWh = Cooling_Delta_T * kWh_Savings_per_Degree$$

$$Customer\ kW = Cooling_Delta_T * kW_Savings_per_Degree$$

$$Customer\ Coincident\ kW = Cooling_Delta_T * kW_Savings_per_Degree * Coincidence\ Factor$$

$$Customer\ Dth = Heating_Delta_T * Dth_Savings_per_Degree$$

Secondary Thermostat:

$$Customer\ kWh = Cooling_Delta_T * kWh_Savings_per_Degree_2nd$$

$$Customer\ kW = Cooling_Delta_T * kW_Savings_per_Degree_2nd$$

$$Customer\ Coincident\ kW = Cooling_Delta_T * kW_Savings_per_Degree_2nd * Coincidence\ Factor$$

$$Customer\ Dth = Heating_Delta_T * Dth_Savings_per_Degree_2nd$$

Variables

kW_Savings_per_Degree	0.1272	kW per degree F of setback (Reference 1, 2)
kWh_Savings_per_Degree	123.8	kWh per degree F of setback (Reference 1, 2)
kW_Savings_per_Degree_2nd	0.0636	kW per degree F of setback for second thermostat = half of savings for first thermostat (Reference 1, 2)
kWh_Savings_per_Degree_2nd	61.9	kWh per degree F of setback for second thermostat = half of savings for first thermostat (Reference 1, 2)
Dth_Savings_per_Degree	4.4	Dth per degree F of setback (Reference 1, 2)
Dth_Savings_per_Degree_2nd	2.2	Dth per degree F of setback for second thermostat = half of savings for first thermostat (Reference 1, 2)
School Kit kW Savings per Degree	0.1138	kW per degree F of setback (Reference 2). Model results differ from calculated measure due to deemed setback schedules.
School Kit kWh Savings per Degree	112.1	kWh per degree F of setback (Reference 2). Model results differ from calculated measure due to deemed setback schedules.
School Kit Dth Savings per Degree	41.7	Dth per degree F of setback (Reference 2). Model results differ from calculated measure due to deemed setback schedules.
School Kit Cooling Delta T	0.76	F degree average weekly setup cooling temperature for School Education Kits. The School education Kit setback temperatures are deemed from qualitative feedback provided by the program's vendor. See Table 18.7.2 for Deemed Savings Results.
School Kit Heating Delta T	1.39	F degree average weekly setback heating temperature for School Education Kits. The School education Kit setback temperatures are deemed from qualitative feedback provided by the program's vendor. See Table 18.7.2 for Deemed Savings Results.
School Kit Deemed Savings	See Table 18.6.2	Results of the application of the deemed values in the energy savings formulas for the School Education Kits are presented in Table 18.6.2
Coincidence Factor	See Table 18.7.1	
Incremental Cost	See Table 18.7.1	
Measure Lifetime	See Table 18.7.1	

Customer Inputs	**M&V Verified**	
Cooling_Delta_T	Yes	One-week weighted average temperature difference between normal operation and cooling setback temperature in degrees F, based on information provided by the customer during the interview.
Heating_Delta_T	Yes	One-week weighted average temperature difference between normal operation and heating setback temperature in degrees F, based on information provided by the customer during the interview.

Table 18.7.1: Measure Life, Coincidence Factor, and Hours (Reference 4)

Type of measure:	Measure life:	Incremental Cost:	Coincidence Factor:	
T-Stat Install & Programming LI-SFW (Heating Only)	10	$29.00	0%	

Table 18.7.2: Deemed Savings for School Education Kits

Type of measure:	kWh	PCkW	Dtherms	Measure life:	Incremental Cost:
Existing Programmable Thermostat - School Education Kits	85	0.066	5.8	10	$0.00

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

References:

1. Energy Information Administration's (EIA) 2009 Residential Energy Consumption Survey (RECS)
2. Bin analysis using RECS data for thermostat operation and typical CO home cooling and heating conditions.
3. Lifetime of 5 years for door weatherstripping and 10 years for programmable T-Stats from "Measure Life Report Residential and Commercial/Industrial Lighting and HVAC Measures", June 2007 by GDS Associates.
4. Consumer Electronics Characteristics http://standby.lbl.gov/summary-table.html

Changes from Recent Filing:

updated model to align program assumptions.

18.8 Residential Smart Thermostats

Algorithms

$$Customer\ kWh = Customer\ Cooling\ kWh\ + Customer\ Heating\ kWh$$

$$Customer\ Coincident\ kW\ = Customer\ kW\ *\ Coincidence\ Factor$$

Smart Thermostat Savings:

$$Customer\ kW = (Cooling\ kW * TStat\ Qty\ Factor) \times ES\ Reduction_{cooling}\ * Cooling\ Scaling\ Factor$$

$$Customer\ Cooling\ kWh = (Cooling\ Tons\ * TStat\ Qty\ Factor)\ * \frac{12}{SEER_{Avg}} *\ EFLH_{Cooling}\ *\ ES\ Reduction_{cooling} *\ Cooling\ Scaling\ Factor$$

$$Customer\ DTh = (Baseline\ DTh * TStat\ Qty\ Factor) * ES\ Reduction_{heating}\ * Heating\ Scaling\ Factor$$

Thermostat Optimization Savings:

$$Customer\ kW = Cooling\ kW * (1 - ES\ Reduction_cooling) * Tstat_Optimzation_Reduction * Cooling\ Scaling\ Factor$$

$$Customer\ Cooling\ kWh = Cooling\ Tons * \frac{12}{SEER_{Avg}} * EFLH_{Cooling}\ * (1 - ES\ Reduction_{cooling}) * Tstat_Optimzation_Reduction * Cooling\ Scaling\ Factor$$

$$Customer\ Heating\ kWh = Heating\ kW * EFLH_Heat\ * (1 - ES\ Reduction_{heating}) * Tstat_Optimzation_Reduction * Heating\ Scaling\ Factor$$

$$Customer\ Dth = Baseline\ Dth * (1 - ES\ Reduction_{heating}) * Tstat_Optimzation_Reduction * Heating\ Scaling\ Factor$$

Variables

ES Reduction Heating	8%	Energy Star Connected Thermostat criteria for annual heating equipment runtime reduction (Reference 1)
ES Reduction Cooling	10%	Energy Star Connected Thermostat criteria for annual cooling equipment runtime reduction (Reference 1)
Typical Res Gas Heating System Effiiciency	80%	gas heating system effiiciency in existing homes
Typical Res Electric Heating System Effiiciency	100%	electric resistance heating system effiiciency in existing homes
Cooling Tons	2.690	Avgerage Home model capacity for Res Cooling (Tons)
SEER_Avg	13.400	Avgerage Home model SEER rating
EER_Avg	11.417	Avgerage Home model EER rating (converted from SEER)
Cooling kW	2.827	Forecasted High Efficiency Thermostat demand
EFLH_Cooling	See Table 18.0.1	Forecasted High Efficiency Thermostat hours use Cooling EFLH
Baseline Dth	101.1	Forecasted Home gas use estimated from average furnace program participation
Heating kW	12.989	Full load kW for electric resistance heating based on forecasted gas usage and annual operating hours.
EFLH_Heat	See Table 18.0.1	Forecasted High Efficiency Thermostat hours use Heating EFLH
TStat Qty Factor	See Table 18.8.3	The Primary Thermostat in a home saves the full EnergyStar heating or cooling criteria. A Secondary Thermostat in a home saves half of the energy and demand of a Primary Thermostat. The baseline cooling and heating demands will be adjusted by the factor based on the type of thermostat (Primary or Secondary) selected.
EnergyStar_CF	76%	Coindicence Factor for High Efficiency Thermostat
Cooling Scaling Factor	See Table 18.8.1	Cooling energy and demand percent adjustment for home types
Heating Scaling Factor	See Table 18.8.1	Heating energy percent adjustment for home types
Tstat_Optimzation_Reduction	3%	Assumed percent savings by participating in manufacturer's optimzation algorithm updates.
Lifetime	10	Measure life for ENERGY STAR Smart Thermostat (Reference 4)
Incremental Cost	See Table 18.8.2	Incremental cost for ENERGY STAR Smart Thermostat (Reference 4)

Customer Inputs	**M&V Verified**	
Certified Energy Star Connected Thermostat	Yes	
County	No	
Home Type	No	

Table 18.8.1

Home type	Single Family	Multifamily	Townhome
Cooling Scaling Factor	100%	35%	64%
Heating Scaling Factor	100%	15%	52%

Table 18.8.2	Incremental Cost
LI SFW EnergyStar Smart Thermostat	$100.00
ENERGY STAR smart thermostat (Reference	$200.00
Home Energy Squad Smart Thermostat	$125.00
ALC Home Energy Squad upgraded Smart Thermostat	$225.00

Table 18.8.3	TStat Qty Factor
Primary EnergyStar Smart Thermostat	1.0
Sedondary EnergyStar Smart Thermostat	0.5

References:

1. ENERGY STAR Connected Thermostat Key Product Criteria - https://www.energystar.gov/products/heating_cooling/smart_thermostats/key_product_criteria

2. 2017 Seasonal Savings Evaluation, Navigant, 3/5/2018
3. Xcel Study of Winter Seasonal Savings, 2017-2018, Initial Estimates
4. Lifetime of 10 years for programmable T-Stats from "Measure Life Report Residential and Commercial/Industrial Lighting and HVAC Measures", June 2007 by GDS Associates.

Changes from Recent Filing:

1. included electric heating savings
2. added Thermostat Optimization savings measure
3. clarified secondary thermostat savings for smart thermostat measures.

18.9 Residential AC Rewards

Algorithms

$$Customer\ kWh = Quantity\ Equipment * Equipment\ kWh\ Savings * Cooling\ Savings$$

$$Customer\ kW = Quantity\ Equipment * Equipment\ kW\ Savings * Cooling\ Savings$$

$$Customer\ Coincident\ kW = Quantity\ Equipment * Equipment\ PCkW\ Savings * Cooling\ Savings$$

Variables

Quantity Equipment	Customer Input	Quantity of smart saver switches installed.
Equipment kW Savings	1.164	Customer kW savings per unit with a smart thermostat.
Equipment kWh Savings	4	Annual kWh savings per unit with a smart thermostat.
Equipment PCkW Savings	1.164	Peak Coincident kW savings perunit with a smart thermostat
Lifetime	5	Length of time the thermostat will be operational
NTG	1	Net-to-Gross factor for Residential Demand Response will be 100% as customers would not have the ability to install a switch or participate in events without the program.
Cooling Scaling Factor	Table 18.9.1	Cooling Scaling factor based on home type

Table 18.9.1

Smart Thermostat Home Type	Single Family	Multi-Family	Townhome/Duplex
Cooling Scaling Factor	100%	35%	64%
Heating Scaling Factor	100%	15%	52%

Customer Inputs	M&V Verified	
Number of thermostats installed.	Yes	

References:

(1) DNV GL & AEC, January 2016. Saver's Switch Program, Residential Program, 2015 Impact Evaluation Report.

(2) Xcel Energy, May 2018. Saver's Switch Control History.

(3) Nexant, 2017. Evaluation of 2016 Smart Thermostat Pilot.

(4) DNV GL & AEC, January 2018. Saver's Switch Program, Residential Wireless Modeling & Event Day Report, Version 8.

Changes from Recent Filing:

None

18.10 Residential Saver's Switch

Algorithms

$$Customer\ kWh = Quantity\ Equipment * Equipment\ kWh\ Savings$$

$$Customer\ kW = Quantity\ Equipment * Equipment\ kW\ Savings$$

$$Customer\ Coincident\ kW = Quantity\ Equipment * Equipment\ PCkW\ Savings$$

Variables

Quantity Equipment	Customer Input	Quantity of smart saver switches installed.
Equipment kW Savings	2.628	Customer kW savings per unit with a smart switch
Equipment kWh Savings	10	Annual kWh savings per unit with a smart switch
Equipment PCkW Savings	1.410	Peak Coincident kW savings per unit with a smart switch
Lifetime	15	Length of time the switch will be operational
NTG	1	Net-to-Gross factor for Residential Demand Response will be 100% as customers would not have the ability to install a switch or participate in events without the program.

Customer Inputs	**M&V Verified**	
Number of units with switch installed.	Yes	

References:

(1) DNV GL & AEC, January 2016. Saver's Switch Program, Residential Program, 2015 Impact Evaluation Report.
(2) Xcel Energy, May 2018. Saver's Switch Control History.
(3) Nexant, 2017. Evaluation of 2016 Smart Thermostat Pilot.
(4) DNV GL & AEC, January 2018. Saver's Switch Program, Residential Wireless Modeling & Event Day Report, Version 8.

Changes from Recent Filing:

None

18.11 Residential Evaporative Cooling

Algorithms

$Customer\ kW = Qty_Prop * (Size_Cooling * 12 / EER_Baseline - Watts_Proposed / 1000)$

$Customer\ kWh = Qty_{Prop} * (Size_Cooling * 12 / SEER_Baseline - Watts_Proposed / Watts/kW) * EFLH_Cool$

$Customer\ Coincident\ kW = Customer\ kW * Coincidence\ Factor$

$Customer\ Incremental\ O\&M\ Savings\ Electric = -1 * Size_Cooling * 12000 * EFLH_Cool / Water_h_fg / Water_Lb/gallon * Water_Rate / 1000\ Gals$

Variables

Coincidence_Factor	70%	Coincidence factor for the refrigerated air system, the probability that peak demand of the AC unit will coincide with peak utility system demand. (Reference 11)
NTG	See Table 18.11.4	Net-to-Gross Factor calculated based on Xcel Energy product experience.
Incremental Costs	See Table 18.11.5	Incremental cost of efficient technology over baseline technology
Measure Life	15	Life of evap cooling equipment
MotorHP	See Table 18.11.3	Motor Horsepower represents the motor size for an evaporative cooler which corresponds to the cooling output of a 3 ton AC unit. (Reference 4)
HP to kW	0.746	Standard conversion from HP to kW
Load Factor	80.00%	Load factor for motor - We will use 80% for all Evap Systems.
Motor Eff	81.67%	Efficiency of the evaporative cooler motor (Reference 2)
Watts/kW	See Table 18.0.6	Conversion factor from Watts to kiloWatts
Water_Rate	9.23	combined cost of water and sewer rate per 1000 gallons
EFLH_Cool	See Table 18.0.1	Full Load Cooling hours based on climate zone.
Watts_Proposed	See Table 18.11.3	Evaporative Cooler operating watts, derived from motor horsepower, load factors and efficiency.
Size_Cooling	See Table 18.11.1	Deemed size of baseline cooling equipment in Tons for an evaporative cooler in each climate zone.
EER_Baseline	See Table 18.11.2	Calculated full load efficiency (EER2) of baseline air conditioning or mini-split heat pump equipment, based on the code minimum SEER2 requirements.
SEER_Baseline	See Table 18.11.2	code part load efficiency of baseline air conditioning equipment.
Water_h_fg	See Table 18.0.6	Specific Enthalpy heat of vaporization of water at standard conditions (60 F), BTU / lb
Water_Lb/gallon	See Table 18.0.6	Density of Water at standard conditions

Customer Inputs	**M&V Verified**	
Qty Proposed	Yes	
County	Yes	
Evap Cooler Type	Yes	

Table 18.11.1 Evap Cooling System Baseline Tons

Description	Front Range	Western Slope	Alamosa / Mountain Area	Lake / Very High Mountains
Standard evaporative cooler	1.8	1.6	1.1	0.9
Premium evaporative cooler	2.5	2.2	1.5	1.2
Multi-ducted premium evaporative cooler	2.5	2.2	1.5	1.2

Table 18.11.2 Evap Cooling System Baseline SEER2 & EER2

Description	Standard evaporative cooler *		Premium evaporative cooler **		Multi-ducted premium evaporative cooler **	
	Baseline SEER2	Baseline EER2	Baseline SEER2	Baseline EER2	Baseline SEER2	Baseline EER2
Front Range	14.3	8.5	13.4	11.42	13.4	11.42
Western Slope	14.3	8.5	13.4	11.42	13.4	11.42
Alamosa/Mountain Area	14.3	8.5	13.4	11.42	13.4	11.42
Lake/Very High Mountain Area	14.3	8.5	13.4	11.42	13.4	11.42

* Standard Evap Cooler Baseline is a code minimum MSHP; 14.3 SEER2, 8.5 EER2.

** Premium and Multi-ducted Permium Evap Cooler baselines are code minimum AC; 13.4 SEER2, 11.42 EER2

Table 18.11.3: Evap Cooler Motor HP & Watts

System Type	HP	Watts_Proposed
Standard evaporative cooler	0.52	380
Premium evaporative cooler	0.52	380
Multi-ducted premium evaporative cooler	1.02	745

Table 18.11.4: Net to Gross Factor

System Type	Net To Gross
Standard evaporative cooler	70%
Premium evaporative cooler	70%
Multi-ducted premium evaporative cooler	85.1%

Table 18.11.5: Incremental Cost of Evaporative Coolers (Reference 5,6,7)

			Front Range		Western Slope		Alamosa / Mountain Area		Lake / Very High Mountain Area	
	Evap Cooler Cost	Baseline Labor Cost	Baseline Equipment Cost	Evap Cooler Inc Cost	Baseline Equipment Cost	Evap Cooler Inc Cost	Baseline Equipment Cost	Evap Cooler Inc Cost	Baseline Equipment Cost	Evap Cooler Inc Cost
Standard evaporative cooler	$ 433.67	$ -	$ 5,797.93	$ (5,364.26)	$ 5,153.71	$ (4,720.04)	$ 3,543.18	$ (3,109.51)	$ 2,898.96	$ (2,465.29)
Premium evaporative cooler	$ 2,778.32	$ (3,712)	$ 6,268.55	$ 221.43	$ 5,516.32	$ 973.66	$ 3,761.13	$ 2,728.85	$ 3,008.90	$ 3,481.08
Multi-ducted premium evaporative cooler	$ 4,020.66	$ (3,712)	$ 6,268.55	$ 1,463.77	$ 5,516.32	$ 2,215.99	$ 3,761.13	$ 3,971.19	$ 3,008.90	$ 4,723.41

Note: Standard Evap Cooler baseline is a code minimum single head Non-Ducted Heat Pump ~~MSHP~~.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

References:

1. ESPRE 2.1 engineering model: Simplified energy analysis methods for residential buildings
2. Average motor efficiency for 1 hp motor from NEMA, "Premium Efficiency Motor Selection and Application Guide"
3. Kinney, Larry. New Evaporative Cooling Systems: An Emerging Solution for Homes in Hot Dry Climates with Modest Cooling Loads.
4. Web site information - Grainger Evap Cooler - Essick Model N28W; Pheonix Mfg Corp; Model PD4231
5. http://www.google.com/products?q=home+depot+evaporative+cooler+cost&ie=UTF-8&oe=utf-8&rls=org.mozilla:en-
6. Xcel Program Data
7. SWEEP 2007 Report. O&M Savings based on manufacturers water use data and current Denver water rates (Denver Water Board).
8. ASHRAE Applications 2007 p.36.3 Used AC window unit as estimate for evaporative cooler.
9. https://www.denverwater.org/residential/billing-and-rates/2018-rates
10. https://www.denvergov.org/content/denvergov/en/wastewater-management/billing-and-rates/wastewater-rates.html
11. 2010 Cadmus Program Evaluation

Changes from Recent Filing:

Included Minimum Qualifying levels for SEER2, EER2, and HSPF2 for all AC and Heat Pump equipment based on IECC2021 where applicable. See Deemed Tables tab.

updated water rates

19.1 BOC

Algorithms

$$Customer\ kWh = ft^2 \times \left[\frac{kWh}{ft^2}\right]$$

$$Customer\ kW = CF \times \frac{Customer\ kWh}{hours}$$

$$Customer\ therms = ft^2 \times \left[\frac{therms}{ft^2}\right]$$

Variables

$\left[\frac{kWh}{ft^2}\right]$	0.121	kWh/sqft of attributable savings (Reference 1)
$\left[\frac{therms}{ft^2}\right]$	0.00806	Therms/sqft of attributable savings (Reference 1)
CF	33.00%	Average of Implemented Recommissioning program measures
hours	8760	Hours per year
Lifetime	5	years (Reference 2)

Customer Inputs	**M&V Verified**	
ft^2		Building Area

References:

1. Department of Energy Resource Technical Reference Manual Version 2.1
2. BOC-Expansion Initiative Market Progress Evaluation Report #1; http://theboc.info/pdf/Eval-BOC-expansion-initiative-market-progress-0414.pdf

19.2 BOC

Algorithms

$$Customer\ kWh = \left(kWh_{Baseline} - kWh_{Proposed}\right)$$

$$Customer\ kW = kW_{Baseline} - kW_{Proposed}$$

Customer may apply for rebate based upon the recommendations provided in the Xcel Energy-funded Study or Assessment. Each measure will be provided by a study consultant and reviewed by Xcel Energy. Technical variables will be provided by the study consultant. Analysis will be based on standard engineering methodologies. Electrical energy savings and electrical demand savings will be calculated based on the project specific details.

Variables

Lifetime	7

19.3 BOC

Algorithms

$$Customer\ kWh = \left(kWh_{Baseline} - kWh_{Proposed}\right)$$

$$Customer\ kW = kW_{Baseline} - kW_{Proposed}$$

Customer may apply for rebate based upon the recommendations provided in the Xcel Energy-funded Study or Assessment. Each measure will be provided by a study consultant and reviewed by Xcel Energy. Technical variables will be provided by the study consultant. Analysis will be based on standard engineering methodologies. Electrical energy savings and electrical demand savings will be calculated based on the project specific details.

Variables

Lifetime	7

20.0 Water Heater Deemed Tables

Table 20.0.1 - Water Heater Incremental Cost, Lifetime, NTG - References 3, 10

Water Heater Type	Size	Draw Pattern	Baseline Cost	Incremental Cost	Lifetime	NTG
High Efficiency Tank-Type Water Heater	Volume <= 40 Gallon	MEDIUM	$ 906.99	$ 126.88	13	90%
High Efficiency Tank-Type Water Heater	Volume <= 40 Gallon	HIGH	$ 833.02	$ 174.76	13	90%
High Efficiency Tank-Type Water Heater	Volume > 40 Gallon	MEDIUM	$ 714.09	$ 119.30	13	90%
High Efficiency Tank-Type Water Heater	Volume > 40 Gallon	HIGH	$ 958.42	$ 384.34	13	90%
High Efficiency Tankless Water Heater	N/A	MEDIUM	$ 906.99	$ 610.06	20	90%
High Efficiency Tankless Water Heater	N/A	HIGH	$ 958.42	$ 974.87	20	90%
Air Source Heat Pump Water Heater ERWH Baseline	N/A	Any	$ 1,263.80	$ 2,020.44	12	100%
Air Source Heat Pump Water Heater Gas Storage WH Baseline	N/A	Any	$ 959.41	$ 2,324.83	12	100%

20.1 Gas Water Heaters

Algorithms

$Customer_Dth = Baseline_Dth - Proposed_Dth$

$Baseline_Dth = Hot_Water_Energy / Baseline_Eff_Gas / 1{,}000{,}000$

$Proposed_Dth = Hot_Water_Energy / Proposed_Eff / 1{,}000{,}000$

$Hot_{Water_{Energy}} = Qty\ x\ Hot_Water_Consumption * C_p * Water_Heater_Delta_T * Days_Per_Year * Water_{Density}$

$Water\ Heater\ Delta\ T = Water_Heater_Temperature - City_Mains_Temperature$

For Storage Water Heaters:

$Baseline_Efficiency_Gas = coef1 - (coef2\ x\ Proposed_Tank_Size)$

For Instantaneous and Indirect Water Heaters:

$Baseline_Efficiency_Gas = coef1 - (coef2\ x\ Baseline_Tank_Size)$

For Indirect Water Heaters:

$$Proposed_Dth = (Hot_Water_Energy / Eff_{P,Boiler} + \frac{UA_{P,DHW}}{Eff_{P,Boiler}} \times Ambient_dT \times HoursPerYear) / 1{,}000{,}000$$

$$Ambient_dT = Water_Heater_Temperature - Ambient_Temperature$$

$$UA_{P,DHW} = \frac{SL_{P,DHW}}{70} \times Proposed\ Tank\ Size \times Water_Density \times SpecificHeat_{Water}$$

$Incremental\ Cost = Proposed\ Cost - Baseline\ Cost$

Variables

Hot_Water_Consumption	See Table 20.1.4	Gallons of Water per day based on number of Bedrooms and Home Type
Water Heater Temperature	120.0	Water Heater Tank Temperature
City Mains Temperature	51.4	Water Main temperature average over the year
Conversion from Btu to Dth	1,000,000	1 Dth = 1,000,000 Btuh
Conversion from Btu to Therm	100,000	1 Therm = 100,000 Btuh
Conversion from kW to Watts	1,000	1 kW = 1,000 Watts
Conversion from Btu to kWh	3,412	1 kW = 3,412 Btuh
C_p	1	Btu/lb/°F Specific Heat of Water
Water_Density	8.34	lb/gal H20
Days_Per_Year	365	Days per Year
HoursPerYear	8,760	Hours per Year
Coef1	See Table 20.1.1 See Table 20.1.2	Code based forumula for calculation of Baseline efficiency based on water heater type and Proposed Tank Size
Coef2	See Table 20.1.1 See Table 20.1.2	Code based forumula for calculation of Baseline efficiency based on water heater type and draw pattern
Baseline_Tank_Size	See Table 20.1.3	For Instantaneous Water Heaters the baseline tank size will be based on the deemed First Hour Rating and the number of bedrooms.
Water Heater Self-Installation Rate	52%	Percent of Water Heaters that self-installed after retail purchase (Reference 9). Zero percent for heat pump water heaters.
Ambient_Temperature	70	Deemed ambient air temperature of the space where the Indirect Water Heater is installed.
SL_P,DHW	See Table 20.1.7	Standby loss factor for the proposed Indirect Water Heater, in °F/h. Deemed from Averages of AHRI database.
Indirect Water Heater Baseline Cost	See Table 20.1.6	Baseline cost of Indirect Water Heater, based on number of bedrooms
Indirect Water Heater Draw Pattern	See Table 20.1.6	Draw Pattern of baseline water heater for Indirect Water Heater measure based on number of bedrooms
Indirect Water Heater Proposed Cost	See Table 20.1.7	Proposed cost of Indirect Water Heater based on the proposed nominal tank size.
Measure Life for Indirect Water Heater	13	Indirect Water Heater measure life is equivalent to a gas fired storage water heater.

Customer Inputs	**M&V Verified**	
Number of Bedrooms	Yes	total number of bedrooms in the home where a new water heater is being installed
Proposed Eff	Yes	Proposed water heater AHRI Certified Uniform Energy Factor (UEF)
First Hour Rating	Yes	AHRI certified First Hour Rating in gallons per hour (GPH)
Quantity Proposed Equipment	Yes	
Instantaneous Water Heater Max GPM Rating	Yes	AHRI Certified GPM Rating
Proposed Tank Size	Yes	DOE Rated Storage Volume for tank type water heaters
Type of Proposed Water Heater	No	Type of proposed water heater. (i.e. Storage, Tankless, Heat Pump)
Water Heater Draw Pattern	No	Usage Bin identified on AHRI Certificate
$Eff_P,Boiler$	Yes	Proposed Boiler Percent AFUE for boiler equipment associated with operation of the indirect water heater.

Deemed Calculator inputs for Income Qualified Single Family Weatherization Program In Lieu of Customer/Contractor Provided Inputs **

Number of Bedrooms	2	Assumed number of bedrooms in the home where a new water heater is being installed
Proposed Tank Size	40	Assumed Nominal tank volume of the Installed Gas Storage Water Heater
First Hour Draw Rating	60	Assumed first hour draw of the installed Gas Storage Water Heater.
Proposed UEF	0.68	Assumed Gas Storage Water Heater Efficiency.
Gas Instantaneous Water Heater Max GPM Rating	3.25	Assumed GPM rating of Gas Tankless Water Heater.
Proposed UEF for Gas Instantaneous Water Heater	0.90	Assumed Gas Tankless Water Heater Efficiency.

** Other inputs necessary to complete the calculations will be provided as required in the Customer Inputs section.

Table 20.1.1 Gas Fired Storage Water Heater and Heat Pump Water Heater Baseline Efficiency Calculation Parameters (Reference 8)

	First Hour Rating to Define Draw Pattern		Electric Storage Water Heater >=20 Gallon and <=55 Gallon Baseline Efficiency Coefficients		Gas Storage WH >20 Gallon and <=55 Gallon Baseline Efficiency Coefficients		Gas Storage WH >55 Gallon and <=100 Gallon Baseline Efficiency Coefficients	
Draw Pattern	min (>=Gallons)	max (< Gallons)	coef1	coef2	coef1	coef2	coef1	coef2
Very Small	1	18	0.8808	0.0008	0.3456	0.0020	0.6470	0.0006
Low	18	51	0.9254	0.0003	0.5982	0.0019	0.7689	0.0005
Medium	51	75	0.9307	0.0002	0.6483	0.0017	0.7897	0.0004
High	75	No Upper Limit	0.9349	0.0001	0.6920	0.0013	0.8072	0.0003

Table 20.1.2 Instantaneous Gas Fired Water Heater baseline Efficiency calculation parameters (Reference 8)

	Instantaneous Gas-Fired Water Heater <2 gal and >50,000 Btu/h GPM Drawn	
Draw Pattern	Minimum (>=GPM)	Maximum (< GPM)
Very Small	0	1.7
Low	1.7	2.8
Medium	2.8	4
High	4	No Upper Limit

Table 20.1.3 Estimated Baseline Gas Storage Water Heater Tank Size for Instantaneous and Indirect Water Heaters - 2019 ASHRAE HVAC Applications Chapter 51 Service Water Heating: Table 4 HUD-FHA Minimum Water Heater Capacities for One- and Two-Family Living Units (Reference 12)

Water Heater Type \ Number of Bedrooms	1	2	3	4	5	6
Average Gas Storage First Hour Draw (Reference 12)	43	60	67	77	90	92
Instantaneous Water Heater Baseline Tank Size	20	30	35	40	50	50
Indirect Water Heater Baseline Tank Size	20	30	35	40	50	50

Table 20.1.4 Water Usage per Day by Number of Bedrooms

Home Type \ Number of Bedrooms	1	2	3	4	5	6
Single Family total HW usage per day	34	48	60	72	84	96
Multi-Family total HW usage per day	41	53	63	73	83	92

Table 20.1.5: Inc Costs for Income Qualifed Single Family Weatherization Program

	Incrmental Cost
High Efficiency Tank-Type Gas Fired Water Heater	$374.00
High Efficiency Tankless Gas Fired Water Heater	$974.87

Table 20.1.6: Baseline Water Heater Deemed Information for Indirect Water Heaters

No. of Bedrooms \ Cost & Draw Pattern	Baseline Cost	Deemed Draw Pattern
1	$719.04	Low
2	$719.04	Medium
3	$719.04	Medium
4	$719.04	High
5	$773.07	High
6	$773.07	High

Table 20.1.7: Proposed Indirect Water Heater Standby Loss Factor (Reference 7), Equipment Cost

Indirect Nominal Tank Size (Proposed Tank Size)	Standby Loss, °F/h	Indirect WH Equip Cost	Minimum Tank Size	Maximum Tank Size
30	1.1286	$1,130.14	25	33
35	0.9538	$1,192.44	33	38
40	0.9957	$1,361.20	38	45
50	0.7304	$1,497.25	45	55
>55	0.5847	$2,084.50	55	120

References:

1. Energy Conservation Program for Consumer Products: Test Procedure for Water Heaters; United States Department of Energy; http://www.gpo.gov/fdsys/pkg/FR-1998-05-11/pdf/98-12296.pdf

2. Denver Water's 2006 Treated Water Quality Summary Report; http://www.denverwater.org/docs/assets/9A12FBC5-BCDF-1B42-D1BC5F0B1CE3B115/TreatedWQSummaryReport20061.pdf

3. Energy Star Residential Water Heaters -Final Criterial Analysis, April 2008. http://www.energystar.gov/ia/partners/prod_development/new_specs/downloads/water_heaters/WaterHeaterAnalysis_Final.pdf

4. New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs; https://www3.dps.ny.gov/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/72c23decff52920a85257f1100671bdd/$FILE/TRM%20Version%206%20-%20January%202019.pdf

5. US Department of Energy; Residential Heat Pump Water Heaters; http://energy.gov/eere/femp/covered-product-category-residential-heat-pump-water-heaters

6. US Department of Energy; Consumer Water Heaters; https://www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=32

7. AHRI Directory of Certified Product Performance for Indirect Water Heaters; https://www.ahridirectory.org/NewSearch?programId=28&searchTypeId=3

8.US Department of Energy,Energy and water conservation standards and their compliance dates: 10 CFR 430.32(d): https://www.ecfr.gov/cgi-bin/text-idx?SID=80dfa785ea350ebeee184bb0ae03e7f0&mc=true&node=se10.3.430_132&rgn=div8

9. EnergyStar - http://aceee.org/sites/default/files/files/pdf/conferences/hwf/2016/Ryan_Session1C_HWF16_2.22.16_0.pdf

10. Equipment Manufacturer Retail Price Information Request (Q4 - 2017 and Invoice analysis from CO 2022 HPWH Rebated Systems)

11. NREL - National Residential Efficiency Measure Database, https://remdb.nrel.gov/measures.php?gId=6&ctId=270

12. 2019 ASHRAE HVAC Applications manual Chapter 51 Service Water Heating

13 Florida Solar Energy Center paper "Estimating Daily Domestic Hot Water Use in North American Homes. https://fsec.ucf.edu/en/publications/pdf/FSEC-PF-464-15.pdf Table 5 on Page 11.

Changes from Recent Filing:

None

20.2 Residential Low Flow

Algorithms

$$\Delta T_{WH} = T_{WH} - T_{city}$$

$$Customer\ Dth = \frac{GPY_{saved} * \Delta T_{WH} * H_{water} * Split\ Factor}{EFF_{WH,gas} * 1{,}000{,}000}$$

$$Customer\ kWh = \frac{GPY_{saved} * \Delta T_{WH} * H_{water} * (1 - Split\ Factor)}{EFF_{WH,electric} * 3{,}412}$$

$$Customer\ kW = \frac{Customer\ kWh}{8760}$$

$$Customer\ PCkW = Customer\ kW * CF$$

Variables

T_{WH}	120	Water heater setpoint temperature °F. (Reference 1)
T_{city}	51.4	Water temperature of city water entering the water heater °F. (Reference 2)
GPY_{saved}	See Table 20.2.3 and 20.2.4	Gallons per year of hot water saved with high-efficiency showerhead or aerator. See table for appropriate home type; Single Family or Multifamily.
ρ_w	8.34	Density of water in lb/gal
c_w	1	Specific heat of water in BTU/(lb·°F)
H_{water}	8.34	Heat content of 1 gallon of water in BTU/(gal·°F)
$EFF_{WH,gas}$	80%	Assumed gas water heater efficiency without standby losses. This only includes combustion efficiency.
$EFF_{WH,electric}$	100%	Assumed electric water heater efficiency without standby loses.
Split Factor	See Table 20.2.6	Gas/electric split factor is based on customer response to showerhead post card. The customer selects from three options for water heating fuel.
Conversion from Dth to BTU	1,000,000	1 Dth = 1,000,000 Btu
Conversion from kWh to BTU	3,412	1 kWh = 3,412 Btu
CF	See Table 20.2.3 and 20.2.4	Amount of Customer kW demand that will coincide with peak utility system demand.
Baseline Flowrates	See Table 20.2.1 and 20.2.2	Baseline showerhead flowrate is assumed to be 2.5GPM and kitchen/bathroom aerator baseline flowrates are assumed to be 2.2GPM per federal minimum standards.
Measure Life	10	Lifetime of showerhead and aerator measures. (Reference 3)
Incremental Costs	See Table 20.2.5	Actual costs provided by vendor; cost per showerhead is assumed for the material costs for cost/benefit calculation purposes.
Residential Water Rate	$3.44	$ / 1000 Gallons
Residential Sewer Rate	$5.79	$ / 1000 Gallons

Customer Inputs	**M&V Verified**	
Showerhead / Aerator received by customer	Yes	
Showerhead / Aerator installed by customer	Yes	
Water Heating Fuel provided by Customer	Yes	If water heating fuel is unkown, the split factor is used to divide the measure between gas and electric fuel types.

Table 20.2.1 - Showerhead Assumptions	**Single Family**	**Multifamily**	
Baseline Showerhead Flowrate	2.50	2.50	Federal minimum standards
Proposed Showerhead Flowrate	1.50	1.50	
Proposed Showerhead Flowrate	1.25	1.25	
Shower Duration	13.02	13.02	Reference 6
Showers per Day	1.39	1.07	Reference 6
Showers in Home	1.82	1.21	Reference 8
Shower Temperature	105	105	Reference 1

Table 20.2.2 - Aerator Assumptions	**Single Family**	**Multifamily**	
Baseline kitchen & bathroom aerator flowrate	2.20	2.20	Federal minimum standards
Proposed kitchen aerator flowrate	1.50	1.50	
Proposed kitchen aerator flowrate	1.00	1.00	
Proposed bathroom aerator flowrate	1.00	1.00	
Proposed bathroom aerator flowrate	0.50	0.50	
Faucet Use for Homes w/o Dishwasher (gal/day)	12.30	9.48	Reference 7
Faucet Use for Homes w/ Dishwasher (gal/day)	7.50	5.78	Reference 7
Houses with Dishwashers	75%	55%	Reference 8
Kitchen Sinks in Home	1.00	1.00	Assumed
Bathroom Sinks in Home	2.21	1.31	Reference 8
Dish Washing Temperature (°F)	120	120	Reference 1
Hand Washing Temperature (°F)	105	105	Reference 1

Table 20.2.3 - Single Family Gallons per Year Savings & Coincidence Factors	Primary Showerhead			Secondary Showerhead			Kitchen Aerator	Primary Bath Faucet Aerator		Secondary Bath Faucet Aerator	
	Standard (1.5 GPM)	Handheld (1.5 GPM)	Styled (1.5 GPM)	Standard (1.5 GPM)	Handheld (1.5 GPM)	Styled (1.5 GPM)	(1.5 GPM)	(1.0 GPM)	(0.5 GPM)	(1.0 GPM)	(0.5 GPM)
GPY_DHW_Savings	2,836	2,836	2,836	2,325	2,325	2,325	351	363	515	363	515
Total Water Savings/Year - Gallons	3,630	3,630	3,630	2,976	2,976	2,976	411	465	659	465	659
Coincidence_Factor (Reference 8)	64%	64%	64%	64%	64%	64%	124%	124%	124%	124%	124%
O&M Savings	$33.50	$33.50	$33.50	$27.47	$27.47	$27.47	$3.79	$4.29	$6.08	$4.29	$6.08

Table 20.2.4 - Multifamily Gallons per Year Savings & Coincidence Factors	Primary Showerhead				Secondary Showerhead			Kitchen Aerator		Primary Bath Faucet Aerator		Secondary Bath Faucet Aerator	
	Standard (1.5 GPM)	Standard (1.25 GPM)	Handheld (1.5 GPM)	Styled (1.5 GPM)	Standard (1.5 GPM)	Handheld (1.5 GPM)	Styled (1.5 GPM)	(1.5 GPM)	(1.0 GPM)	(1.0 GPM)	(0.5 GPM)	(1.0 GPM)	(0.5 GPM)
GPY_DHW_Savings	3,282	4,102	3,282	3,282	695	695	695	419	718	389	551	389	551
Total Water Savings/Year - Gallons	4,200	5,250	4,200	4,200	890	890	890	482	827	498	706	498	706
Coincidence_Factor (Reference 8)	64%	64%	64%	64%	64%	64%	64%	124%	124%	124%	124%	124%	124%
O&M Savings	$38.77	$48.46	$38.77	$38.77	$8.21	$8.21	$8.21	$4.45	$7.63	$4.60	$6.51	$4.60	$6.51

Table 20.2.5 - Incremental Costs	Primary Showerhead				Secondary Showerhead			Kitchen Aerator		Primary Bath Faucet Aerator		Secondary Bath Faucet Aerator	
	Standard (1.5 GPM)	Standard (1.25 GPM)	Handheld (1.5 GPM)	Styled (1.5 GPM)	Standard (1.5 GPM)	Handheld (1.5 GPM)	Styled (1.5 GPM)	(1.5 GPM)	(1.0 GPM)	(1.0 GPM)	(0.5 GPM)	(1.0 GPM)	(0.5 GPM)
Energy Efficient Showerhead	$3.75	-	$9.25	$5.00	$3.75	$9.25	$5.00	$1.99	-	$0.65	-	$0.65	-
Home Energy Squad	$3.23	-	-	-	-	-	-	$2.05	-	$0.47	$0.47	-	-
Energy Savings Kits	$3.89	-	-	-	$3.89	-	-	$2.39	-	$0.89	-	-	-
Income Qualified SF Weatherization	$3.35	-	-	-	-	-	-	$1.69	-	$0.54	-	-	-
MultiFamily Building Incremental Costs	$14.00	$14.00	$14.00	-	-	-	-	$5.00	$5.00	$4.00	$4.00		
School Kits - Incremental Costs	$3.22	-	-	-	-	-	-	$1.22	-	-	$0.48	-	-

*Note that these incremental costs are estimates. Actual incremental costs will be used when they are known.

Table 20.2.6	Gas Split Factor
Gas Water Heater	100%
Electric Water Heater	0%
Unknown Water Heater	93%

References:

1. Development of Standardized Domestic Hot Water Event Schedules for Residential Buildings; R. Hendron and J. Burch; NREL/CP-550-40874
2. Denver Water's 2006 Treated Water Quality Summary Report; http://www.denverwater.org/docs/assets/9A12FBC5-BCDF-1B42-D1BC5F0B1CE3B115/TreatedWQSummaryReport20061.pdf
3. DEER Database for Energy Efficient Resources; www.deeresources.com
4. Inside and outside city of Denver water rates - https://www.denverwater.org/residential/billing-and-rates/2020-rates
5. Inside and outside city of Denver sewer rates - https://www.denvergov.org/content/denvergov/en/wastewater-management/billing-and-rates.html
6. Xcel Energy New Mexico Residential Shower Use Study
7. The Effect of Efficiency Standards on Water Use and Water Heating Energy Use in the U.S.: A Detailed End-use Treatment; J Koomey, C Dunham, J Lutz; LBL-35475
8. Residential Energy Consumption Survey 2015; http://www.eia.gov/consumption/residential/
9. 2010 Xcel Energy Colorado Home Use Study (PS Co Service Area)

Changes from Recent Filing:

Updated water & sewer rates, and costs.

20.3 Commercial Low Flow

Algorithms

$$\Delta T_{WH} = T_{WH} - T_{city}$$

$$Gas\ Savings\ (Gross\ Dth) = Quantity * \frac{\rho_w * c_w * WtrSave * \Delta T_{WH}}{EFF_{WH,gas} * 1{,}000{,}000}$$

$$Energy\ Savings\ (Customer\ kWh) = Quantity * \frac{GPY_{saved} * \Delta T_{WH} * H_{water}}{EFF_{WH,electric} * 3{,}412}$$

$$Demand\ Savings\ (Customer\ kW) = \frac{Customer\ kWh}{8760}$$

$$Demand\ Savings\ (Customer\ PCkW) = Customer\ kW * CF$$

$$GPYsaved = (Baseline_{GPM} - Proposed_{GPM}) * Runtime_{Hours} * Facility_{Days} * 60$$

$$O\&M\ Savings = Quantity * GPY_{saved} * (Water_{Rate} + Sewer_{Rate})/1000$$

Variables

T_{WH}	Table 20.3.1	Water heater setpoint temperature °F. (Reference 1)
T_{city}	51.4	Water temperature of city water entering the water heater °F. (Reference 2)
ρ_w	8.34	Density of water in lb/gal
c_w	1	Specific heat of water in BTU/(lb·°F)
H_{water}	8.34	Heat content of 1 gallon of water in BTU/(gal·°F)
$EFF_{WH,gas}$	80%	Assumed gas water heater efficiency without standby losses. This only includes combustion efficiency.
$EFF_{WH,electric}$	98%	Assumed electric water heater efficiency
Conversion from Dth to BTU	1,000,000	1 Dth = 1,000,000 Btu
Conversion from kWh to BTU	3,412	1 kWh = 3,412 Btu
CF	See Table 20.3.2	Amount of Customer kW demand that will coincide with peak utility system demand.
Baseline GPM	See Table 20.3.2	Baseline showerhead flowrate is assumed to be 2.5GPM and kitchen/bathroom aerator baseline flowrates
Proposed GPM	See Table 20.3.2	Lifetime of showerhead and aerator measures. (Reference 3)
Runtime Hours	See Table 20.3.3	Number of hours per day equipment is used
Facility Days	See Table 20.3.3	Number of days per year the equipment is operated based on building type
Incremental Costs	See Table 20.3.4	Actual costs provided by vendor. Costs are re-evaluated throughout the year and updated to account for the evolving market.
Measure Life	See Table 20.3.4	Lifetime of commercial aerator and pre-rinse sprayer measures
Water Rate	$3.44	$ / 1000 Gallons
Sewer Rate	$5.79	$ / 1000 Gallons

Customer Inputs	**M&V Verified**
Quantity of Equipment	Yes
Building Type	Yes
Water Heating Fuel	Yes

Table 20.3.1

Equipment	**Degrees F**
Kitchen Aerator	125
Restroom Aerator	105
Pre-Rinse Sprayer	105
Showerhead	105

Table 20.3.2

Equipment	**Baseline GPM**	**Proposed GPM**	**CF**
Kitchen Aerator	2.2	1.5	1%
Restroom Aerator	2.2	0.6	1%
Pre-Rinse Sprayer	1.6	1.28	6%
Showerhead	2.5	1.5	6%

Table 20.3.3:

Building Type	**Facility Days**	**Annual Gallons per Faucet**	**Runtime Hours (Hrs/Day)**
Large Office	250	11,250	0.341
Fast Food Restaurant	365	9,581	0.199
Sit-Down Restaurant	365	15,768	0.327
Grocery Store	365	3,650	0.076
Elementary School	200	3,000	0.114
Jr/Sr High School or College	200	9,000	0.341
Healthcare	365	16,425	0.341
Hotel	365	1,278	0.027
Other Commercial	250	5,000	0.152
Average	**303**	**8,328**	**0.213**

* The following building types were considered not to apply to this measure: Small Office, Retail, Warehouse and Motel.

Table 20.3.4

Equipment	Cost*	Lifetime
Kitchen Aerator	$9.51	9
Restroom Aerator	$9.49	9
Pre-Rinse Sprayer	$39.50	5
Showerhead	$14.00	10

* See note above on updating costs throughout the program year.

References:

1. Development of Standardized Deomestic Hot Water Event Schedules for Residential Buildings; R. Hendron and J. Burch; NREL/CP-550-40874
2. United States Department of Energy. DHW Event Schedule Generator. (365 day average water main temperature for Minneapolis-St Paul Intl AP, MN). http://energy.gov/eere/buildings/downloads/dhw-event-schedule-generator
3. DEER Database for Energy Efficient Resources version 2014; www.deeresources.com
4. St Paul 2015 Water Rate Schedule - http://mn-stpaul.civicplus.com/DocumentView.asp?DID=3493
5. Xcel Energy New Mexico Residential Shower Use Study
6. The Effect of Efficiency Standards on Water Use and Water Heating Energy Use in the U.S.: A Detailed End-use Treatment; J Koomey, C Dunham, J Lutz; LBL-35475
7. Residential Energy Consumption Survey 2009; http://www.eia.gov/consumption/residential/

Changes from Recent Filing:

Updated water & sewer rates

20.4 Heat Pump Water Heaters

Algorithms

$Hot_Water_Energy = Qty \times Hot_Water_Consumption \times Water_Heater_Delta_T \times Days_Per_Year \times Water_Density$

Water Heater Delta T = Water_Heater_Temperature - City_Mains_Temperature

Heat Pump Water Heater with Gas Water Heater Baseline:

Customer kWh = Cooling_Benefit_kWh - Customer Water Heating kWh

Customer Water Heating kWh = Hot_Water_Energy / Proposed Eff /3,412

*Cooling_Benefit_kWh = (Hot Water Energy / Proposed_Eff) / (Cooling_SEER * 1000 / 3412) * Cooling_Hrs / 8760 / 3412*

Customer PCkW = Zero

Customer_Dth = Baseline_Dth + Heating_Penalty_Dth

Baseline_Dth = Hot_Water_Energy / Baseline_Eff_Gas / 1,000,000

*Heating_Penalty_Dth = -1 * (Hot Water Energy / Proposed_Eff) / Heating_Eff * Heating Hours / 8760 / 1,000,000*

Baseline_Efficiency_Gas= coef1 - coef2 x Baseline_Tank_Size

Heat Pump Water Heater with Electric Resistance Water Heater Baseline:

Customer kWh = Baseline_kWh - Proposed kWh + Cooling_Benefit kWh + Heating_Penalty kWh

Baseline_kWh = Hot_Water_Energy / Baseline_Eff_Electric / 3,412

Proposed_kWh = Hot_Water_Energy / Proposed_Eff / 3,412

Baseline_Eff_Electric = coef1 - (coef2 x Basline_Tank_Size)

Customer kW = Baseline_kW - Proposed_kW

Baseline_kW = Baseline_kWh / 8760 + Cooling_Benefit_kWh / Cooling_Hrs

Proposed_kW = Proposed_kWh / 8760

Customer_PCkW = Customer_kW x Coincidence_Factor

*Heating_Penalty_kWh = -1 * (Hot Water Energy / Proposed_Eff) / Heating_Eff * Heating Hours / 8760 / 3,412*

*Heating_Penalty_Dth = -1 * (Hot Water Energy / Proposed_Eff) / Heating_Eff * Heating Hours / 8760 / 1,000,000*

*Cooling_Benefit_kWh = (Hot Water Energy / Proposed_Eff) / (Cooling_SEER * 1000 / 3412) * Cooling_Hrs / 8760 / 3412*

*Heat Penalty Energy O&M = Heating_Penalty_Dth * Heating Energy O&M Rate*

Variables

Hot_Water_Consumption	See Table 20.4.4	Gallons of Water per day based on number of Bedrooms and Home Type
Water Heater Temperature	120.0	Water Heater Tank Temperature
City Mains Temperature	51.4	Water Main temperature average over the year
Conversion from Btu to Dth	1,000,000	1 Dth = 1,000,000 Btuh
Conversion from Btu to Therm	100,000	1 Therm = 100,000 Btuh
Conversion from kW to Watts	1,000	1 kW = 1,000 Watts
Conversion from Btu to kWh	3,412	1 kW = 3,412 Btuh
Specific Heat of Water	1	Btu/lb/°F
Water_Density	8.34	lb/gal H20
Days_Per_Year	365	Days per Year
Coef1	See Table 20.4.1 See Table 20.4.2	Code based forumula for calculation of Baseline efficiency based on water heater type and draw pattern
Coef2	See Table 20.4.1 See Table 20.4.2	Code based forumula for calculation of Baseline efficiency based on water heater type and draw pattern
Baseline_Tank_Size	See Table 20.4.2	Baseline Gas Water Heater Tank Size determined by customer provided First Hour Rating. Tank Size used in baseline efficiency equation.
Baseline_Tank_Size	See Table 20.4.3	Baseline Electric Resistance Water Heater Tank Size and Quantity determined by number of bedrooms. Tank Size used in baseline efficiency equation.
Gas Heating System Efficiency	78%	For homes with Gas heating systems the assumed efficiency for calculating HPWH O&M heating penalty
Air Source Heat Pump Heating System Efficiency	2.40	For homes with ASHP heating systems the assumed efficiency for calculating HPWH O&M kWh heating penalty in COP HSPF
Electric Resistance Heating Efficiency	100%	The assumed heating efficiency used for Heating Penalty calculations for homes with electric resistance heat.
Cooling System Efficiency	13.4	SEER of the typical home cooling system for calculating HPWH O&M Cooling benefit
Heating Energy O&M Rate	6.38	Cost per Dth for heating penalty due to heat pump water heater opearting during heating season.

Coincidence_Factor	100%	We are using the average water heater savings over the summer hours. Coincidence factor becomes 100%
Hours per Year	8760	total hours in a year
Heating Hours	6154	Hours in the year at or below the heating enable temp of 62 F
Cooling Hours	957	Hours in the year at or above the cooling enable temp of 77 F
Water Heater Self-Installation Rate	52%	Percent of Water Heaters that self-installed after retail purchase (Reference 9)

Customer Inputs	**M&V Verified**	
Number of Bedrooms	Yes	total number of bedrooms in the home where a new water heater is being installed
Proposed Eff	Yes	Proposed water heater AHRI Certified Uniform Energy Factor (UEF)
First Hour Rating	Yes	AHRI certified First Hour Rating in gallons per hour (GPH)
Quantity Proposed Equipment	Yes	
Proposed Tank Size	Yes	DOE Rated Storage Volume for tank type water heaters
Type of Proposed Water Heater	No	Type of proposed water heater. (i.e. Storage, Tankless, Heat Pump)
Water Heater Draw Pattern	No	Usage Bin identified on AHRI Certificate

Table 20.4.1 Gas Fired Storage Water Heater and Heat Pump Water Heater Baseline Efficiency Calculation Parameters (Reference 8)

	First Hour Rating to Define Draw Pattern		Electric Storage Water Heater >=20 Gallon and <=55 Gallon Baseline Efficiency Coefficients		Gas Storage WH >=20 gallons and <=55 Gallons Baseline Efficiency Coefficients		Gas Storage WH >55 Gallons and <=100 gallons Baseline Efficiency Coefficients	
Draw Pattern	min (>=Gallons)	max (< Gallons)	coef1	coef2	coef1	coef2	coef1	coef2
Very Small	1	18	0.8808	0.0008	0.3456	0.0020	0.6470	0.0006
Low	18	51	0.9254	0.0003	0.5982	0.0019	0.7689	0.0005
Medium	51	75	0.9307	0.0002	0.6483	0.0017	0.7897	0.0004
High	75	No Upper Limit	0.9349	0.0001	0.6920	0.0013	0.8072	0.0003

Table 20.4.2 Estimated Baseline Gas Storage Water Heater Tank Size

First Hour Draw		
Minimum (>=GPH)	Maximum (< GPH)	Baseline Tank Size
20	45	20
45	55	25
55	64	30
64	72	35
72	81	40
81	89	45
89	99	50
99	106	55
106	115	60
115	125	65
125	135	70
135	140	75
140	149	80
149	157	85
157	167	90
167	199	95

Table 20.4.3 2019 ASHRAE HVAC Applications Chapter 51 Service Water Heating: Table 4 HUD-FHA Minimum Water Heater Capacities for One- and Two-Family Living Units (Reference 12)

Water Heater Type \ Number of Bedrooms	1	2	3	4	5	6
Baseline Quantity Electric Storage Tanks	1	1	1	2	2	2
Baseline Tank Volume Electric Storage Tanks	30	40	55	30	30	40
Baseline Wattage per Electric Storage Tank	3.8	4.5	4.5	4.5	4.5	4.5

Table 20.4.4 Water Usage per Day by Number of Bedrooms

Home Type \ Number of Bedrooms	1	2	3	4	5	6
Single Family total HW usage per day	34	48	60	72	84	96
Multi-Family total HW usage per day	41	53	63	73	83	92

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

References:

1. Energy Conservation Program for Consumer Products: Test Procedure for Water Heaters; United States Department of Energy;
http://www.gpo.gov/fdsys/pkg/FR-1998-05-11/pdf/98-12296.pdf

2. Denver Water's 2006 Treated Water Quality Summary Report;
http://www.denverwater.org/docs/assets/9A12FBC5-BCDF-1B42-D1BC5F0B1CE3B115/TreatedWQSummaryReport20061.pdf

3. Energy Star Residential Water Heaters -Final Criterial Analysis, April 2008.
http://www.energystar.gov/ia/partners/prod_development/new_specs/downloads/water_heaters/WaterHeaterAnalysis_Final.pdf

4. Not Used

5. US Department of Energy; Residential Heat Pump Water Heaters;
http://energy.gov/eere/femp/covered-product-category-residential-heat-pump-water-heaters

6. US Department of Energy; Consumer Water Heaters;
https://www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=32

7. Not Used

8.US Department of Energy,Energy and water conservation standards and their compliance dates: 10 CFR 430.32(d):
https://www.ecfr.gov/cgi-bin/text-idx?SID=80dfa785ea350ebeee184bb0ae03e7f0&mc=true&node=se10.3.430_132&rgn=div8

9. EnergyStar - http://aceee.org/sites/default/files/files/pdf/conferences/hwf/2016/Ryan_Session1C_HWF16_2.22.16_0.pdf

10. Equipment Manufacturer Retail Price Information Request (Q4 - 2017)

11. NREL - National Residential Efficiency Measure Database, https://remdb.nrel.gov/measures.php?gId=6&ctId=270

12. 2019 ASHRAE HVAC Applications manual Chapter 51 Service Water Heating

13 Florida Solar Energy Center paper "Estimating Daily Domestic Hot Water Use in North American Homes.
https://fsec.ucf.edu/en/publications/pdf/FSEC-PF-464-15.pdf Table 5 on Page 11.

Changes from Recent Filing:

Updated incremental costs

20.5 Water Heater Demand Response

Algorithms

Customer kWh = HPWH Load Shifting & DR kWh

Customer kW = HPWH_Load_Shift_DR_kW

Customer kWh = ERWH DR kWh

Customer kW = ERWH_DR_kW

Customer_PCkW = Customer_kW x Coincidence_Factor

Variables

HPWH Load Shifting & DR kWh Savings	118.4	kWh savings per year for daily load shifting in Residential Heat Pump WH Unit with a smart switch.
HPWH Load Shifting & DR PCkW @ Customer Savings	0.076	Peak Coincident kW savings per year for daily load shifting in Residential HPWH Unit with a smart switch (Reference 3).
HPWH_Load_Shift_DR_kW	0.536	kW savings of average residential HPWH Unit operating in HP only mode.
HPWH_Coincidence_Factor	0.142	Coincidence Factor for DR or Load Shifting event of Heat Pump Water Heater.
Incremental Cost	$0.00	There is no cost to the customer to enroll
ERWH DR kWh Savings	0.160	kWh savings per year for Residential Electric Resistance Water Heater (ERWH) Unit with a smart switch. Deemed based on 5 DR Events. Actual number of events may be different.
ERWH DR PCkW @ Customer Savings	0.172	Peak Coincident kW savings per year for Residential ERWH Unit with a smart switch.
ERWH_DR_kW	4.500	Connected kW of average residential ERWH.
ERWH_Coincidence_Factor	0.03822	Coincidence Factor for DR Event of Electric Resistance Water Heater.

Customer Inputs	**M&V Verified**	
Quantity Proposed Equipment	Yes	quantity of controlled water heaters.

References:

1. Energy Conservation Program for Consumer Products: Test Procedure for Water Heaters; United States Department of Energy; http://www.gpo.gov/fdsys/pkg/FR-1998-05-11/pdf/98-12296.pdf
2. Denver Water's 2006 Treated Water Quality Summary Report; http://www.denverwater.org/docs/assets/9A12FBC5-BCDF-1B42-D1BC5F0B1CE3B115/TreatedWQSummaryReport20061.pdf
3. Energy Star Residential Water Heaters -Final Criterial Analysis, April 2008. http://www.energystar.gov/ia/partners/prod_development/new_specs/downloads/water_heaters/WaterHeaterAnalysis_Final.pdf
4. Not Used
5. US Department of Energy; Residential Heat Pump Water Heaters; http://energy.gov/eere/femp/covered-product-category-residential-heat-pump-water-heaters
6. US Department of Energy; Consumer Water Heaters; https://www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=32
7. Not Used
8.US Department of Energy,Energy and water conservation standards and their compliance dates: 10 CFR 430.32(d): https://www.ecfr.gov/cgi-bin/text-idx?SID=80dfa785ea350ebeee184bb0ae03e7f0&mc=true&node=se10.3.430_132&rgn=div8
9. EnergyStar - http://aceee.org/sites/default/files/files/pdf/conferences/hwf/2016/Ryan_Session1C_HWF16_2.22.16_0.pdf
10. Equipment Manufacturer Retail Price Information Request (Q4 - 2017)
11. NREL - National Residential Efficiency Measure Database, https://remdb.nrel.gov/measures.php?gId=6&ctId=270
12. 2019 ASHRAE HVAC Applications manual Chapter 51 Service Water Heating
13 Florida Solar Energy Center paper "Estimating Daily Domestic Hot Water Use in North American Homes. https://fsec.ucf.edu/en/publications/pdf/FSEC-PF-464-15.pdf Table 5 on Page 11.

Changes from Recent Filing:

None

20.6 Water Heater Treatments

Algorithms

Customer_Dth_Water_Heater_Blanket = (WH_Tank_Size / 45) x (HLF before - HLF with blanket) x 8760 / HE_Gas / 1,000,000

Customer kWh_Water_Heater_Blanket = (WH_Tank_Size / 45) x (HLF before - HLF with blanket) x 8760 / HE_Elec / 3412

Customer_kW_Water_Heater_Blanket = (WH_Tank_Size / 45) x (HLF before - HLF with blanket) x 8760 / HE_Elec / 3412 / Hr_WH_Operation

*Customer_PCkW_Water_Heater_Blanket = Customer_kW_Water_Heater_Blanket * Coincidence Factor*

Customer_Dth_Water_Heater_Setback = (WH_S_Baseline - WH_S_Proposed) / 10

Variables

WH_S_Baseline	26.2	Baseline gas water heater shell losses, Therms/year
WH_S_Proposed	22.4	Proposed gas water heater shell losses, with -10 F adjustment of setpoint, Therms/year
HE_Elec	1.0	Heat generation efficiency for electric water heater based on steady-state water heater efficiency.
HE_Gas	0.8	Heat generation efficiency for gas water heater based on steady-state water heater efficiency.
HLF_Before	236.86	Heat loss in BTU/hr based on a 45 gallon average of water heater sizes with 2" of polyurethane insulation at 135 F degrees.
HLF_with_blanket	138	Heat loss in BTU/hr based on a 45 gallon average of water heater sizes with 2" of polyurethane insulation at 135 F degrees plus an additional 2.5" fiberglass blanket.
Coincidence_Factor	100%	Coincidence Factor for water heater treatements is 100% because the kW is based on the average water heater savings over all annual hours.
Hr_WH_Operation	8760	Annual Water Heater available operating hours
Measure Life	7.5	Water Heater Blanket measure life
Measure Life	8	Water Heater Setback measure life

Customer Inputs	**M&V Verified**	
Quantity Proposed Equipment	Yes	
Type of Water Heater	Yes	Type of water heater, i.e. Gas or Electric Resistance
WH Tank Size	Yes	Tank Size of customer's Water Heater

*For Income Qualified SF Weatherization Program, WH Tank Size is assumed to be 40 gallons.

Table 20.6.1: Inc Costs for Various Program Water Heater Treatments

	Incremental Cost
IQ Single Family Weatherization Water Heater Blanket direct install	$ 75.00
Home Energy Squad Water Heater Blanket	$ 12.00
Home Energy Squad Water Heater Temperature Setback	$ -
Geographic Prequalification Water Heater Blanket	$ 82.50

References:

None

Changes from Recent Filing:

None

20.7 Water Heater Pipe Insulation

Algorithms

Unit kWh Savings per Year = $\left(Q_{Loss,Base} - Q_{Loss,Insul}\right) * \frac{Hours * Length}{3412 * Eff}$

Unit kW Savings per Year = $\frac{Unit\ kWh\ Savings\ per\ Year}{8760\ Hours}$

Unit Therms Savings per Year = $\left(Q_{Loss,Base} - Q_{Loss,Insul}\right) * \frac{Hours * Length}{100{,}000 * Eff}$

Unit Decatherm per Hour Savings = Unit Therm Savings Per Year / Hours

Variables

Q_Loss Base	See Table 20.7.1	Heat Loss (BTU/ft) from bare piping
Q_Loss Insul	See Table 20.7.1	Heat Loss (BTU/ft) from insulated piping
Eff	0.92	Deemed UEF for Electric Resistence Water Heater
	0.59	Deemed UEF for Natural Gas Water Heater
Length	Customer Input	Length of pipe to be treated adjacent to Water Heater. Maximum length allowed is 6 feet.
Hours	4823	Hours when outside air temperature is above building thermal balance point
Lifetime	See Table 20.7.2	
Incremental Cost	See Table 20.7.2	

Customer Inputs	**M&V Verified**	
Length	Yes	Length of pipe insulated - maximum of 6 feet from water heater
Water Heater Type	Yes	Gas or Electric water heater

Table 20.7.1 Average Heat Loss

Location	Avg Heat Loss of Bare Pipe (BTU/ft)	Avg Heat Loss of Insulated Pipe (Btu/ft)
Zone 1, 2, 3	36.9	6.9

Table 20.7.2 Incremental Cost and Lifetime

Lifetime	13	Years
Unit Incremental Cost	$3.63	$ per Foot

Assumptions

1. Pipes are assumed to be equal mix of 1/2" , 3/4" and 1" sizes
2. Insulation assumed to be R-2 pipe insulation
3. Water Heater temperature assumed to be 120 degF
4. Ambient temperature assumed to be 60 degF

References

1. State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs Version 4.0 January 20, 2023

Changes from Recent Filing:

New measure for 2024 filing

Program	Measure Group	Measure Lifetime (years)	Rebate Amount ($)	Incremental Cost ($)	Annual Customer kWh Savings (kWh/yr)	Annual Customer Peak Coincident Demand Savings (PCkW)	Gas Savings (Dth)	Peak Gas Savings (Dth/hr)	Non-Energy O&M Savings ($)	Gas Demand Targeted Area Penetration (%)	Electric NTG (%)	Gas NTG (%)	Install Rate (%)	2024 Electric Units	2025 Electric Units	2026 Electric Units	2024 Gas Units	2025 Gas Units	2026 Gas Units
Affordable New Home Construction - CO	Step A EE	30	$5,023	$5,023	208	0	0.0	0.00E+00	$0.00	7%	100%	100%	100%	0	0	25	0	0	0
Affordable New Home Construction - CO	Step A BE	30	$8,916	$8,916	0	0	22.1	0.00E+00	$0.00	7%	100%	100%	100%	0	0	25	0	0	25
Affordable New Home Construction - CO	Step B	30	$5,168	$5,168	-9,353	0	66.5	4.57E-01	$0.00	7%	100%	100%	100%	0	0	25	0	0	25
Affordable New Home Construction - CO	Step C	30	$10,894	$10,894	4,514	1	0.0	0.00E+00	$0.00	7%	100%	100%	100%	0	0	25	0	0	0
Business Energy Assessments - CO	Behavioral Commercial	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Business Energy Assessments - CO	Custom BEA Commercial Project	17	$7,754	$34,851	101,300	20	0.0	0.00E+00	$0.00	0%	100%	0%	100%	10	10	10	0	0	0
Business Energy Assessments - CO	Custom Electrification Equipment	20	$7,171	$99,750	-51,247	0	819.6	5.18E-01	$0.00	6%	93%	93%	100%	16	16	16	16	16	16
Business Energy Assessments - CO	Load Shifting	0	$0	$50,000	0	50	0.0	0.00E+00	$0.00	0%	100%	0%	100%	5	5	5	0	0	0
Business Energy Assessments - CO	BEA Prescriptive	15	$4,306	$20,197	66,500	8	19.4	8.42E-02	-$108.67	0%	98%	2%	100%	315	315	315	8	8	8
Business Energy Assessments - CO	BEA Assessment	0	$6,154	$8,462	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	130	130	130	6	6	6
Business Energy Assessments - CO	Building Operator Certification	5	$500	$1,619	50,219	3	30.0	1.50E-02	$0.00	3%	87%	44%	100%	78	78	78	40	40	40
Business Energy Assessments - CO	CO - Small Building Tune-Up Study - E/G	0	$1,099	$2,306	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	28	28	28	28	28	28
Business Energy Assessments - CO	CO - Small Building Tune-Up Measure - E/G	7	$0	$0	50,394	0	0.0	0.00E+00	-$51.18	7%	100%	100%	100%	28	28	28	28	28	28
Business New Construction - CO	EDA	20	$7,222	$62,449	61,130	19	300.0	0.00E+00	$14,259.48	0%	91%	91%	100%	169	301	456	145	272	405
Business New Construction - CO	EEB	20	$7,602	$23,991	33,647	8	112.3	0.00E+00	$1,008.87	0%	91%	91%	100%	136	180	306	56	105	236
Business New Construction - CO	Lighting NC LPD	14	$7,274	$20,978	69,926	13	0.0	0.00E+00	-$33.73	0%	95%	95%	100%	44	44	42	0	0	0
Business New Construction - CO	Code Compliance - 2024	20	$0	$0	3,781,213	432	7,507.6	0.00E+00	$0.00	0%	100%	100%	100%	1	1	1	1	1	1
Business New Construction - CO	AC Rewards - Business	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Commercial Building Controls - CO	AC Rewards - Business	5	$229	$229	34	2	0.0	0.00E+00	$0.00	0%	100%	0%	100%	370	1,340	599	0	0	0
Compressed Air - CO	ECO	5	$0	$390	29,167	4	0.0	0.00E+00	$0.00	0%	89%	0%	100%	1	1	1	0	0	0
Compressed Air - CO	Supply Side Study	5	$5,707	$6,287	31,586	5	0.0	0.00E+00	$0.00	0%	89%	0%	100%	21	23	25	0	0	0
Compressed Air - CO	Cycling Dryers	20	$1,433	$3,681	16,255	2	0.0	0.00E+00	$0.00	0%	89%	0%	100%	10	11	13	0	0	0
Compressed Air - CO	Dryer Purge Demand Controls	20	$2,020	$11,695	57,559	7	0.0	0.00E+00	$0.00	0%	89%	0%	100%	6	6	9	0	0	0
Compressed Air - CO	Mist Eliminators	11	$1,685	$6,886	10,841	1	0.0	0.00E+00	$542.00	0%	89%	0%	100%	3	4	4	0	0	0
Compressed Air - CO	No Air Loss Drain	13	$200	$323	3,790	1	0.0	0.00E+00	$0.00	0%	89%	0%	100%	22	22	23	0	0	0
Compressed Air - CO	New VFD Compressor	20	$6,401	$8,513	76,205	9	0.0	0.00E+00	$0.00	0%	89%	0%	100%	33	38	43	0	0	0
Compressed Air - CO	Demand Side Study	0	$4,970	$6,627	0	0	0.0	0.00E+00	$0.00	0%	89%	0%	100%	3	3	4	0	0	0
Compressed Air - CO	Pressure Flow Controller	15	$2,000	$5,430	22,053	2	0.0	0.00E+00	$0.00	0%	89%	0%	100%	2	2	3	0	0	0
Compressed Air - CO	Storage Tank	20	$2,000	$8,000	45,845	5	0.0	0.00E+00	$0.00	0%	89%	0%	100%	2	2	3	0	0	0
Compressed Air - CO	Leak Fixes	5	$1,500	$2,250	60,306	8	0.0	0.00E+00	$0.00	0%	89%	0%	100%	2	3	3	0	0	0
Compressed Air - CO	Industrial Battery Chargers	20	$250	$873	2,672	0	0.0	0.00E+00	$0.00	0%	89%	0%	100%	2	3	3	0	0	0
Compressed Air - CO	Custom Compressed Air Project	19	$6,833	$26,862	73,895	11	0.0	0.00E+00	$0.00	0%	89%	0%	100%	13	16	18	0	0	0
Critical Peak Pricing - CO	Critical Peak Pricing	1	$0	$0	23,722	539	0.0	0.00E+00	$0.00	0%	100%	0%	100%	62	69	79	0	0	0
Custom Efficiency - CO	Custom Electric Project	18	$9,478	$354,989	156,422	27	0.0	0.00E+00	$27,620.57	0%	87%	0%	100%	14	30	14	0	0	0
Custom Efficiency - CO	Custom Custom Project	17	$3,808	$39,849	0	0	952.1	6.16E-01	$238.58	7%	0%	87%	100%	0	0	0	7	10	13
Custom Efficiency - CO	Custom Electrification Equipment	20	$6,932	$96,423	-49,537	0	792.3	4.99E-01	$0.00	5%	93%	93%	100%	33	76	142	33	76	142
Custom Efficiency - CO	Load Shifting	0	$0	$50,000	0	50	0.0	0.00E+00	$0.00	0%	100%	0%	100%	1	1	1	0	0	0
Custom Efficiency - CO	Custom Electric Engineering Study	0	$10,935	$18,598	0	0	0.0	0.00E+00	$0.00	0%	0%	0%	100%	4	8	8	0	0	0
Custom Efficiency - CO	Custom Gas Engineering Study	0	$11,682	$27,792	0	0	0.0	0.00E+00	$0.00	0%	0%	0%	100%	0	0	0	4	10	10
Data Center Efficiency - CO	EDA	20	$677,649	$1,464,186	6,906,450	1,262	0.0	0.00E+00	$0.00	0%	100%	0%	100%	1	1	1	0	0	0
Data Center Efficiency - CO	Computer VDI	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Data Center Efficiency - CO	High Efficiency Servers	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Data Center Efficiency - CO	Data Center Implementation	15	$48,531	$377,294	971,980	89	0.0	0.00E+00	$0.00	0%	100%	0%	100%	2	2	1	0	0	0
Data Center Efficiency - CO	Data Center Prescriptive Project- Study Identified	15	$3,515	$19,325	155,321	21	0.0	0.00E+00	-$198.22	0%	100%	0%	100%	0	0	1	0	0	0
Data Center Efficiency - CO	Data Center Prescriptive Project - Site Visit Identified	18	$18,397	$79,650	570,912	14	0.0	0.00E+00	$0.00	0%	80%	0%	100%	1	1	1	0	0	0
Data Center Efficiency - CO	Data Center Prescriptive Project - Customer Identified	20	$34,671	$82,142	290,095	36	0.0	0.00E+00	$0.00	0%	45%	0%	100%	1	1	0	0	0	0
Data Center Efficiency - CO	CRAC Units	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Data Center Efficiency - CO	Plate & Frame Heat Exchangers - Study Identified	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Data Center Efficiency - CO	Plate & Frame Heat Exchangers - Site Visit Identified	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Data Center Efficiency - CO	Plate & Frame Heat Exchangers - Customer Identified	20	$10,600	$65,571	180,351	0	0.0	0.00E+00	$0.00	0%	45%	0%	100%	1	1	0	0	0	0
Data Center Efficiency - CO	DEPACC	20	$50,000	$95,246	33,748	91	0.0	0.00E+00	-$502.74	0%	45%	0%	100%	1	1	0	0	0	0
Data Center Efficiency - CO	CO - Data Center Eff Study	0	$7,000	$9,333	0	0	0.0	0.00E+00	$0.00	0%	100%	0%	100%	2	2	0	0	0	0
Electric Vehicle Optimization - CO	Dynamic Optimization	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	0%	100%	3,774	8,900	10,887	0	0	0
Electric Vehicle Optimization - CO	Static Optimization	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Energy Efficient Showerhead - CO	Aerators - EWH	10	$1	$1	60	0	0.0	0.00E+00	$4.10	0%	94%	94%	32%	5,333	5,333	6,746	0	0	0
Energy Efficient Showerhead - CO	Aerators - GWH	10	$1	$1	0	0	0.3	9.27E-07	$4.11	0%	94%	94%	32%	0	0	0	53,550	48,692	55,744
Energy Efficient Showerhead - CO	Showerheads - EWH	10	$4	$4	439	0	0.9	0.00E+00	$30.96	0%	94%	94%	72%	3,420	3,420	4,326	0	0	0
Energy Efficient Showerhead - CO	Showerheads - GWH	10	$4	$4	0	0	1.9	3.54E-06	$30.73	0%	94%	94%	72%	0	0	0	36,144	31,755	35,176
Energy Management Systems - CO	Energy Management Systems Custom Project	15	$56,395	$171,340	403,756	58	497.3	3.22E-01	$4,226.64	7%	100%	100%	100%	4	5	5	4	5	5
Energy Management Systems - CO	Energy Management Systems Load Shift Project	5	$0	$0	20,857	20	0.0	0.00E+00	$0.00	0%	100%	100%	100%	1	1	1	0	0	0
Energy Management Systems - CO	Empower Intelligence - CO Custom Electric Project	7	$0	$0	41,297	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	74	77	80	0	0	0
Energy Management Systems - CO	Load Shifting	0	$0	$50,000	0	50	0.0	0.00E+00	$0.00	0%	100%	100%	100%	4	6	8	0	0	0
Energy Management Systems - CO	Pneumatic to DDC	8	$100	$990	2,105	0	3.1	0.00E+00	$0.00	3%	100%	100%	100%	1,107	1,107	1,569	580	580	586
Energy Management Systems - CO	Demand Control	15	$530	$1,601	406	0	56.8	0.00E+00	$0.00	7%	100%	100%	100%	4	4	4	4	4	4
Energy Management Systems - CO	GREM	15	$50	$260	271	0	1.7	0.00E+00	$0.00	5%	100%	100%	100%	700	800	850	400	500	550
Energy Management Systems - CO	Empower Intelligence - CO Virtual Commissioning Subscription	0	$0	$1,032	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	745	775	803	0	0	0
Energy Savings Kits - CO	Advanced Power Strip	7	$14	$14	103	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	4,000	4,000	4,000	0	0	0
Energy Savings Kits - CO	Weatherstripping - Electric Heating and Cooling	10	$2	$2	221	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	2,000	2,000	2,000	0	0	0
Energy Savings Kits - CO	Weatherstripping - Electric Heating Only	10	$2	$2	209	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	1,050	1,050	1,050	0	0	0
Energy Savings Kits - CO	Weatherstripping - Gas Heating / Electric Cooling	10	$2	$2	12	0	1.6	2.65E-04	$0.00	0%	100%	100%	100%	500	500	500	500	500	500
Energy Savings Kits - CO	Weatherstripping - Gas Heating Only	10	$2	$2	0	0	1.6	2.65E-04	$0.00	0%	100%	100%	100%	0	0	0	200	200	200
Energy Savings Kits - CO	Window Film - Electric Heating	1	$2	$2	229	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	500	500	500	0	0	0
Energy Savings Kits - CO	Window Film - Gas Heating	1	$2	$2	0	0	1.7	9.56E-04	$0.00	0%	100%	100%	100%	0	0	0	500	500	500
Energy Savings Kits - CO	Home Lighting DI	21	$7	$7	87	0	0.0	0.00E+00	$0.00	0%	100%	100%	78%	10,000	10,000	10,000	0	0	0
Energy Savings Kits - CO	Home Lighting - Direct Install	8	$2	$2	30	0	0.0	0.00E+00	$0.00	0%	100%	100%	78%	8,000	8,000	8,000	0	0	0
Energy Savings Kits - CO	Aerators - EWH	10	$2	$2	60	0	0.0	0.00E+00	$4.04	0%	100%	100%	66%	1,000	1,000	1,000	0	0	0
Energy Savings Kits - CO	Aerators - GWH	10	$2	$2	0	0	0.3	1.18E-06	$3.79	0%	100%	100%	63%	0	0	0	6,500	6,500	6,500
Energy Savings Kits - CO	Showerheads - EWH	10	$4	$4	476	0	0.0	0.00E+00	$33.50	0%	100%	100%	70%	800	800	800	0	0	0
Energy Savings Kits - CO	Showerheads - GWH	10	$4	$4	0	0	2.0	3.54E-06	$33.50	0%	100%	100%	70%	0	0	0	3,200	3,200	3,200
EV Critical Peak Pricing - CO	Electric Vehicle Critical Peak Pricing	0	$0	$0	0	29	0.0	0.00E+00	$0.00	0%	100%	100%	100%	28	38	48	0	0	0
Home Energy Insights - CO	Behavioral Residential	1	$0	$0	72	0	0.1	0.00E+00	$0.00	0%	100%	100%	100%	1,565,725	1,776,160	1,899,765	1,700,000	1,710,000	1,850,000
Home Energy Insights - CO	Behavioral Adjustment	0	$0	$0	-48	0	-0.1	0.00E+00	$0.00	0%	100%	100%	100%	1,565,725	1,776,160	1,899,765	1,700,000	1,710,000	1,850,000
Home Energy Insights - CO	High Bill Alerts	1	$0	$0	0	0	0.4	0.00E+00	$0.00	0%	100%	100%	100%	300,000	300,000	400,000	390,000	950,000	950,000
Home Energy Insights - CO	High Bill Alerts - Behavioral Adjustment	0	$0	$0	-6	0	-0.2	0.00E+00	$0.00	0%	100%	100%	100%	300,000	300,000	400,000	390,000	950,000	950,000
Home Energy Insights - CO	Conservation Messaging	1	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	500,000	700,000	700,000
Home Energy Insights - CO	Conservation Messaging - Behavioral Adjustment	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	500,000	700,000	700,000
Home Energy Squad - CO	Advanced Power Strip	7	$10	$10	103	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	40	60	100	0	0	0
Home Energy Squad - CO	Weatherstripping - Electric Heating and Cooling	10	$8	$9	221	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	86	233	240	0	0	0
Home Energy Squad - CO	Weatherstripping - Electric Heating Only	10	$7	$9	209	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	86	233	234	0	0	0
Home Energy Squad - CO	Weatherstripping - Gas Heating / Electric Cooling	10	$9	$9	12	0	1.6	2.65E-04	$0.00	0%	100%	100%	100%	4,338	12,049	11,050	4,524	12,189	11,190
Home Energy Squad - CO	Weatherstripping - Gas Heating Only	10	$9	$9	0	0	1.6	2.65E-04	$0.00	0%	100%	100%	100%	0	0	0	6,290	7,300	6,585
Home Energy Squad - CO	Attic Hatch Insulation - Electric Heating and Cooling	20	$50	$50	356	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	10	194	190	0	0	0
Home Energy Squad - CO	Attic Hatch Insulation - Electric Heating Only	20	$50	$50	340	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	10	194	190	0	0	0
Home Energy Squad - CO	Attic Hatch Insulation - Gas Heating / Electric Cooling	20	$50	$50	11	0	1.3	0.00E+00	$0.00	0%	100%	100%	100%	18	117	117	148	147	130
Home Energy Squad - CO	Attic Hatch Insulation - Gas Heating Only	20	$50	$50	0	0	1.5	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	50	50	40
Home Energy Squad - CO	Trip Charge	0	$0	$50	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	8,000	16,250	11,000	8,000	16,250	11,000
Home Energy Squad - CO	Home Lighting - Direct Install	12	$3	$3	26	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	278,640	398,288	425,000	0	0	0
Home Energy Squad - CO	Home Lighting DI	18	$15	$15	14	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	324	1,400	1,400	0	0	0
Home Energy Squad - CO	ALC Energy Star Smart Thermostat	10	$0	$247	128	0	4.1	0.00E+00	$0.00	0%	100%	100%	100%	151	244	220	70	124	100
Home Energy Squad - CO	Smart Thermostat Optimization	1	$0	$0	40	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	324	480	400	0	0	0
Home Energy Squad - CO	AC Rewards-EE	10	$192	$192	142	0	8.1	0.00E+00	$0.00	0%	100%	100%	100%	36	100	80	36	100	80
Home Energy Squad - CO	Energy Star Smart Thermostat	10	$125	$125	130	0	5.3	0.00E+00	$0.00	0%	100%	100%	100%	52	160	160	47	115	110
Home Energy Squad - CO	Programmable Thermostat	10	$0	$0	149	0	10.6	0.00E+00	$0.00	0%	100%	100%	100%	50	100	75	100	150	210
Home Energy Squad - CO	Aerators - EWH	10	$1	$1	78	0	0.0	0.00E+00	$5.50	0%	100%	100%	100%	1,178	1,318	1,460	0	0	0
Home Energy Squad - CO	Aerators - GWH	10	$1	$1	0	0	0.3	1.52E-06	$4.65	0%	100%	100%	100%	0	0	0	1,400	2,220	2,450
Home Energy Squad - CO	Showerheads - EWH	10	$3	$3	476	0	0.0	0.00E+00	$33.50	0%	100%	100%	100%	130	400	400	0	0	0
Home Energy Squad - CO	Showerheads - GWH	10	$3	$3	0	0	2.0	3.54E-06	$33.50	0%	100%	100%	100%	0	0	0	1,385	1,485	1,385
Home Energy Squad - CO	Water Heater Setback	8	$0	$0	0	0	0.4	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	1,134	1,680	1,680
Home Energy Squad - CO	Water Heater Blanket Electric	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Home Energy Squad - CO	Water Heater Blanket Gas	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Home Energy Squad - CO	Water Heater Pipe Insulation	13	$18	$18	44	0	1.2	2.57E-04	$0.00	0%	100%	100%	100%	32	50	75	400	400	300
Home Lighting - CO	Advanced Power Strip	7	$11	$28	106	0	0.0	0.00E+00	$0.00	0%	100%	0%	100%	4,000	4,000	4,000	0	0	0
Home Lighting - CO	Residential Home Lighting - Residential Customers	20	$2	$2	11	0	0.0	0.00E+00	$0.00	0%	73%	0%	99%	227,692	226,722	225,755	0	0	0
Home Lighting - CO	Home Lighting - Residential Customers	8	$2	$2	31	0	0.0	0.00E+00	$0.00	0%	90%	0%	100%	83,000	79,000	76,000	0	0	0
Home Lighting - CO	Residential Home Lighting - Business Customers	5	$2	$8	57	0	0.0	0.00E+00	$0.00	0%	78%	0%	100%	15,650	15,588	15,526	0	0	0
Home Lighting - CO	Residential Home Lighting - Residential Customers - Online Store	20	$2	$2	11	0	0.0	0.00E+00	$0.00	0%	100%	0%	99%	8,375	8,375	8,375	0	0	0
Home Lighting - CO	Home Lighting - Residential Customers - Online Store	8	$1	$1	31	0	0.0	0.00E+00	$0.00	0%	100%	0%	100%	5,000	5,000	5,000	0	0	0
HVAC+R Systems - CO	Food Service	12	$429	$3,923	0	0	139.0	3.21E-02	$0.00	7%	0%	100%	100%	0	0	0	14	14	14
HVAC+R Systems - CO	Ozone Laundry	10	$3,028	$10,894	0	0	92.0	1.02E-01	$1,249.14	7%	0%	100%	100%	0	0	0	1	1	1
HVAC+R Systems - CO	Steam Cooker	12	$430	$2,270	0	0	511.1	1.24E-01	$718.99	7%	0%	100%	100%	0	0	0	4	4	4
HVAC+R Systems - CO	Custom Cooling Project	19	$26,286	$78,509	101,583	55	0.0	0.00E+00	-$1,560.43	0%	87%	0%	100%	10	10	0	0	0	0
HVAC+R Systems - CO	Custom Heating Project	17	$3,808	$39,849	0	0	952.1	6.16E-01	$238.58	7%	0%	87%	100%	0	0	0	1	1	1
HVAC+R Systems - CO	Custom Motors Project	16	$37,881	$161,177	487,067	71	0.0	0.00E+00	$880.50	0%	87%	0%	100%	7	7	0	0	0	0
HVAC+R Systems - CO	Custom Electrification Equipment	20	$2,157	$30,000	-15,413	0	246.5	1.06E-01	$0.00	1%	93%	93%	100%	14	72	72	14	72	72
HVAC+R Systems - CO	Load Shifting	0	$0	$50,000	0	50	0.0	0.00E+00	$0.00	0%	100%	100%	100%	5	5	5	0	0	0
HVAC+R Systems - CO	DX Units 20 - 63.3 Tons	20	$628	$4,489	11,694	4	0.0	0.00E+00	$0.00	0%	89%	0%	100%	140	150	155	0	0	0
HVAC+R Systems - CO	DX Units > 63.3 Tons	20	$1,711	$20,401	30,848	11	0.0	0.00E+00	$0.00	0%	89%	0%	100%	19	21	120	0	0	0
HVAC+R Systems - CO	Water-source Heat Pumps	15	$1,056	$1,046	-2,245	1	0.0	0.00E+00	$0.00	0%	89%	0%	100%	450	455	460	0	0	0
HVAC+R Systems - CO	PTHP	20	$138	$282	1,257	1	4.0	0.00E+00	$0.00	0%	92%	36%	100%	86	294	520	1	102	200
HVAC+R Systems - CO	Air-Cooled Chillers	20	$10,725	$15,774	38,329	10	0.0	0.00E+00	$0.00	0%	89%	0%	100%	56	64	56	0	0	0

Program	Measure Group	Measure Lifetime (years)	Rebate Amount ($)	Incremental Cost ($)	Annual Customer kWh Savings (kWh/yr)	Annual Customer Peak Coincident Demand Savings (PCkW)	Gas Savings (Dth)	Peak Gas Savings (Dth/hr)	Non-Energy O&M Savings ($)	Gas Demand Targeted Area Penetration (%)	Electric NTG (%)	Gas NTG (%)	Install Rate (%)	2024 Electric Units	2025 Electric Units	2026 Electric Units	2024 Gas Units	2025 Gas Units	2026 Gas Units
HVAC+R Systems - CO	Screw/Scroll Chillers	20	$6,056	$11,407	26,085	9	0.0	0.00E+00	$0.00	0%	71%	0%	100%	35	40	35	0	0	0
HVAC+R Systems - CO	Centrifugal Chillers	20	$19,588	$23,306	165,329	25	0.0	0.00E+00	$0.00	0%	71%	0%	100%	35	40	36	0	0	0
HVAC+R Systems - CO	VFD Chiller Retrofit	15	$36,000	$86,256	229,680	-42	0.0	0.00E+00	$0.00	0%	81%	0%	100%	1	1	3	0	0	0
HVAC+R Systems - CO	DEPACC	20	$17,500	$34,943	21,192	72	0.0	0.00E+00	-$126.28	0%	71%	0%	100%	10	20	5	0	0	0
HVAC+R Systems - CO	Mini-Split Heat Pump - MS	18	$148	$372	1,159	1	0.0	0.00E+00	$0.00	0%	89%	0%	100%	120	135	90	0	0	0
HVAC+R Systems - CO	Dual Fuel RTU	20	$4,655	$13,705	-1,834	1	76.6	0.00E+00	$0.00	0%	93%	47%	100%	10	80	284	5	40	142
HVAC+R Systems - CO	ASHP < 5.4 Tons	20	$1,125	$2,012	50	0	22.9	0.00E+00	$0.00	0%	92%	39%	100%	173	475	835	28	170	390
HVAC+R Systems - CO	GSHP	20	$4,041	$14,311	2,092	1	41.3	0.00E+00	$0.00	0%	92%	40%	100%	3	6	23	1	2	10
HVAC+R Systems - CO	WSHP	20	$504	$1,490	-495	0	36.6	0.00E+00	$0.00	0%	93%	47%	100%	95	300	200	55	150	100
HVAC+R Systems - CO	MSHP	20	$675	$407	581	1	4.8	0.00E+00	$0.00	0%	93%	47%	100%	0	100	200	0	50	100
HVAC+R Systems - CO	ccMSHP	20	$1,688	$407	572	1	5.1	0.00E+00	$0.00	0%	93%	47%	100%	0	2	200	0	1	100
HVAC+R Systems - CO	Indoor Ag Dehumidification	12	$1,586	$2,916	14,580	2	0.0	0.00E+00	$0.00	0%	100%	100%	100%	20	20	20	0	0	0
HVAC+R Systems - CO	Steam Traps	5	$50	$287	0	0	85.4	1.09E-02	$0.00	7%	0%	100%	100%	0	0	0	2	2	2
HVAC+R Systems - CO	Boiler Controls	19	$1,220	$11,364	0	0	144.2	1.17E-01	$0.00	7%	0%	100%	100%	0	0	0	24	34	24
HVAC+R Systems - CO	Process Steam Traps	20	$100	$267	0	0	502.7	6.07E-02	$0.00	7%	0%	100%	100%	0	0	0	7	7	7
HVAC+R Systems - CO	Boiler Tune Up	2	$126	$504	0	0	105.1	8.56E-02	$0.00	7%	0%	86%	100%	0	0	0	4	4	3
HVAC+R Systems - CO	Process Boiler Tune Up	20	$264	$1,055	0	0	1,335.6	1.52E-01	$0.00	7%	0%	86%	100%	0	0	0	1	1	1
HVAC+R Systems - CO	Demand Control Ventilation	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
HVAC+R Systems - CO	Unit Heater	15	$500	$1,407	0	0	23.6	1.96E-02	$0.00	7%	0%	86%	100%	0	0	0	15	10	10
HVAC+R Systems - CO	Pipe Insulation - Direct Install	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
HVAC+R Systems - CO	Heat Pump Water Heater - Beneficial Electrification	10	$875	$4,426	-12,568	-1	131.9	1.31E-02	$0.00	7%	93%	93%	100%	56	101	140	56	101	140
HVAC+R Systems - CO	Heat Pump Water Heater - Electric Efficiency	10	$875	$4,541	11,255	1	0.0	0.00E+00	-$10.60	7%	86%	0%	100%	13	40	84	0	0	0
HVAC+R Systems - CO	Pipe Insulation	13	$2,751	$2,734	0	0	100.4	1.93E-02	$0.00	7%	0%	86%	100%	0	0	0	2	2	2
HVAC+R Systems - CO	HVLS Destratification Fans	15	$2,000	$4,176	0	0	77.3	1.24E-02	$0.00	7%	0%	86%	100%	10	14	20	10	14	20
HVAC+R Systems - CO	Boiler	25	$15,863	$37,593	0	0	906.9	4.79E-01	$0.00	7%	0%	86%	100%	0	0	0	11	9	5
HVAC+R Systems - CO	Motors	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
HVAC+R Systems - CO	VFDs	15	$2,764	$5,704	27,533	4	0.0	0.00E+00	$0.00	0%	81%	0%	100%	428	551	445	0	0	0
HVAC+R Systems - CO	Well Pump VFD	15	$1,273	$8,548	51,202	7	0.0	0.00E+00	$0.00	0%	81%	0%	100%	4	4	30	0	0	0
HVAC+R Systems - CO	Fan Efficiency (FEI)	16	$2,475	$3,990	29,592	4	0.0	0.00E+00	$0.00	0%	81%	0%	100%	2	2	2	0	0	0
HVAC+R Systems - CO	Refigeration Fans	15	$58	$176	645	0	0.0	0.00E+00	$0.00	0%	100%	0%	100%	10	10	10	0	0	0
HVAC+R Systems - CO	Fractional HP Circ. Pumps	15	$75	$187	3,081	1	0.0	0.00E+00	$0.00	0%	81%	0%	100%	2	2	2	0	0	0
HVAC+R Systems - CO	Fractional HP Fan Motors	15	$75	$187	523	0	0.0	0.00E+00	$0.00	0%	81%	0%	100%	2	2	2	0	0	0
HVAC+R Systems - CO	Pump Efficiency (PEI)	16	$2,581	$3,381	63,266	13	0.0	0.00E+00	$0.00	0%	81%	0%	100%	2	2	2	0	0	0
HVAC+R Systems - CO	Integrated Drives	15	$1,077	$3,389	6,971	2	0.0	0.00E+00	$0.00	0%	81%	0%	100%	6	6	6	0	0	0
HVAC+R Systems - CO	Indoor Ag Ventilation	7	$90	$150	769	0	0.0	0.00E+00	$0.00	0%	100%	0%	100%	3	3	3	0	0	0
HVAC+R Systems - CO	Anti-Sweat Heater Controls	12	$60	$180	1,415	0	0.0	0.00E+00	$0.00	0%	100%	0%	100%	4	4	4	0	0	0
HVAC+R Systems - CO	No Heat Case Doors	12	$125	$538	1,572	0	0.0	0.00E+00	$0.00	0%	100%	0%	100%	4	4	4	0	0	0
HVAC+R Systems - CO	Medium-temp Enclosed Reach-in Case	15	$70	$338	970	0	0.0	0.00E+00	$0.00	0%	100%	0%	100%	2	2	2	0	0	0
HVAC+R Systems - CO	Retrofit of open multi-deck cases with solid glass doors	12	$125	$498	1,047	0	7.5	1.46E-03	$0.00	7%	100%	0%	100%	4	4	4	0	0	0
HVAC+R Systems - CO	Walk-in Freezer Defrost Controls	15	$598	$1,695	6,324	1	0.0	0.00E+00	$0.00	0%	100%	0%	100%	2	2	2	0	0	0
HVAC+R Systems - CO	Floating Head Pressure Controls	15	$2,200	$4,185	61,190	0	0.0	0.00E+00	$0.00	0%	100%	0%	100%	2	5	11	0	0	0
HVAC+R Systems - CO	Strip Curtains - Direct Install	4	$271	$271	4,620	1	0.0	0.00E+00	$0.00	0%	100%	0%	100%	2	2	2	0	0	0
HVAC+R Systems - CO	Auto Closers - Direct Install	8	$157	$157	1,625	0	0.0	0.00E+00	$0.00	0%	100%	0%	100%	4	4	4	0	0	0
HVAC+R Systems - CO	Cooling Engineering Study	0	$12,802	$18,705	0	0	0.0	0.00E+00	$0.00	0%	100%	0%	100%	2	2	0	0	0	0
HVAC+R Systems - CO	Motors Engineering Study	0	$10,875	$14,500	0	0	0.0	0.00E+00	$0.00	0%	100%	0%	100%	2	2	0	0	0	0
Income Qualified Home Energy Squad - CO	Advanced Power Strip	7	$10	$10	103	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	100	100	100	0	0	0
Income Qualified Home Energy Squad - CO	Weatherstripping - Electric Heating and Cooling	10	$9	$9	221	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	20	29	34	0	0	0
Income Qualified Home Energy Squad - CO	Weatherstripping - Electric Heating Only	10	$9	$9	209	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	20	29	34	0	0	0
Income Qualified Home Energy Squad - CO	Weatherstripping - Gas Heating / Electric Cooling	10	$9	$9	12	0	1.6	2.65E-04	$0.00	0%	100%	100%	100%	760	1,754	2,060	766	1,768	2,077
Income Qualified Home Energy Squad - CO	Weatherstripping - Gas Heating Only	10	$9	$9	0	0	1.6	2.65E-04	$0.00	0%	100%	100%	100%	0	0	0	345	872	1,025
Income Qualified Home Energy Squad - CO	Attic Hatch Insulation - Electric Heating and Cooling	20	$50	$50	356	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	15	29	34	0	0	0
Income Qualified Home Energy Squad - CO	Attic Hatch Insulation - Electric Heating Only	20	$50	$50	340	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	15	29	34	0	0	0
Income Qualified Home Energy Squad - CO	Attic Hatch Insulation - Gas Heating / Electric Cooling	20	$50	$50	14	0	1.5	0.00E+00	$0.00	0%	100%	100%	100%	15	29	34	191	269	284
Income Qualified Home Energy Squad - CO	Attic Hatch Insulation - Gas Heating Only	20	$50	$50	0	0	1.5	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	11	29	34
Income Qualified Home Energy Squad - CO	Trip Charge	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Income Qualified Home Energy Squad - CO	Home Lighting - Direct Install	12	$3	$3	26	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	29,853	61,753	85,400	0	0	0
Income Qualified Home Energy Squad - CO	Home Lighting DI	18	$15	$15	14	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	103	247	342	0	0	0
Income Qualified Home Energy Squad - CO	ALC Energy Star Smart Thermostat	10	$0	$242	131	0	5.1	0.00E+00	$0.00	0%	100%	100%	100%	10	32	38	13	28	28
Income Qualified Home Energy Squad - CO	Smart Thermostat Optimization	1	$0	$0	45	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	21	58	68	0	0	0
Income Qualified Home Energy Squad - CO	AC Rewards-EE	10	$192	$192	142	0	8.1	0.00E+00	$0.00	0%	100%	100%	100%	6	15	17	90	120	125
Income Qualified Home Energy Squad - CO	Energy Star Smart Thermostat	10	$125	$125	126	0	7.5	0.00E+00	$0.00	0%	100%	100%	100%	8	23	27	86	135	142
Income Qualified Home Energy Squad - CO	Programmable Thermostat	10	$0	$0	149	0	10.6	0.00E+00	$0.00	0%	100%	100%	100%	114	290	341	114	290	341
Income Qualified Home Energy Squad - CO	Aerators - EWH	10	$1	$1	71	0	0.0	0.00E+00	$4.82	0%	100%	100%	100%	142	343	414	0	0	0
Income Qualified Home Energy Squad - CO	Aerators - GWH	10	$1	$1	0	0	0.3	8.52E-07	$4.53	0%	100%	100%	100%	0	0	0	804	1,975	2,323
Income Qualified Home Energy Squad - CO	Showerheads - EWH	10	$3	$3	476	0	0.0	0.00E+00	$33.50	0%	100%	100%	100%	84	216	320	0	0	0
Income Qualified Home Energy Squad - CO	Showerheads - GWH	10	$3	$3	0	0	2.0	3.54E-06	$33.50	0%	100%	100%	100%	0	0	0	259	727	854
Income Qualified Home Energy Squad - CO	Water Heater Setback	8	$0	$0	0	0	0.4	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	142	406	480
Income Qualified Home Energy Squad - CO	Water Heater Blanket Electric	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Income Qualified Home Energy Squad - CO	Water Heater Blanket Gas	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Income Qualified Home Energy Squad - CO	Water Heater Pipe Insulation	13	$18	$18	47	0	1.2	2.53E-04	$0.00	0%	100%	100%	100%	20	25	35	52	145	171
Income Qualified MF Weatherization - CO	IQMF Project	19	$6,823	$32,216	22,780	3	126.8	6.21E-02	$221.93	3%	100%	100%	100%	56	53	53	18	26	33
Income Qualified MF Weatherization - CO	Boiler	25	$2,262	$7,079	0	0	146.0	1.19E-01	$0.00	7%	100%	100%	100%	0	0	0	23	24	24
Income Qualified MF Weatherization - CO	Unit Heater	16	$350	$992	0	0	21.3	1.77E-02	$0.00	7%	100%	100%	100%	0	0	0	3	3	3
Income Qualified MF Weatherization - CO	Unit Heater Infrared	15	$186	$153	1,913	0	85.3	7.08E-02	$0.00	7%	100%	100%	100%	3	3	3	1	1	1
Income Qualified MF Weatherization - CO	Water Heater	16	$863	$1,245	0	0	50.7	4.42E-03	$0.00	7%	100%	100%	100%	0	0	0	7	7	7
Income Qualified MF Weatherization - CO	BE-Custom Beneficial Electrification Project	14	$2,399	$7,271	-933	0	11.6	0.00E+00	$0.00	0%	100%	100%	100%	432	865	1,720	285	575	1,145
Income Qualified SF Weatherization - CO	Refrigerator Replacement	14	$900	$1,200	422	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	50	50	50	0	0	0
Income Qualified SF Weatherization - CO	Attic Insulation - Electric Heating Only	20	$2,229	$2,354	3,354	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	15	15	15	0	0	0
Income Qualified SF Weatherization - CO	Attic Insulation - Gas Heating Only	20	$1,946	$2,000	0	0	14.3	7.34E-03	$0.00	0%	100%	100%	100%	0	0	0	800	800	800
Income Qualified SF Weatherization - CO	Wall Insulation - Electric Heating Only	20	$1,753	$1,957	3,806	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	3	3	3	0	0	0
Income Qualified SF Weatherization - CO	Wall Insulation - Gas Heating Only	20	$1,150	$1,168	0	0	17.9	9.55E-03	$0.00	0%	100%	100%	100%	0	0	0	500	500	500
Income Qualified SF Weatherization - CO	Crawl Space Wall Insulation - Electric Heating Only	20	$1,532	$1,582	2,163	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	5	5	5	0	0	0
Income Qualified SF Weatherization - CO	Crawl Space Wall Insulation - Gas Heating Only	20	$1,380	$1,401	0	0	13.8	7.21E-03	$0.00	0%	100%	100%	100%	0	0	0	190	190	190
Income Qualified SF Weatherization - CO	Air Sealing - Electric Heating Only	10	$1,038	$1,110	2,052	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	20	20	20	0	0	0
Income Qualified SF Weatherization - CO	Air Sealing - Gas Heating Only	10	$721	$730	0	0	8.3	4.41E-03	$0.00	0%	100%	100%	100%	0	0	0	850	850	850
Income Qualified SF Weatherization - CO	Storm Windows - Electric Heating Only	20	$451	$451	853	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	5	5	5	0	0	0
Income Qualified SF Weatherization - CO	Storm Windows - Gas Heating Only	20	$812	$821	0	0	5.7	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	300	300	300
Income Qualified SF Weatherization - CO	Home Lighting - Direct Install	18	$1	$1	10	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	1,440,250	1,440,250	1,440,250	0	0	0
Income Qualified SF Weatherization - CO	BE-High Efficiency Non-Ducted Heat Pump with QI	18	$3,317	$1,798	-1,331	0	13.9	0.00E+00	$0.00	0%	100%	100%	100%	842	874	900	421	437	450
Income Qualified SF Weatherization - CO	High Efficiency Furnace Tier 1	18	$1,000	$1,294	0	0	14.6	7.97E-03	$0.00	0%	100%	100%	100%	0	0	0	800	800	800
Income Qualified SF Weatherization - CO	High Efficiency Furnace Tier 2	18	$3,760	$1,294	0	0	14.6	7.97E-03	$0.00	0%	100%	100%	100%	0	0	0	100	100	100
Income Qualified SF Weatherization - CO	High Efficiency Boiler Tier 1	20	$1,000	$1,446	0	0	10.1	5.52E-03	$0.00	0%	100%	100%	100%	0	0	0	15	15	15
Income Qualified SF Weatherization - CO	High Efficiency Boiler Tier 2	20	$4,000	$1,446	0	0	10.1	5.52E-03	$0.00	0%	100%	100%	100%	0	0	0	5	5	5
Income Qualified SF Weatherization - CO	IQ-SFW Boiler/Furnace Tune-up	2	$395	$300	0	0	5.2	2.83E-03	$0.00	0%	100%	100%	100%	0	0	0	105	105	105
Income Qualified SF Weatherization - CO	Energy Star Smart Thermostat	10	$150	$100	0	0	6.5	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	250	250	250
Income Qualified SF Weatherization - CO	T-Stat Install & Programming	10	$100	$29	0	0	11.6	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	1,000	1,000	1,000
Income Qualified SF Weatherization - CO	BE-High Efficiency Ducted Heat Pump with QI	18	$4,250	$5,881	-1,898	0	21.0	1.25E-03	$0.00	0%	100%	100%	100%	4	20	40	2	10	20
Income Qualified SF Weatherization - CO	High Efficiency Ducted Heat Pump - Electric Resistance Baseline	18	$7,750	$4,454	5,058	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	2	2	2	0	0	0
Income Qualified SF Weatherization - CO	Standard evaporative cooler	15	$1,200	-$5,119	628	1	0.0	0.00E+00	-$12.64	0%	100%	100%	100%	71	71	71	0	0	0
Income Qualified SF Weatherization - CO	High Efficiency Non-Ducted cold climate Heat Pump - Electric Resistance Baseline	15	$9,250	$11,163	5,720	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	2	2	2	0	0	0
Income Qualified SF Weatherization - CO	BE-High Efficiency Non-Ducted cold climate Heat Pump	15	$4,889	$2,893	-1,599	0	17.3	0.00E+00	$0.00	0%	100%	100%	100%	24	40	72	12	20	36
Income Qualified SF Weatherization - CO	High Efficiency Ducted cold climate Heat Pump - Electric Resistance Baseline	18	$10,250	$10,948	10,458	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	2	2	2	0	0	0
Income Qualified SF Weatherization - CO	BE-High Efficiency Ducted cold climate Heat Pump with QI	18	$5,441	$9,048	-2,962	0	31.4	8.44E-04	$0.00	0%	100%	100%	100%	24	50	68	12	25	34
Income Qualified SF Weatherization - CO	High Efficiency Non-Ducted Heat Pump - Electric Resistance Baseline	18	$7,750	$2,973	4,274	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	2	2	2	0	0	0
Income Qualified SF Weatherization - CO	Single-Family Audit	0	$250	$250	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	400	400	400	25	25	250
Income Qualified SF Weatherization - CO	Aerators - EWH	10	$4	$1	60	0	0.0	0.00E+00	$4.12	0%	100%	100%	100%	603	603	603	0	0	0
Income Qualified SF Weatherization - CO	Aerators - GWH	10	$5	$1	0	0	0.3	1.01E-06	$4.01	0%	100%	100%	100%	0	0	0	45	45	45
Income Qualified SF Weatherization - CO	Showerheads - EWH	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Income Qualified SF Weatherization - CO	Showerheads - GWH	10	$10	$3	0	0	2.0	3.54E-06	$33.50	0%	100%	100%	100%	0	0	0	400	400	400
Income Qualified SF Weatherization - CO	Water Heater Blanket Gas	8	$75	$75	0	0	1.0	1.10E-04	$0.00	0%	100%	100%	100%	0	0	0	1	1	1
Income Qualified SF Weatherization - CO	Water Heater Blanket Electric	8	$75	$75	226	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	100	100	100	0	0	0
Income Qualified SF Weatherization - CO	Gas-Fired Storage Water Heater	13	$339	$374	0	0	2.5	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	51	51	51
Income Qualified SF Weatherization - CO	Heat Pump Water Heater	12	$1,800	$2,020	2,798	0	0.0	0.00E+00	-$15.48	0%	100%	100%	100%	21	26	31	0	0	0
Income Qualified SF Weatherization - CO	BE-Heat Pump Water Heater - Gas WH Baseline	12	$4,800	$2,325	-958	0	16.0	0.00E+00	$0.00	0%	100%	100%	100%	70	75	80	70	75	80
Income Qualified SF Weatherization - CO	Tankless Water Heater	20	$349	$975	0	0	6.1	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	41	41	41
Insulation Rebates - CO	Attic Insulation - Electric Heating and Cooling	20	$477	$2,285	1,674	0	0.0	0.00E+00	$0.00	0%	85%	85%	100%	20	30	70	0	0	0
Insulation Rebates - CO	Attic Insulation - Electric Heating Only	20	$479	$2,927	2,689	0	0.0	0.00E+00	$0.00	0%	85%	85%	100%	90	120	165	0	0	0
Insulation Rebates - CO	Attic Insulation - Gas Heating / Electric Cooling	20	$486	$2,647	172	0	16.0	8.75E-03	$0.00	0%	85%	85%	100%	1,805	2,280	3,285	1,805	2,280	3,285
Insulation Rebates - CO	Attic Insulation - Gas Heating Only	20	$485	$2,910	0	0	16.7	8.92E-03	$0.00	0%	85%	85%	100%	0	0	0	500	775	1,000
Insulation Rebates - CO	Wall Insulation - Electric Heating and Cooling	20	$350	$2,091	2,963	0	0.0	0.00E+00	$0.00	0%	85%	85%	100%	1	2	5	0	0	0
Insulation Rebates - CO	Wall Insulation - Electric Heating Only	20	$350	$1,500	6,592	0	0.0	0.00E+00	$0.00	0%	85%	85%	100%	5	10	15	0	0	0
Insulation Rebates - CO	Wall Insulation - Gas Heating / Electric Cooling	20	$268	$1,896	158	0	14.7	8.04E-03	$0.00	0%	85%	85%	100%	102	124	156	102	124	156
Insulation Rebates - CO	Wall Insulation - Gas Heating Only	20	$280	$2,139	0	0	13.8	7.50E-03	$0.00	0%	85%	85%	100%	0	0	0	10	20	30
Insulation Rebates - CO	Air Sealing - Electric Heating and Cooling	10	$287	$1,177	1,867	0	0.0	0.00E+00	$0.00	0%	85%	85%	100%	20	30	70	0	0	0
Insulation Rebates - CO	Air Sealing - Electric Heating Only	10	$298	$1,147	3,005	0	0.0	0.00E+00	$0.00	0%	85%	85%	100%	90	120	165	0	0	0
Insulation Rebates - CO	Air Sealing - Gas Heating / Electric Cooling	10	$269	$1,020	108	0	14.7	8.05E-03	$0.00	0%	85%	85%	100%	1,755	2,230	3,235	1,755	2,230	3,235
Insulation Rebates - CO	Air Sealing - Gas Heating Only	10	$273	$1,273	0	0	13.4	7.02E-03	$0.00	0%	85%	85%	100%	0	0	0	500	775	1,000
Insulation Rebates - CO	Cellular Shades - Electric Heating and Cooling	14	$20	$28	15	0	0.0	0.00E+00	$0.00	0%	85%	85%	100%	10	20	30	0	0	0
Insulation Rebates - CO	Cellular Shades - Gas Heating / Electric Cooling	14	$20	$28	5	0	0.0	2.00E-05	$0.00	0%	85%	85%	100%	150	200	250	150	200	250
Insulation Rebates - CO	Codes & Standards	20	$0	$0	3	0	0.1	0.00E+00	$0.00	7%	85%	85%	100%	0	0	0	0	0	58,985
LED Street Lighting - CO	Company Owned Street Lighting	20	$0	$116	463	0	0.0	0.00E+00	$0.00	0%	90%	0%	100%	3,000	3,000	3,000	0	0	0

Program	Measure Group	Measure Lifetime (years)	Rebate Amount ($)	Incremental Cost ($)	Annual Customer kWh Savings (kWh/yr)	Annual Customer Peak Coincident Demand Savings (PCkW)	Gas Savings (Dth)	Peak Gas Savings (Dth/hr)	Non-Energy O&M Savings ($)	Gas Demand Targeted Area Penetration (%)	Electric NTG (%)	Gas NTG (%)	Install Rate (%)	2024 Electric Units	2025 Electric Units	2026 Electric Units	2024 Gas Units	2025 Gas Units	2026 Gas Units
Lighting - CO	Custom Lighting Project	16	$6,944	$24,015	79,287	12	0.0	0.00E+00	-$50.38	0%	73%	0%	100%	40	19	1	0	0	0
Lighting - CO	Network Lighting Controls	15	$33	$60	132	0	0.0	0.00E+00	-$0.13	0%	73%	0%	100%	900	5	1	0	0	0
Lighting - CO	Lighting Controls	12	$15	$38	136	0	0.0	0.00E+00	-$0.03	0%	73%	0%	100%	83,405	18,905	2,430	0	0	0
Lighting - CO	Retrofit Flat	20	$58	$166	692	0	0.0	0.00E+00	-$0.02	0%	81%	0%	100%	5,064	3,500	830	0	0	0
Lighting - CO	Retrofit High Bay	20	$39	$172	600	0	0.0	0.00E+00	-$0.06	0%	81%	0%	100%	39,285	16,472	150	0	0	0
Lighting - CO	Retrofit Exterior	20	$41	$300	711	0	0.0	0.00E+00	$0.00	0%	81%	0%	100%	7,074	7,839	2,534	0	0	0
Lighting - CO	Retrofit Troffer	20	$29	$125	213	0	0.0	0.00E+00	-$0.05	0%	81%	0%	100%	26,701	19,885	19,105	0	0	0
Lighting - CO	Retrofit Tube	12	$3	$7	48	0	0.0	0.00E+00	$0.00	0%	81%	0%	100%	670,179	965,503	1,078,001	0	0	0
Lighting - CO	Retrofit Refrigerator	20	$35	$168	359	0	0.0	0.00E+00	$0.00	0%	81%	0%	100%	100	100	10	0	0	0
Lighting - CO	Indoor Agricultural Lighting	20	$519	$631	7,102	1	0.0	0.00E+00	$0.00	0%	92%	0%	100%	100	175	200	0	0	0
Lighting - CO	Midstream Screw In	6	$4	$5	45	0	0.0	0.00E+00	$0.00	0%	78%	0%	100%	83,000	34,500	600	0	0	0
Lighting - CO	Midstream Tube	13	$3	$9	52	0	0.0	0.00E+00	$0.00	0%	78%	0%	100%	93,100	23,275	0	0	0	0
Lighting - CO	Midstream High Bay	17	$69	$249	565	0	0.0	0.00E+00	-$0.06	0%	78%	0%	100%	1,410	562	137	0	0	0
Lighting - CO	Midstream Troffer	18	$17	$41	113	0	0.0	0.00E+00	-$0.02	0%	79%	0%	100%	6,100	430	25	0	0	0
Lighting - CO	Midstream Flat	20	$23	$117	430	0	0.0	0.00E+00	-$0.01	0%	78%	0%	100%	3,200	260	20	0	0	0
Multifamily Buildings - CO	ENERGY STAR Clothes Dryer	16	$30	$75	220	0	0.0	2.31E-06	$0.00	0%	100%	100%	100%	618	618	618	20	20	20
Multifamily Buildings - CO	ENERGY STAR Clothes Washer	11	$30	$72	84	0	2.4	2.69E-04	$9.33	7%	100%	100%	100%	604	604	604	860	1,031	860
Multifamily Buildings - CO	AC Rewards - Business	10	$26	$26	450	0	3.8	3.94E-03	$0.00	6%	100%	100%	100%	33	33	33	30	30	30
Multifamily Buildings - CO	Multifamily Buildings Lighting Project	16	$3,016	$16,439	60,806	5	0.0	0.00E+00	-$30.00	0%	100%	100%	100%	7	7	7	0	0	0
Multifamily Buildings - CO	Multi-Family Prescriptive	15	$42	$57	104	0	0.7	3.16E-04	-$0.20	0%	100%	100%	100%	10,620	10,620	10,620	11	16	23
Multifamily Buildings - CO	Home Lighting - Direct Install	21	$5	$5	8	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	136,900	136,900	136,900	0	0	0
Multifamily Buildings - CO	Direct Install Flat	20	$25	$25	330	0	0.0	0.00E+00	-$4.89	0%	100%	100%	100%	11,000	11,000	11,000	0	0	0
Multifamily Buildings - CO	Midstream Tube	12	$5	$13	48	0	0.0	0.00E+00	-$0.01	0%	100%	100%	100%	300	300	300	0	0	0
Multifamily Buildings - CO	Direct Install Tubes	11	$23	$23	80	0	0.0	0.00E+00	-$0.18	0%	100%	100%	100%	180	180	180	0	0	0
Multifamily Buildings - CO	Energy Star Smart Thermostat	10	$60	$60	59	0	1.0	0.00E+00	$0.00	0%	100%	100%	100%	120	120	120	100	100	100
Multifamily Buildings - CO	Smart Thermostat Optimization	1	$0	$0	16	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	100	100	100	0	0	0
Multifamily Buildings - CO	Multifamily Audit	0	$400	$400	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	1,053	1,053	1,053	942	999	1,055
Multifamily Buildings - CO	Aerators - EWH	10	$4	$4	62	0	0.0	0.00E+00	$5.54	0%	100%	100%	100%	140	140	140	0	0	0
Multifamily Buildings - CO	Aerators - GWH	10	$5	$5	0	0	0.4	7.16E-07	$5.91	0%	100%	100%	100%	0	0	0	19,000	23,300	22,800
Multifamily Buildings - CO	Showerheads - EWH	10	$14	$14	611	0	0.0	0.00E+00	$43.08	0%	100%	100%	100%	90	90	90	0	0	0
Multifamily Buildings - CO	Showerheads - GWH	10	$14	$14	0	0	2.3	3.54E-06	$38.77	0%	100%	100%	100%	0	0	0	1,419	1,996	3,496
Non-Profit Energy Efficiency Program - CO	NEEP Project	19	$4,006	$12,096	14,163	3	39.8	2.58E-02	-$7.04	4%	100%	100%	100%	53	53	53	45	50	55
Non-Profit Energy Efficiency Program - CO	Boiler	25	$2,769	$8,688	0	0	169.6	1.38E-01	$0.00	7%	100%	100%	100%	0	0	0	31	46	56
Non-Profit Energy Efficiency Program - CO	Unit Heater	16	$350	$992	0	0	21.3	1.77E-02	$0.00	7%	100%	100%	100%	0	0	0	7	6	9
Non-Profit Energy Efficiency Program - CO	Unit Heater Infrared	15	$186	$153	1,913	0	85.3	7.08E-02	$0.00	7%	100%	100%	100%	1	1	1	5	3	3
Non-Profit Energy Efficiency Program - CO	Water Heater	17	$777	$1,181	0	0	47.9	3.62E-03	$0.00	7%	100%	100%	100%	0	0	0	16	16	26
Non-Profit Energy Efficiency Program - CO	BE-Custom Beneficial Electrification Project	14	$2,401	$7,276	-967	0	12.3	0.00E+00	$0.00	0%	100%	100%	100%	165	330	653	110	220	434
Peak Day Partners - CO	Peak Day Partners	1	$51,000	$0	57,500	2,500	0.0	0.00E+00	$0.00	0%	100%	0%	100%	8	9	11	0	0	0
Peak Partner Rewards - CO	Peak Partner Rewards	2	$12,573	$0	6,812	348	0.0	0.00E+00	$0.00	0%	100%	0%	100%	91	102	114	0	0	0
Refrigerator Recycling - CO	Refrigerator Recycling	8	$50	$0	752	0	0.0	0.00E+00	$0.00	0%	80%	0%	100%	5,300	5,850	6,400	0	0	0
Refrigerator Recycling - CO	Window/Room AC Unit Recycling	4	$0	$0	557	0	0.0	0.00E+00	$0.00	0%	80%	0%	100%	50	55	60	0	0	0
Residential Battery DR - CO	Battery - DR	5	$0	$0	62	1	0.0	0.00E+00	$0.00	0%	100%	0%	100%	500	500	600	0	0	0
Residential Demand Response - CO	Residential AC Switch	15	$40	$0	1	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	190,000	185,000	180,000	0	0	0
Residential Demand Response - CO	AC Rewards-DR	5	$36	$1	1	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	62,180	72,205	81,230	0	0	0
Residential Demand Response - CO	Water Heater HPWH Load Shift & DR	1	$44	$0	118	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	100	150	200	0	0	0
Residential Demand Response - CO	Water Heater - ERWH DR	1	$25	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	20	20	20	0	0	0
Residential HVAC - CO	BE-High Efficiency Ducted Heat Pump with QI	18	$399	$5,529	-1,930	0	21.0	1.25E-03	$0.00	4%	93%	93%	100%	6,322	14,376	23,006	3,136	7,128	11,383
Residential HVAC - CO	High Efficiency Ducted Heat Pump - Electric Resistance Baseline	18	$595	$4,464	5,058	0	0.0	0.00E+00	$0.00	0%	93%	93%	100%	25	50	100	0	0	0
Residential HVAC - CO	BE-High Efficiency Non-Ducted Heat Pump with QI	18	$270	$1,798	-1,331	0	13.3	0.00E+00	$0.00	0%	93%	93%	100%	1,752	1,440	2,890	851	660	1,325
Residential HVAC - CO	BE-High Efficiency Ducted cold climate Heat Pump with QI	18	$884	$9,513	-3,128	0	33.1	8.88E-04	$0.00	4%	93%	93%	100%	150	1,920	5,680	50	900	2,720
Residential HVAC - CO	BE-High Efficiency Ducted cold climate Heat Pump with QI - Full Electrification	18	$884	$7,648	-3,364	0	33.9	1.62E-02	$0.00	4%	93%	93%	100%	20	120	240	10	60	120
Residential HVAC - CO	High Efficiency Ducted cold climate Heat Pump - Electric Resistance Baseline	18	$1,734	$11,351	10,792	0	0.0	0.00E+00	$0.00	0%	93%	93%	100%	6	12	25	0	0	0
Residential HVAC - CO	BE-High Efficiency Non-Ducted cold climate Heat Pump	15	$529	$5,808	-1,599	0	19.1	0.00E+00	$0.00	0%	93%	93%	100%	150	2,120	6,240	50	1,000	3,000
Residential HVAC - CO	BE-High Efficiency Non-Ducted cold climate Heat Pump - Full Electrification	15	$529	$2,893	-2,675	0	20.3	1.11E-02	$0.00	4%	93%	93%	100%	100	600	1,200	50	300	600
Residential HVAC - CO	High Efficiency Non-Ducted cold climate Heat Pump - Electric Resistance Baseline	15	$925	$404	5,720	0	0.0	0.00E+00	$0.00	0%	93%	93%	100%	125	251	502	0	0	0
Residential HVAC - CO	High Efficiency Boiler	20	$225	$1,331	0	0	20.6	8.14E-03	$0.00	7%	100%	100%	100%	0	0	0	100	100	100
Residential HVAC - CO	High Efficiency GSHP with QI - ER Baseline	20	$5,500	$22,519	25,055	1	0.0	0.00E+00	$0.00	0%	93%	93%	100%	2	5	10	0	0	0
Residential HVAC - CO	BE-High Efficiency GSHP with QI - AC & Gas Baseline	20	$2,750	$11,608	-3,862	1	74.6	4.09E-02	$0.00	4%	93%	93%	100%	20	50	98	10	25	49
Residential HVAC - CO	Standard evaporative cooler	15	$300	-$5,062	757	1	0.0	0.00E+00	-$14.77	0%	70%	70%	100%	1,706	1,706	1,706	0	0	0
Residential HVAC - CO	Premium evaporative cooler	15	$675	$705	1,221	1	0.0	0.00E+00	-$20.97	0%	70%	70%	100%	426	426	426	0	0	0
Residential HVAC - CO	Multi-ducted premium evaporative cooler	15	$1,200	$1,599	902	1	0.0	0.00E+00	-$19.20	0%	90%	90%	100%	566	566	566	0	0	0
Residential HVAC - CO	High Efficiency Furnace	18	$225	$1,294	0	0	21.3	1.17E-02	$0.00	7%	86%	86%	100%	0	0	0	3,250	3,250	3,250
Residential HVAC - CO	AC Rewards-EE	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Residential HVAC - CO	Energy Star Smart Thermostat	10	$50	$215	142	0	8.1	0.00E+00	$0.00	0%	100%	100%	100%	2,133	2,133	2,133	2,007	2,007	2,007
Residential HVAC - CO	Smart Thermostat Optimization	1	$0	$0	39	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	33,884	33,884	33,884	0	0	0
Residential HVAC - CO	High Efficiency Non-Ducted Heat Pump - Electric Resistance Baseline	18	$552	$2,973	4,274	0	0.0	0.00E+00	$0.00	0%	93%	93%	100%	125	251	502	0	0	0
Residential HVAC - CO	Heat Pump Water Heater	12	$750	$2,020	2,937	0	0.0	0.00E+00	-$20.07	0%	93%	93%	100%	30	55	105	0	0	0
Residential HVAC - CO	Gas-Fired Storage Water Heater	13	$50	$363	0	0	2.3	0.00E+00	$0.00	0%	90%	90%	100%	0	0	0	60	0	0
Residential HVAC - CO	Tankless Water Heater	20	$100	$943	0	0	7.6	0.00E+00	$0.00	0%	90%	90%	100%	0	0	0	285	0	0
Residential HVAC - CO	Indirect Water Heater	13	$100	$576	0	0	5.2	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	25	0	0
Residential HVAC - CO	BE-Heat Pump Water Heater - Gas WH Baseline	12	$750	$2,329	-931	0	18.0	0.00E+00	$0.00	0%	93%	93%	100%	46	101	201	46	101	201
Residential New Home Construction - CO	Step A EE	30	$487	$608	141	0	0.0	0.00E+00	$0.00	7%	93%	93%	100%	77	225	550	77	225	550
Residential New Home Construction - CO	Step A BE	30	$1,089	$1,357	0	0	10.2	0.00E+00	$0.00	7%	93%	93%	100%	77	225	550	77	225	550
Residential New Home Construction - CO	Step B	30	$2,965	$3,707	-11,665	0	80.7	4.57E-01	$0.00	7%	93%	93%	100%	77	225	550	77	225	550
Residential New Home Construction - CO	Step C	30	$5,931	$7,414	5,012	1	0.0	0.00E+00	$0.00	7%	93%	93%	100%	77	225	550	77	225	550
Residential New Home Construction - CO	Better than Code	0	$23,333	$15,833	0	0	0.0	0.00E+00	$0.00	7%	93%	93%	100%	24	16	0	0	0	0
Residential New Home Construction - CO	Marshall Fires Recovery	0	$23,333	$15,833	0	0	0.0	0.00E+00	$0.00	7%	93%	93%	100%	24	16	0	0	0	0
Residential New Home Construction - CO	All Code Years	30	$454	$2,908	1,236	0	19.7	0.00E+00	$0.00	7%	73%	73%	100%	2,838	0	0	4,764	0	0
Residential New Home Construction - CO	Codes & Standards	30	$0	$0	615	0	3.7	0.00E+00	$0.00	7%	47%	47%	100%	6,242	6,242	6,242	14,565	14,565	14,565
School Education Kits - CO	Advanced Power Strip	7	$21	$21	103	0	0.0	0.00E+00	$0.00	0%	100%	100%	91%	7,750	7,750	7,750	0	0	0
School Education Kits - CO	Home Lighting - Direct Install	15	$6	$6	32	0	0.0	0.00E+00	$0.00	0%	100%	100%	90%	254,100	256,227	258,350	0	0	0
School Education Kits - CO	Programmable Thermostat	10	$0	$0	85	0	5.9	0.00E+00	$0.00	0%	100%	100%	4%	48,250	48,500	48,740	48,250	48,500	48,740
School Education Kits - CO	Aerators - EWH	10	$1	$1	74	0	0.0	0.00E+00	$5.03	0%	100%	100%	46%	6,213	6,213	6,213	0	0	0
School Education Kits - CO	Aerators - GWH	10	$1	$1	0	0	0.3	9.68E-07	$5.03	0%	100%	100%	46%	0	0	0	82,538	82,538	82,538
School Education Kits - CO	Showerheads - EWH	10	$3	$3	476	0	0.0	0.00E+00	$33.50	0%	100%	100%	51%	3,378	3,378	3,378	0	0	0
School Education Kits - CO	Showerheads - GWH	10	$3	$3	0	0	2.0	3.54E-06	$33.50	0%	100%	100%	51%	0	0	0	44,873	44,873	44,873
Self Direct - CO	Self Direct	17	$80,000	$923,145	926,303	202	0.0	0.00E+00	$0.00	0%	91%	0%	100%	5	5	5	0	0	0
Self Direct - CO	Custom Electrification Equipment	20	$3,451	$48,000	-24,660	0	394.4	2.13E-01	$0.00	2%	93%	93%	100%	3	3	3	3	3	3
Self Direct - CO	Load Shifting	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Small Business Energy Solutions - CO	Dishwasher	15	$250	$371	6,998	1	7.0	1.06E-03	$395.19	3%	94%	94%	100%	35	35	35	15	15	15
Small Business Energy Solutions - CO	Food Service	12	$400	$3,148	0	0	145.0	3.36E-02	$0.00	7%	94%	94%	100%	0	0	0	5	5	5
Small Business Energy Solutions - CO	Steam Cooker	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Small Business Energy Solutions - CO	AC Rewards - Business	10	$19	$19	450	0	2.2	2.30E-03	$0.00	4%	94%	94%	100%	300	300	300	0	0	0
Small Business Energy Solutions - CO	Custom Small Business Energy Solutions Lighting Project	16	$3,446	$10,865	33,906	6	0.0	0.00E+00	-$20.38	0%	94%	94%	100%	9	9	9	0	0	0
Small Business Energy Solutions - CO	Custom Small Business Energy Solutions Refrigeration Project	20	$45,612	$76,813	490,879	89	0.0	0.00E+00	$0.00	0%	94%	94%	100%	1	1	1	0	0	0
Small Business Energy Solutions - CO	SBES Prescriptive	19	$1,145	$4,940	8,812	2	0.0	0.00E+00	-$9.53	0%	94%	94%	100%	182	77	77	0	0	0
Small Business Energy Solutions - CO	ASHP < 5.4 Tons	20	$1,471	$1,446	2,018	0	8.3	0.00E+00	$0.00	0%	93%	14%	100%	200	290	500	30	55	75
Small Business Energy Solutions - CO	GSHP	20	$3,605	$12,694	-471	1	47.1	0.00E+00	$0.00	0%	93%	46%	100%	41	51	121	20	25	60
Small Business Energy Solutions - CO	MSHP	20	$820	$495	1,046	1	22.5	0.00E+00	$0.00	0%	93%	40%	100%	4	10	14	2	4	6
Small Business Energy Solutions - CO	ccMSHP	20	$3,375	$407	-132	0	8.6	0.00E+00	$0.00	0%	93%	78%	100%	2	4	6	1	3	5
Small Business Energy Solutions - CO	Demand Control Ventilation	20	$500	$5,711	7,497	1	161.8	3.25E-02	$0.00	7%	94%	94%	100%	10	10	10	10	10	10
Small Business Energy Solutions - CO	Pipe Insulation - Direct Install	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Small Business Energy Solutions - CO	Heat Pump Water Heater - Beneficial Electrification	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Small Business Energy Solutions - CO	Heat Pump Water Heater - Electric Efficiency	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Small Business Energy Solutions - CO	Direct Install Refrigerator	5	$6	$6	741	0	0.0	0.00E+00	$0.00	0%	94%	94%	100%	20	20	20	0	0	0
Small Business Energy Solutions - CO	Direct Install Screw In	7	$10	$10	116	0	0.0	0.00E+00	-$0.26	0%	94%	94%	100%	1,000	1,000	1,000	0	0	0
Small Business Energy Solutions - CO	Direct Install Tubes	11	$23	$23	80	0	0.0	0.00E+00	-$0.18	0%	94%	94%	100%	115,000	115,000	120,000	0	0	0
Small Business Energy Solutions - CO	Direct Install Flat	20	$58	$58	287	0	0.0	0.00E+00	-$0.64	0%	94%	94%	100%	300	300	300	0	0	0
Small Business Energy Solutions - CO	Midstream Screw In	3	$5	$6	73	0	0.0	0.00E+00	-$0.01	0%	78%	0%	99%	60,456	54,456	51,506	0	0	0
Small Business Energy Solutions - CO	Midstream Tube	12	$4	$12	73	0	0.0	0.00E+00	-$0.01	0%	78%	0%	99%	99,600	24,900	0	0	0	0
Small Business Energy Solutions - CO	Midstream High Bay	12	$53	$148	427	0	0.0	0.00E+00	-$0.04	0%	78%	0%	99%	980	945	940	0	0	0
Small Business Energy Solutions - CO	Midstream Troffer	16	$9	$19	46	0	0.0	0.00E+00	$0.00	0%	78%	0%	99%	27,645	20,770	20,470	0	0	0
Small Business Energy Solutions - CO	Midstream Flat	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Small Business Energy Solutions - CO	Refigeration Fans	15	$55	$205	658	0	0.0	0.00E+00	$0.00	0%	94%	94%	100%	8	8	8	0	0	0
Small Business Energy Solutions - CO	Anti-Sweat Heater Controls	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Small Business Energy Solutions - CO	No Heat Case Doors	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Small Business Energy Solutions - CO	Medium-temp Enclosed Reach-In Case	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Small Business Energy Solutions - CO	Retrofit of open multi-deck cases with solid glass doors	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Small Business Energy Solutions - CO	Walk-in Freezer Defrost Controls	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Small Business Energy Solutions - CO	Floating Head Pressure Controls	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Small Business Energy Solutions - CO	Strip Curtains - Direct Install	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Small Business Energy Solutions - CO	Auto Closers - Direct Install	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Small Business Energy Solutions - CO	Aerators - EWH	9	$10	$10	501	0	0.0	0.00E+00	$25.33	0%	94%	94%	100%	859	659	659	0	0	0
Small Business Energy Solutions - CO	Aerators - GWH	9	$10	$10	0	0	3.5	4.53E-07	$57.54	0%	94%	94%	100%	0	0	0	3,487	3,487	3,487
Small Business Energy Solutions - CO	Showerheads - EWH	10	$14	$14	1,807	0	0.0	0.00E+00	$124.71	0%	94%	94%	100%	2	2	2	0	0	0
Small Business Energy Solutions - CO	Showerheads - GWH	10	$14	$14	0	0	7.0	3.54E-06	$124.71	0%	94%	94%	100%	0	0	0	10	10	10
Strategic Energy Management - CO	Energy Information Systems	2	$727	$154	308,975	50	0.0	0.00E+00	$0.00	0%	100%	0%	100%	35	35	35	0	0	0
Strategic Energy Management - CO	Custom Strategic Energy Management Load Shift Project	1	$3,750	$0	78,214	75	0.0	0.00E+00	$0.00	0%	100%	0%	100%	2	2	2	0	0	0
Strategic Energy Management - CO	Custom Strategic Energy Management Project	15	$25,365	$97,702	469,676	40	0.0	0.00E+00	$4,143.92	0%	100%	0%	100%	33	40	45	0	0	0
Strategic Energy Management - CO	Custom Electrification Equipment	20	$8,438	$117,366	-60,297	0	964.4	6.22E-01	$0.00	7%	93%	93%	100%	10	43	122	10	43	122

Program	Measure Group	Measure Lifetime (years)	Rebate Amount ($)	Incremental Cost ($)	Annual Customer kWh Savings (kWh/yr)	Annual Customer Peak Coincident Demand Savings (PCkW)	Gas Savings (Dth)	Peak Gas Savings (Dth/hr)	Non-Energy O&M Savings ($)	Gas Demand Targeted Area Penetration (%)	Electric NTG (%)	Gas NTG (%)	Install Rate (%)	2024 Electric Units	2025 Electric Units	2026 Electric Units	2024 Gas Units	2025 Gas Units	2026 Gas Units
Strategic Energy Management - CO	Load Shifting	0	$0	$50,000	0	50	0.0	0.00E+00	$0.00	0%	100%	0%	100%	15	15	15	0	0	0
Strategic Energy Management - CO	SEM Prescriptive	16	$10,393	$27,044	126,544	23	0.0	0.00E+00	-$59.11	0%	100%	0%	100%	304	293	302	0	0	0
Strategic Energy Management - CO	SEM	0	$17,253	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	0%	100%	20	20	20	0	0	0
Tiered Geographic Prequalification - CO	Refrigerator Replacement	14	$288	$1,200	422	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	76	76	76	0	0	0
Tiered Geographic Prequalification - CO	Attic Insulation - Electric Heating Only	20	$690	$2,438	3,088	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	15	15	15	0	0	0
Tiered Geographic Prequalification - CO	Attic Insulation - Gas Heating Only	20	$563	$2,008	0	0	13.3	6.90E-03	$0.00	0%	100%	100%	100%	0	0	0	75	187	345
Tiered Geographic Prequalification - CO	Wall Insulation - Electric Heating Only	20	$677	$2,130	4,384	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	3	3	3	0	0	0
Tiered Geographic Prequalification - CO	Wall Insulation - Gas Heating Only	20	$617	$1,250	0	0	18.8	1.01E-02	$0.00	0%	100%	100%	100%	0	0	0	50	40	142
Tiered Geographic Prequalification - CO	Crawl Space Wall Insulation - Electric Heating Only	20	$628	$1,833	3,789	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	5	5	5	0	0	0
Tiered Geographic Prequalification - CO	Crawl Space Wall Insulation - Gas Heating Only	20	$459	$1,419	0	0	13.4	7.02E-03	$0.00	0%	100%	100%	100%	0	0	0	65	101	101
Tiered Geographic Prequalification - CO	Air Sealing - Electric Heating Only	20	$470	$1,221	2,052	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	20	20	20	0	0	0
Tiered Geographic Prequalification - CO	Air Sealing - Gas Heating Only	20	$479	$802	0	0	8.3	4.41E-03	$0.00	0%	100%	100%	100%	0	0	0	175	365	390
Tiered Geographic Prequalification - CO	Storm Windows - Electric Heating Only	20	$381	$496	853	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	5	5	5	0	0	0
Tiered Geographic Prequalification - CO	Storm Windows - Gas Heating Only	20	$488	$903	0	0	5.7	0.00E+00	$2.59	0%	100%	100%	100%	0	0	0	50	135	135
Tiered Geographic Prequalification - CO	Manufacutred Home Floor Insulation - Electric Heating and Cooling	20	$8,145	$9,050	2,913	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	1	1	1	0	0	0
Tiered Geographic Prequalification - CO	Manufacutred Home Floor Insulation - Gas Heating / Electric Cooling	20	$8,145	$9,050	0	0	12.7	6.79E-03	$0.00	0%	100%	100%	100%	0	0	0	1	1	1
Tiered Geographic Prequalification - CO	Home Lighting - Direct Install	18	$1	$1	10	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	1,437,170	1,437,170	1,437,170	0	0	0
Tiered Geographic Prequalification - CO	BE-High Efficiency Non-Ducted Heat Pump with QI	18	$3,003	$1,798	-1,331	0	13.3	0.00E+00	$0.00	0%	100%	100%	100%	42	74	100	21	37	50
Tiered Geographic Prequalification - CO	High Efficiency Furnace Tier 1	18	$181	$1,294	0	0	14.6	7.97E-03	$0.00	0%	100%	100%	100%	0	0	0	600	600	200
Tiered Geographic Prequalification - CO	High Efficiency Furnace Tier 2	18	$2,933	$1,294	0	0	14.6	7.97E-03	$0.00	0%	100%	100%	100%	0	0	0	100	100	40
Tiered Geographic Prequalification - CO	High Efficiency Boiler Tier 1	0	$780	$1,446	0	0	10.1	5.52E-03	$0.00	0%	100%	100%	100%	0	0	0	15	15	7
Tiered Geographic Prequalification - CO	High Efficiency Boiler Tier 2	0	$3,120	$1,446	0	0	10.1	5.52E-03	$0.00	0%	100%	100%	100%	0	0	0	5	5	5
Tiered Geographic Prequalification - CO	IQ-SFW Boiler/Furnace Tune-up	0	$308	$300	0	0	5.2	2.83E-03	$0.00	0%	100%	100%	100%	0	0	0	105	105	85
Tiered Geographic Prequalification - CO	Energy Star Smart Thermostat	0	$105	$100	0	0	5.2	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	650	650	650
Tiered Geographic Prequalification - CO	T-Stat Install & Programming	0	$90	$29	0	0	11.6	0.00E+00	$0.00	0%	100%	100%	100%	0	2	4	380	480	370
Tiered Geographic Prequalification - CO	BE-High Efficiency Ducted Heat Pump with QI	0	$3,460	$6,249	-2,227	0	24.0	1.43E-03	$0.00	0%	100%	100%	100%	7	21	42	4	12	24
Tiered Geographic Prequalification - CO	High Efficiency Ducted Heat Pump - Electric Resistance Baseline	0	$6,975	$4,454	5,058	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	2	2	2	0	0	0
Tiered Geographic Prequalification - CO	Standard evaporative cooler	0	$938	-$5,119	635	1	0.0	0.00E+00	-$12.64	0%	100%	100%	100%	71	71	71	0	0	0
Tiered Geographic Prequalification - CO	High Efficiency Non-Ducted cold climate Heat Pump - Electric Resistance Baseline	0	$8,325	$11,163	5,720	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	1	2	2	0	0	0
Tiered Geographic Prequalification - CO	BE-High Efficiency Non-Ducted cold climate Heat Pump	0	$3,774	$2,893	-1,599	0	19.1	0.00E+00	$0.00	0%	100%	100%	100%	24	40	76	12	20	38
Tiered Geographic Prequalification - CO	High Efficiency Ducted cold climate Heat Pump - Electric Resistance Baseline	0	$9,225	$10,948	10,458	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	2	2	2	0	0	0
Tiered Geographic Prequalification - CO	BE-High Efficiency Ducted cold climate Heat Pump with QI	0	$4,275	$9,048	-2,962	0	31.4	8.44E-04	$0.00	0%	100%	100%	100%	24	50	68	12	25	34
Tiered Geographic Prequalification - CO	High Efficiency Non-Ducted Heat Pump - Electric Resistance Baseline	0	$6,975	$2,973	4,274	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	2	2	2	0	0	0
Tiered Geographic Prequalification - CO	Aerators - EWH	0	$1	$2	60	0	0.0	0.00E+00	$4.04	0%	100%	100%	100%	50	50	50	0	0	0
Tiered Geographic Prequalification - CO	Aerators - GWH	0	$1	$1	0	0	0.3	9.19E-07	$4.12	0%	100%	100%	100%	0	0	0	603	603	603
Tiered Geographic Prequalification - CO	Showerheads - EWH	0	$3	$4	476	0	0.0	0.00E+00	$33.50	0%	100%	100%	100%	20	20	20	0	0	0
Tiered Geographic Prequalification - CO	Showerheads - GWH	0	$0	$0	0	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	0	0	0
Tiered Geographic Prequalification - CO	Water Heater Blanket Gas	0	$64	$83	0	0	1.0	1.10E-04	$0.00	0%	100%	100%	100%	0	0	0	400	400	400
Tiered Geographic Prequalification - CO	Water Heater Blanket Electric	0	$74	$83	226	0	0.0	0.00E+00	$0.00	0%	100%	100%	100%	1	1	1	0	0	0
Tiered Geographic Prequalification - CO	Gas-Fired Storage Water Heater	0	$927	$374	0	0	2.5	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	150	150	150
Tiered Geographic Prequalification - CO	Heat Pump Water Heater	0	$1,782	$2,020	2,590	0	0.0	0.00E+00	-$6.95	0%	100%	100%	100%	12	12	12	0	0	0
Tiered Geographic Prequalification - CO	BE-Heat Pump Water Heater - Gas WH Baseline	0	$3,544	$3,033	-958	0	16.0	0.00E+00	$0.00	0%	100%	100%	100%	20	30	40	20	30	40
Tiered Geographic Prequalification - CO	Tankless Water Heater	0	$1,061	$1,100	0	0	6.1	0.00E+00	$0.00	0%	100%	100%	100%	0	0	0	100	100	100
Whole Home Efficiency - CO	ENERGY STAR Clothes Dryer	0	$30	$75	160	0	0.0	0.00E+00	$0.00	0%	83%	83%	100%	1	1	1	0	0	0
Whole Home Efficiency - CO	ENERGY STAR Clothes Washer	0	$30	$190	88	0	2.8	3.15E-04	$17.23	5%	83%	83%	100%	4	4	4	3	3	3
Whole Home Efficiency - CO	ENERGY STAR Hybrid Heat Pump Dryer	0	$60	$600	105	0	1.7	1.97E-04	$0.00	4%	88%	88%	100%	4	4	4	2	2	2
Whole Home Efficiency - CO	Attic Insulation - Electric Heating and Cooling	0	$433	$2,800	1,577	0	0.0	0.00E+00	$0.00	0%	83%	83%	100%	60	60	60	0	0	0
Whole Home Efficiency - CO	Attic Insulation - Electric Heating Only	0	$385	$2,012	3,736	0	0.0	0.00E+00	$0.00	0%	83%	83%	100%	60	60	60	0	0	0
Whole Home Efficiency - CO	Attic Insulation - Gas Heating / Electric Cooling	0	$401	$1,855	124	0	11.5	6.28E-03	$0.00	0%	83%	83%	100%	12	12	12	12	12	12
Whole Home Efficiency - CO	Attic Insulation - Gas Heating Only	0	$441	$2,257	0	0	16.0	8.30E-03	$0.00	0%	83%	83%	100%	0	0	0	1	1	1
Whole Home Efficiency - CO	Wall Insulation - Electric Heating and Cooling	0	$350	$2,391	2,963	0	0.0	0.00E+00	$0.00	0%	83%	83%	100%	1	1	1	0	0	0
Whole Home Efficiency - CO	Wall Insulation - Electric Heating Only	0	$350	$1,500	6,988	0	0.0	0.00E+00	$0.00	0%	83%	83%	100%	10	10	10	0	0	0
Whole Home Efficiency - CO	Wall Insulation - Gas Heating / Electric Cooling	0	$225	$2,495	260	0	24.1	1.32E-02	$0.00	0%	83%	83%	100%	3	3	3	3	3	3
Whole Home Efficiency - CO	Wall Insulation - Gas Heating Only	0	$297	$1,690	0	0	28.9	1.49E-02	$0.00	0%	83%	83%	100%	0	0	0	1	1	1
Whole Home Efficiency - CO	Air Sealing - Electric Heating and Cooling	0	$287	$1,177	1,867	0	0.0	0.00E+00	$0.00	0%	83%	83%	100%	60	60	60	0	0	0
Whole Home Efficiency - CO	Air Sealing - Electric Heating Only	0	$298	$1,147	3,005	0	0.0	0.00E+00	$0.00	0%	83%	83%	100%	60	60	60	0	0	0
Whole Home Efficiency - CO	Air Sealing - Gas Heating / Electric Cooling	0	$242	$934	113	0	15.1	8.25E-03	$0.00	0%	83%	83%	100%	12	12	12	12	12	12
Whole Home Efficiency - CO	Air Sealing - Gas Heating Only	0	$236	$816	0	0	13.7	7.13E-03	$0.00	0%	83%	83%	100%	0	0	0	1	1	1
Whole Home Efficiency - CO	BE-High Efficiency Non-Ducted Heat Pump with QI	0	$270	$1,798	-1,331	0	13.3	0.00E+00	$0.00	0%	93%	93%	100%	40	40	40	20	20	20
Whole Home Efficiency - CO	High Efficiency Furnace	0	$225	$1,294	0	0	21.3	1.17E-02	$0.00	0%	83%	83%	100%	0	0	0	1	1	1
Whole Home Efficiency - CO	High Efficiency Ducted Heat Pump - Electric Resistance Baseline	0	$595	$4,454	5,058	0	0.0	0.00E+00	$0.00	0%	83%	83%	100%	1	1	1	0	0	0
Whole Home Efficiency - CO	BE-High Efficiency Ducted cold climate Heat Pump with QI	0	$884	$9,513	-3,128	0	33.1	8.88E-04	$0.00	0%	93%	93%	100%	8	8	8	4	4	4
Whole Home Efficiency - CO	High Efficiency Ducted cold climate Heat Pump - Electric Resistance Baseline	0	$1,734	$11,261	10,794	0	0.0	0.00E+00	$0.00	0%	83%	83%	100%	1	1	1	0	0	0
Whole Home Efficiency - CO	BE-High Efficiency Non-Ducted cold climate Heat Pump	0	$529	$5,898	-1,599	0	19.1	0.00E+00	$0.00	0%	93%	93%	100%	40	60	80	20	30	40
Whole Home Efficiency - CO	High Efficiency Non-Ducted cold climate Heat Pump - Electric Resistance Baseline	0	$925	$11,163	5,720	0	0.0	0.00E+00	$0.00	0%	83%	83%	100%	1	1	1	0	0	0
Whole Home Efficiency - CO	High Efficiency GSHP with QI - ER Baseline	0	$5,500	$22,519	25,055	1	0.0	0.00E+00	$0.00	0%	83%	83%	100%	1	1	1	0	0	0
Whole Home Efficiency - CO	BE-High Efficiency GSHP with QI - AC & Gas Baseline	0	$2,750	$11,608	-3,862	1	74.6	4.09E-02	$0.00	0%	93%	93%	100%	10	16	24	5	8	12
Whole Home Efficiency - CO	Premium evaporative cooler	0	$675	$1,851	658	1	0.0	0.00E+00	-$11.39	0%	83%	83%	100%	16	16	16	0	0	0
Whole Home Efficiency - CO	Energy Star Smart Thermostat	0	$50	$215	142	0	5.4	0.00E+00	$0.00	0%	83%	83%	100%	2	2	2	2	2	2
Whole Home Efficiency - CO	Smart Thermostat Optimization	0	$0	$0	45	0	0.0	0.00E+00	$0.00	0%	83%	83%	100%	1	1	1	0	0	0
Whole Home Efficiency - CO	High Efficiency Non-Ducted Heat Pump - Electric Resistance Baseline	0	$552	$2,973	4,274	0	0.0	0.00E+00	$0.00	0%	83%	83%	100%	4	4	4	0	0	0
Whole Home Efficiency - CO	Heat Pump Water Heater	0	$750	$2,020	2,590	0	0.0	0.00E+00	-$6.95	0%	83%	83%	100%	6	6	6	0	0	0
Whole Home Efficiency - CO	Tankless Water Heater	0	$100	$792	0	0	7.5	0.00E+00	$0.00	0%	83%	83%	100%	0	0	0	2	2	2

Appendix I – EnCompass Model Data

The EnCompass Model Data section contains the modeled assumptions for Renewable Generation, Load Net of Renewables, Total Load, and Average CO_2 emissions presented in a 12 x 24 monthly-hourly average format over the EnCompass forecast window of 2024-2050. The emissions data is utilized to calculate the lifetime emissions reductions and associated Social Cost of Carbon benefits utilized in the cost-benefit analysis of this Plan.

PSCo Renewable Generation

PSCo Average Renewable Generation [MWh/h]
Total Renewable Generation / Number of Hours

Year	Month	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8	HE9	HE10	HE11	HE12	HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21	HE22	HE23	HE24
2024	Jan	1,794	1,811	1,781	1,737	1,775	1,847	1,921	2,139	2,399	2,486	2,628	2,726	2,762	2,769	2,694	2,424	2,052	1,778	1,825	1,775	1,656	1,692	1,747	1,775
2024	Feb	1,769	1,759	1,703	1,726	1,737	1,696	1,735	2,218	2,440	2,575	2,710	2,783	2,810	2,839	2,763	2,647	2,284	1,665	1,587	1,644	1,643	1,785	1,743	1,741
2024	Mar	1,727	1,710	1,676	1,682	1,672	1,700	2,041	2,522	2,642	2,796	2,801	2,760	2,733	2,886	2,878	2,855	2,741	2,294	2,028	2,109	2,122	2,090	1,967	1,832
2024	Apr	2,000	1,988	1,987	2,008	2,031	2,098	2,414	2,519	2,675	2,847	2,882	2,945	2,944	2,896	2,793	2,681	2,475	2,296	2,005	2,108	2,183	2,171	2,155	2,082
2024	May	1,638	1,596	1,584	1,580	1,554	1,803	2,035	2,350	2,586	2,705	2,744	2,765	2,739	2,703	2,660	2,601	2,604	2,575	2,308	2,216	2,231	2,118	1,926	1,747
2024	Jun	1,676	1,598	1,583	1,519	1,483	1,859	2,081	2,238	2,410	2,615	2,746	2,743	2,638	2,549	2,517	2,526	2,436	2,298	1,977	1,769	1,848	1,908	1,801	1,796
2024	Jul	1,707	1,564	1,459	1,383	1,365	1,551	1,862	2,129	2,364	2,543	2,657	2,661	2,496	2,357	2,329	2,331	2,378	2,409	2,056	1,854	1,871	1,796	1,820	1,802
2024	Aug	1,838	1,714	1,592	1,469	1,362	1,352	1,732	2,040	2,283	2,592	2,658	2,620	2,460	2,242	2,109	2,062	1,821	1,712	1,633	1,876	2,019	2,069	2,057	1,990
2024	Sep	1,719	1,653	1,614	1,592	1,550	1,481	1,819	2,096	2,346	2,601	2,691	2,741	2,654	2,502	2,402	2,204	1,996	1,752	1,653	1,826	1,850	1,897	1,925	1,843
2024	Oct	1,663	1,660	1,587	1,565	1,547	1,546	1,757	2,173	2,249	2,407	2,562	2,588	2,582	2,555	2,454	2,354	2,095	1,765	1,960	1,928	1,782	1,723	1,698	1,609
2024	Nov	2,024	2,042	2,008	1,982	1,888	1,806	1,782	2,274	2,417	2,546	2,682	2,750	2,739	2,678	2,511	2,224	1,809	1,800	1,819	1,818	1,857	1,889	1,932	1,975
2024	Dec	1,898	1,919	1,940	1,945	1,981	1,972	1,926	2,118	2,420	2,555	2,659	2,680	2,690	2,646	2,515	2,248	1,824	1,789	1,872	1,877	1,895	1,901	1,914	1,932
2025	Jan	1,770	1,794	1,789	1,739	1,762	1,853	1,930	2,139	2,462	2,572	2,703	2,776	2,813	2,796	2,709	2,466	2,078	1,779	1,825	1,762	1,654	1,686	1,752	1,787
2025	Feb	1,797	1,765	1,718	1,719	1,736	1,697	1,724	2,218	2,484	2,692	2,880	2,965	2,974	3,005	2,879	2,767	2,389	1,719	1,628	1,669	1,660	1,793	1,774	1,786
2025	Mar	1,763	1,726	1,686	1,689	1,686	1,705	2,048	2,562	2,735	2,906	2,943	2,903	2,893	3,010	3,035	2,970	2,825	2,327	2,028	2,109	2,122	2,096	1,987	1,851
2025	Apr	2,126	2,116	2,090	2,081	2,124	2,168	2,536	2,652	2,878	3,040	3,099	3,154	3,154	3,100	2,972	2,853	2,615	2,362	2,033	2,141	2,210	2,210	2,201	2,191
2025	May	1,701	1,671	1,625	1,610	1,575	1,854	2,101	2,406	2,659	2,787	2,851	2,872	2,856	2,804	2,752	2,667	2,656	2,644	2,361	2,235	2,232	2,116	1,956	1,779
2025	Jun	1,703	1,628	1,615	1,537	1,511	1,903	2,167	2,353	2,554	2,813	2,943	2,914	2,809	2,737	2,690	2,693	2,575	2,397	2,023	1,791	1,864	1,909	1,815	1,837
2025	Jul	1,714	1,570	1,459	1,382	1,363	1,556	1,886	2,199	2,451	2,653	2,777	2,785	2,635	2,479	2,436	2,406	2,422	2,433	2,061	1,853	1,870	1,797	1,820	1,793
2025	Aug	1,832	1,709	1,592	1,468	1,361	1,339	1,740	2,091	2,359	2,670	2,743	2,718	2,573	2,343	2,209	2,130	1,862	1,732	1,637	1,876	2,019	2,069	2,057	1,979
2025	Sep	1,730	1,654	1,610	1,583	1,542	1,486	1,844	2,142	2,362	2,608	2,699	2,768	2,699	2,547	2,442	2,236	2,002	1,761	1,653	1,825	1,850	1,896	1,928	1,871
2025	Oct	1,720	1,735	1,663	1,591	1,561	1,554	1,783	2,309	2,430	2,658	2,857	2,918	2,935	2,920	2,813	2,673	2,308	1,802	1,969	1,930	1,787	1,730	1,729	1,657
2025	Nov	2,111	2,119	2,093	2,024	1,914	1,822	1,781	2,385	2,640	2,812	2,958	2,995	3,011	2,980	2,813	2,464	1,889	1,799	1,818	1,821	1,860	1,922	1,981	2,038
2025	Dec	1,947	1,954	1,980	1,993	2,032	2,017	1,934	2,182	2,664	2,876	3,050	3,084	3,104	3,088	2,877	2,553	1,877	1,789	1,873	1,889	1,910	1,903	1,936	1,971
2026	Jan	2,051	2,075	2,048	1,982	2,019	2,111	2,184	2,543	2,990	3,112	3,275	3,295	3,370	3,387	3,293	3,039	2,545	2,028	2,067	1,986	1,869	1,907	1,997	2,036
2026	Feb	2,074	2,045	1,987	1,972	1,977	1,928	1,957	2,735	3,054	3,242	3,448	3,544	3,591	3,630	3,518	3,394	2,978	2,042	1,869	1,908	1,892	2,049	2,044	2,061
2026	Mar	2,196	2,134	2,076	2,078	2,098	2,109	2,549	3,221	3,381	3,512	3,527	3,478	3,486	3,644	3,698	3,664	3,528	3,040	2,562	2,636	2,636	2,596	2,450	2,294
2026	Apr	2,610	2,602	2,604	2,599	2,610	2,725	3,190	3,336	3,480	3,684	3,727	3,757	3,770	3,755	3,670	3,546	3,308	3,081	2,578	2,652	2,734	2,721	2,720	2,673
2026	May	2,191	2,146	2,095	2,074	2,051	2,468	2,800	3,175	3,448	3,573	3,622	3,644	3,611	3,551	3,540	3,474	3,445	3,456	3,049	2,757	2,791	2,654	2,465	2,263
2026	Jun	2,211	2,146	2,116	2,012	1,979	2,613	2,911	3,122	3,345	3,654	3,725	3,713	3,629	3,571	3,608	3,633	3,504	3,257	2,716	2,341	2,409	2,494	2,381	2,376
2026	Jul	2,278	2,091	1,966	1,870	1,868	2,287	2,735	3,107	3,395	3,623	3,822	3,887	3,773	3,639	3,552	3,504	3,498	3,438	2,898	2,498	2,477	2,360	2,387	2,386
2026	Aug	2,500	2,291	2,141	1,979	1,827	1,853	2,470	2,900	3,229	3,635	3,750	3,727	3,550	3,377	3,240	3,168	2,853	2,654	2,401	2,570	2,767	2,832	2,813	2,749
2026	Sep	2,339	2,239	2,137	2,081	2,010	1,963	2,624	3,061	3,268	3,638	3,737	3,839	3,781	3,653	3,531	3,298	2,975	2,548	2,247	2,465	2,516	2,570	2,606	2,518
2026	Oct	2,304	2,264	2,138	2,026	2,025	2,050	2,540	3,231	3,316	3,532	3,686	3,669	3,728	3,689	3,652	3,539	3,243	2,436	2,647	2,608	2,448	2,362	2,357	2,222
2026	Nov	2,621	2,630	2,616	2,546	2,392	2,298	2,332	3,159	3,526	3,611	3,682	3,796	3,925	3,918	3,755	3,478	2,663	2,458	2,489	2,447	2,465	2,489	2,558	2,609
2026	Dec	2,447	2,466	2,480	2,499	2,573	2,592	2,522	2,888	3,568	3,859	3,897	3,989	4,038	4,115	3,931	3,616	2,541	2,356	2,457	2,500	2,563	2,543	2,567	2,529
2027	Jan	2,547	2,553	2,451	2,404	2,436	2,567	2,656	3,122	3,693	3,816	3,969	3,980	4,063	4,061	4,034	3,896	3,273	2,597	2,627	2,552	2,404	2,458	2,533	2,536
2027	Feb	2,671	2,621	2,525	2,546	2,605	2,497	2,568	3,543	3,754	3,988	4,121	4,220	4,272	4,397	4,362	4,324	3,837	2,685	2,440	2,506	2,526	2,693	2,647	2,637
2027	Mar	2,577	2,503	2,453	2,445	2,496	2,537	3,141	4,006	4,113	4,211	4,259	4,246	4,233	4,402	4,534	4,588	4,446	3,721	3,028	3,110	3,088	3,009	2,868	2,691
2027	Apr	2,888	2,853	2,842	2,869	2,849	3,062	3,637	3,812	3,857	4,119	4,105	4,209	4,229	4,322	4,404	4,331	4,084	3,754	2,979	3,040	3,085	3,070	3,030	2,916
2027	May	2,419	2,359	2,313	2,299	2,243	2,895	3,362	3,730	3,972	4,050	4,205	4,260	4,236	4,161	4,159	4,153	4,064	4,100	3,517	3,110	3,131	2,993	2,755	2,517
2027	Jun	2,442	2,310	2,301	2,185	2,194	3,113	3,544	3,805	3,963	4,265	4,393	4,507	4,411	4,371	4,393	4,428	4,310	3,986	3,262	2,774	2,828	2,896	2,733	2,682
2027	Jul	2,693	2,459	2,297	2,175	2,175	2,804	3,371	3,832	4,156	4,429	4,650	4,743	4,672	4,573	4,551	4,494	4,460	4,333	3,587	2,991	2,944	2,817	2,866	2,813
2027	Aug	3,222	2,958	2,776	2,534	2,289	2,289	3,060	3,616	3,992	4,466	4,618	4,628	4,535	4,390	4,376	4,371	4,038	3,840	3,364	3,588	3,783	3,787	3,664	3,485
2027	Sep	2,923	2,824	2,687	2,553	2,417	2,350	3,162	3,638	3,837	4,193	4,346	4,538	4,507	4,458	4,414	4,154	3,873	3,301	2,914	3,241	3,280	3,242	3,199	3,096
2027	Oct	2,864	2,727	2,595	2,464	2,505	2,525	2,963	3,620	3,715	3,850	3,901	3,923	4,010	4,061	4,004	4,016	3,684	3,021	3,314	3,337	3,169	3,036	2,961	2,795
2027	Nov	2,944	2,934	2,888	2,816	2,752	2,708	2,852	3,666	3,887	3,973	4,139	4,217	4,328	4,331	4,139	3,884	3,223	3,066	3,086	3,013	3,050	3,059	3,043	2,988

PSCo Renewable Generation

2027	Dec	2,910	2,867	2,828	2,918	3,041	3,040	2,980	3,347	4,027	4,235	4,310	4,383	4,454	4,556	4,414	4,057	2,992	2,872	3,029	3,157	3,258	3,142	3,087	2,994
2028	Jan	2,855	2,796	2,668	2,604	2,612	2,770	2,953	3,424	4,013	4,119	4,316	4,243	4,402	4,418	4,466	4,300	3,754	3,064	3,096	2,960	2,761	2,798	2,888	2,842
2028	Feb	2,951	2,977	2,857	2,879	2,910	2,806	2,967	3,858	4,146	4,349	4,497	4,539	4,610	4,723	4,616	4,531	4,120	3,055	2,916	3,067	3,065	3,209	3,043	2,950
2028	Mar	2,862	2,744	2,706	2,770	2,798	2,755	3,356	4,192	4,240	4,377	4,450	4,436	4,380	4,573	4,686	4,769	4,645	4,146	3,586	3,696	3,662	3,487	3,263	3,041
2028	Apr	3,137	3,145	3,154	3,095	3,059	3,262	3,758	3,975	4,079	4,290	4,303	4,313	4,393	4,446	4,503	4,518	4,280	3,996	3,320	3,381	3,463	3,398	3,309	3,156
2028	May	2,597	2,523	2,489	2,451	2,379	2,963	3,403	3,839	4,050	4,169	4,319	4,404	4,443	4,461	4,459	4,446	4,354	4,312	3,795	3,405	3,466	3,347	2,978	2,667
2028	Jun	2,561	2,484	2,494	2,367	2,352	3,283	3,738	3,999	4,210	4,485	4,612	4,656	4,554	4,550	4,536	4,507	4,368	4,154	3,407	2,959	2,989	3,092	2,962	2,819
2028	Jul	2,813	2,548	2,411	2,312	2,345	2,954	3,491	3,945	4,219	4,475	4,672	4,827	4,772	4,685	4,628	4,517	4,465	4,320	3,635	3,161	3,071	2,964	3,027	2,925
2028	Aug	3,136	2,873	2,718	2,479	2,238	2,292	3,148	3,774	4,192	4,653	4,829	4,815	4,682	4,531	4,481	4,420	4,053	3,791	3,274	3,467	3,695	3,679	3,573	3,465
2028	Sep	2,917	2,786	2,664	2,554	2,399	2,357	3,233	3,814	4,027	4,434	4,582	4,780	4,746	4,676	4,603	4,281	3,913	3,267	2,871	3,217	3,275	3,293	3,283	3,138
2028	Oct	2,831	2,674	2,561	2,472	2,503	2,519	2,972	3,673	3,793	3,966	4,068	4,097	4,231	4,194	4,152	4,067	3,683	2,956	3,275	3,297	3,171	3,022	2,916	2,750
2028	Nov	3,000	2,952	2,873	2,868	2,770	2,683	2,813	3,662	3,966	4,060	4,195	4,282	4,396	4,378	4,254	3,983	3,263	3,152	3,192	3,117	3,073	3,086	3,065	3,020
2028	Dec	2,988	2,909	2,828	2,927	3,088	3,094	2,993	3,376	4,008	4,244	4,371	4,454	4,487	4,564	4,440	4,083	2,974	2,833	2,993	3,098	3,221	3,170	3,142	3,046
2029	Jan	3,038	2,975	2,855	2,765	2,784	2,970	3,170	3,639	4,274	4,400	4,551	4,530	4,647	4,706	4,701	4,567	4,023	3,328	3,342	3,210	2,985	3,044	3,069	3,038
2029	Feb	3,170	3,115	3,008	3,030	3,098	2,945	3,122	4,035	4,386	4,599	4,707	4,814	4,890	4,983	4,938	4,871	4,362	3,168	3,045	3,189	3,172	3,329	3,213	3,153
2029	Mar	3,124	3,004	2,998	3,025	3,020	3,002	3,686	4,617	4,662	4,804	4,840	4,795	4,732	4,941	5,044	5,107	5,000	4,489	3,866	3,996	3,973	3,829	3,586	3,323
2029	Apr	3,423	3,375	3,396	3,339	3,322	3,537	4,080	4,326	4,373	4,547	4,562	4,651	4,688	4,756	4,787	4,777	4,681	4,351	3,585	3,663	3,739	3,698	3,583	3,469
2029	May	2,781	2,716	2,660	2,646	2,537	3,199	3,741	4,196	4,396	4,546	4,661	4,712	4,734	4,767	4,805	4,740	4,700	4,664	4,081	3,680	3,740	3,566	3,244	2,901
2029	Jun	2,814	2,687	2,658	2,534	2,495	3,505	3,957	4,202	4,368	4,668	4,852	4,943	4,868	4,851	4,786	4,758	4,595	4,357	3,583	3,143	3,142	3,270	3,160	3,028
2029	Jul	3,047	2,752	2,577	2,495	2,539	3,229	3,846	4,312	4,546	4,864	5,118	5,276	5,162	5,013	4,928	4,838	4,805	4,652	3,928	3,349	3,284	3,152	3,239	3,174
2029	Aug	3,336	3,077	2,900	2,658	2,413	2,493	3,417	4,121	4,545	5,028	5,180	5,202	5,106	4,944	4,786	4,682	4,316	4,060	3,470	3,650	3,877	3,885	3,767	3,657
2029	Sep	3,148	3,015	2,898	2,784	2,624	2,576	3,544	4,136	4,348	4,719	4,866	5,090	5,142	5,081	4,953	4,597	4,188	3,493	3,059	3,402	3,455	3,495	3,494	3,345
2029	Oct	3,036	2,920	2,736	2,627	2,687	2,702	3,185	3,963	4,055	4,181	4,348	4,385	4,523	4,510	4,443	4,366	3,904	3,133	3,449	3,457	3,279	3,173	3,090	2,947
2029	Nov	3,218	3,200	3,111	3,118	3,015	2,909	3,007	3,947	4,309	4,343	4,466	4,570	4,640	4,639	4,531	4,250	3,457	3,318	3,339	3,309	3,302	3,297	3,337	3,233
2029	Dec	3,206	3,153	3,081	3,146	3,285	3,303	3,206	3,610	4,283	4,575	4,671	4,710	4,765	4,865	4,734	4,309	3,119	2,950	3,134	3,277	3,372	3,336	3,319	3,228
2030	Jan	3,087	3,055	2,912	2,859	2,938	3,051	3,250	3,733	4,428	4,593	4,725	4,673	4,743	4,759	4,786	4,647	4,084	3,347	3,361	3,226	3,010	3,073	3,130	3,086
2030	Feb	3,192	3,162	3,056	3,062	3,110	2,967	3,144	4,135	4,491	4,722	4,880	4,943	4,945	5,012	4,951	4,886	4,457	3,288	3,114	3,260	3,229	3,360	3,280	3,204
2030	Mar	3,197	3,086	3,049	3,029	3,042	3,040	3,700	4,655	4,671	4,822	4,912	4,857	4,800	5,038	5,124	5,160	5,123	4,553	3,885	4,016	3,981	3,874	3,634	3,373
2030	Apr	3,506	3,424	3,376	3,345	3,335	3,611	4,182	4,468	4,535	4,655	4,773	4,763	4,851	4,909	4,920	4,867	4,694	4,355	3,638	3,744	3,828	3,748	3,708	3,528
2030	May	2,841	2,831	2,723	2,711	2,606	3,240	3,804	4,286	4,507	4,591	4,738	4,748	4,765	4,730	4,672	4,607	4,566	4,549	4,018	3,668	3,777	3,602	3,228	2,895
2030	Jun	2,886	2,758	2,733	2,617	2,595	3,559	4,000	4,333	4,502	4,817	5,038	5,147	5,115	5,054	4,987	4,954	4,748	4,464	3,661	3,125	3,152	3,303	3,182	3,090
2030	Jul	3,046	2,779	2,575	2,496	2,535	3,215	3,869	4,371	4,694	4,925	5,255	5,410	5,389	5,227	5,183	5,049	4,967	4,773	4,025	3,392	3,353	3,255	3,311	3,165
2030	Aug	3,326	3,083	2,893	2,659	2,416	2,522	3,464	4,183	4,548	5,022	5,194	5,217	5,103	4,946	4,785	4,658	4,295	4,039	3,462	3,639	3,863	3,864	3,791	3,645
2030	Sep	3,156	3,017	2,918	2,809	2,647	2,564	3,548	4,197	4,391	4,820	4,948	5,157	5,211	5,143	5,091	4,748	4,291	3,541	3,069	3,412	3,479	3,537	3,562	3,417
2030	Oct	3,018	2,914	2,753	2,669	2,733	2,742	3,240	4,059	4,127	4,315	4,482	4,470	4,605	4,654	4,635	4,530	4,077	3,280	3,533	3,507	3,369	3,215	3,136	2,956
2030	Nov	3,257	3,239	3,178	3,168	3,023	2,937	3,035	4,003	4,467	4,519	4,573	4,666	4,760	4,825	4,689	4,421	3,511	3,379	3,413	3,361	3,354	3,338	3,369	3,304
2030	Dec	3,233	3,209	3,132	3,232	3,396	3,400	3,290	3,725	4,479	4,715	4,792	4,820	4,924	5,075	4,913	4,455	3,169	2,970	3,134	3,287	3,418	3,377	3,385	3,287
2031	Jan	3,636	3,498	3,413	3,344	3,347	3,532	3,730	4,134	4,727	4,773	4,995	4,925	5,093	5,190	5,068	4,890	4,407	3,942	4,051	3,881	3,630	3,681	3,707	3,624
2031	Feb	3,826	3,769	3,528	3,545	3,670	3,613	3,772	4,537	4,780	5,021	5,151	5,244	5,316	5,331	5,333	5,207	4,731	3,878	3,726	3,917	3,936	4,046	3,941	3,816
2031	Mar	3,704	3,563	3,565	3,570	3,673	3,725	4,369	4,980	4,957	5,154	5,214	5,245	5,185	5,147	5,219	5,167	5,091	4,835	4,648	4,852	4,772	4,538	4,220	3,920
2031	Apr	3,998	3,971	3,954	3,845	3,864	4,056	4,488	4,661	4,700	4,849	4,753	4,718	4,789	4,904	4,870	4,973	4,877	4,608	4,125	4,238	4,348	4,195	4,152	3,977
2031	May	3,301	3,250	3,148	3,116	2,992	3,609	3,980	4,404	4,503	4,642	4,707	4,782	4,811	4,801	4,737	4,819	4,853	4,999	4,602	4,209	4,291	4,119	3,625	3,322
2031	Jun	3,330	3,198	3,218	3,085	3,034	4,029	4,411	4,643	4,850	5,153	5,321	5,381	5,267	5,277	5,193	5,209	5,115	4,830	4,044	3,766	3,815	3,988	3,837	3,665
2031	Jul	3,583	3,276	3,102	3,011	3,066	3,622	4,131	4,626	4,972	5,264	5,487	5,570	5,444	5,445	5,497	5,541	5,584	5,317	4,628	4,120	4,014	3,822	3,770	3,629
2031	Aug	3,986	3,703	3,471	3,205	3,007	3,002	3,808	4,408	4,814	5,275	5,440	5,382	5,363	5,250	5,250	5,079	4,849	4,743	4,310	4,576	4,797	4,814	4,640	4,337
2031	Sep	3,741	3,655	3,508	3,386	3,123	3,076	3,951	4,384	4,621	5,029	5,212	5,411	5,301	5,246	5,132	4,796	4,507	4,024	3,728	4,127	4,151	4,147	4,062	4,013
2031	Oct	3,693	3,403	3,149	3,023	3,140	3,266	3,641	4,385	4,449	4,635	4,769	4,760	4,866	4,848	4,791	4,715	4,474	3,720	4,013	4,056	3,869	3,769	3,741	3,569
2031	Nov	3,812	3,818	3,755	3,675	3,549	3,505	3,586	4,439	4,740	4,851	5,005	4,925	5,057	4,967	4,807	4,399	3,899	3,817	3,816	3,804	3,811	3,876	3,852	3,815
2031	Dec	3,833	3,766	3,671	3,783	3,933	3,947	3,909	4,280	4,928	5,166	5,195	5,204	5,256	5,434	5,236	4,756	3,697	3,617	3,819	4,008	4,161	4,081	3,992	3,880
2032	Jan	3,838	3,728	3,625	3,551	3,576	3,698	3,817	4,272	4,875	4,928	5,156	5,178	5,361	5,383	5,313	5,148	4,594	4,094	4,215	4,033	3,768	3,862	3,937	3,875
2032	Feb	4,049	4,032	3,771	3,759	3,885	3,777	3,917	4,651	4,918	5,180	5,280	5,405	5,548	5,622	5,564	5,394	4,811	3,938	3,839	4,051	4,093	4,222	4,136	4,006

PSCo Renewable Generation

2032	Mar	3,855	3,680	3,691	3,655	3,739	3,811	4,478	5,091	5,094	5,247	5,335	5,327	5,284	5,336	5,391	5,444	5,289	4,984	4,762	4,931	4,840	4,637	4,351	4,007
2032	Apr	4,156	4,196	4,169	4,027	4,070	4,210	4,558	4,705	4,808	4,925	4,808	4,868	4,850	4,894	4,966	4,926	4,887	4,676	4,184	4,368	4,443	4,341	4,258	4,158
2032	May	3,493	3,419	3,356	3,298	3,157	3,744	4,135	4,612	4,731	4,845	4,868	4,930	4,941	4,978	4,974	4,921	4,993	5,152	4,764	4,451	4,499	4,293	3,860	3,557
2032	Jun	3,536	3,354	3,401	3,263	3,196	4,129	4,478	4,730	4,902	5,134	5,321	5,410	5,354	5,376	5,308	5,275	5,198	4,945	4,216	3,892	3,920	4,110	3,961	3,831
2032	Jul	3,807	3,432	3,249	3,203	3,210	3,801	4,250	4,801	5,096	5,373	5,606	5,714	5,586	5,544	5,662	5,653	5,709	5,524	4,802	4,280	4,199	4,037	4,034	3,845
2032	Aug	4,235	3,996	3,740	3,446	3,121	3,109	3,907	4,613	5,031	5,546	5,751	5,683	5,609	5,463	5,384	5,321	5,095	5,055	4,549	4,852	5,041	5,053	4,804	4,561
2032	Sep	3,894	3,805	3,733	3,559	3,305	3,221	4,058	4,478	4,652	5,095	5,179	5,371	5,275	5,250	5,160	4,894	4,606	4,123	3,866	4,169	4,103	4,164	4,125	4,104
2032	Oct	3,901	3,678	3,415	3,283	3,337	3,371	3,827	4,470	4,553	4,695	4,802	4,819	4,944	4,950	4,824	4,844	4,562	3,943	4,217	4,225	4,009	3,924	3,944	3,791
2032	Nov	4,029	4,046	4,050	3,922	3,791	3,664	3,800	4,635	4,877	4,987	5,181	5,215	5,260	5,221	4,979	4,615	4,054	4,018	4,002	3,984	3,960	4,056	4,096	4,025
2032	Dec	4,059	3,976	3,935	3,987	4,140	4,103	4,030	4,341	5,065	5,279	5,387	5,380	5,415	5,558	5,357	4,852	3,747	3,735	3,955	4,098	4,276	4,196	4,162	4,082
2033	Jan	3,988	3,839	3,728	3,700	3,688	3,849	4,017	4,516	5,096	5,169	5,292	5,283	5,471	5,480	5,246	5,007	4,485	4,084	4,209	4,118	3,813	3,894	4,033	3,996
2033	Feb	4,165	4,134	3,962	3,905	3,973	3,885	4,038	4,834	5,072	5,323	5,423	5,704	5,786	5,753	5,586	5,374	4,826	3,980	4,005	4,141	4,191	4,355	4,250	4,162
2033	Mar	4,009	3,794	3,821	3,774	3,875	3,861	4,542	5,299	5,332	5,450	5,569	5,542	5,512	5,435	5,453	5,457	5,401	5,038	4,853	5,014	4,925	4,763	4,497	4,175
2033	Apr	4,393	4,339	4,352	4,277	4,229	4,381	4,758	4,889	5,139	5,155	5,036	5,115	5,025	5,018	5,036	4,997	4,902	4,740	4,301	4,427	4,548	4,450	4,433	4,318
2033	May	3,549	3,477	3,428	3,335	3,213	3,790	4,247	4,673	4,875	5,039	5,153	5,201	5,041	5,092	5,041	4,990	5,085	5,218	4,944	4,606	4,644	4,426	3,951	3,642
2033	Jun	3,685	3,551	3,569	3,389	3,278	4,251	4,587	4,910	5,146	5,378	5,541	5,628	5,456	5,474	5,380	5,448	5,326	5,016	4,326	4,026	3,998	4,232	4,072	3,936
2033	Jul	3,946	3,592	3,367	3,245	3,322	3,875	4,330	4,904	5,265	5,532	5,723	5,709	5,566	5,478	5,626	5,593	5,732	5,527	4,825	4,305	4,246	4,056	4,119	3,939
2033	Aug	4,370	4,059	3,823	3,513	3,221	3,195	4,000	4,687	5,119	5,677	5,874	5,863	5,710	5,556	5,427	5,424	5,060	5,039	4,598	4,934	5,171	5,099	4,921	4,740
2033	Sep	3,980	3,892	3,802	3,689	3,476	3,330	4,299	4,735	4,976	5,338	5,456	5,541	5,490	5,370	5,308	5,046	4,727	4,233	3,964	4,292	4,250	4,266	4,273	4,166
2033	Oct	3,976	3,778	3,574	3,427	3,388	3,401	3,954	4,643	4,724	4,932	5,102	4,994	5,094	4,989	4,911	4,925	4,688	4,010	4,292	4,315	4,091	3,954	4,002	3,870
2033	Nov	4,112	4,131	4,092	4,017	3,823	3,793	3,895	4,740	5,083	5,187	5,394	5,300	5,323	5,279	5,037	4,746	4,112	4,084	4,099	4,047	4,075	4,084	4,099	4,120
2033	Dec	4,258	4,153	4,074	4,195	4,348	4,285	4,164	4,477	5,205	5,470	5,494	5,533	5,474	5,534	5,296	4,844	3,792	3,684	3,946	4,132	4,295	4,324	4,358	4,216
2034	Jan	4,103	3,980	3,887	3,800	3,826	3,928	4,010	4,482	5,057	5,122	5,288	5,308	5,572	5,621	5,624	5,335	4,725	4,288	4,357	4,183	3,940	4,028	4,156	4,120
2034	Feb	4,259	4,217	4,010	3,992	4,142	4,044	4,207	4,990	5,243	5,457	5,553	5,785	5,873	5,913	5,838	5,673	5,168	4,218	4,128	4,295	4,316	4,470	4,382	4,276
2034	Mar	4,107	3,925	3,945	3,902	3,985	4,000	4,642	5,319	5,342	5,497	5,581	5,589	5,538	5,637	5,662	5,739	5,641	5,273	4,989	5,192	5,126	4,904	4,624	4,317
2034	Apr	4,537	4,523	4,509	4,362	4,322	4,495	4,787	4,940	5,115	5,187	5,144	5,133	5,107	5,160	5,213	5,291	5,298	4,951	4,451	4,645	4,742	4,598	4,602	4,449
2034	May	3,727	3,652	3,519	3,458	3,347	3,864	4,230	4,647	4,777	4,898	5,033	5,180	5,213	5,232	5,278	5,267	5,322	5,477	5,144	4,809	4,793	4,579	4,118	3,804
2034	Jun	3,754	3,587	3,612	3,466	3,396	4,332	4,733	4,960	5,218	5,492	5,694	5,742	5,662	5,647	5,512	5,589	5,517	5,195	4,351	4,060	4,123	4,355	4,231	4,067
2034	Jul	4,015	3,663	3,425	3,344	3,391	3,975	4,407	4,907	5,292	5,573	5,796	5,887	5,803	5,716	5,732	5,791	5,829	5,636	4,874	4,355	4,290	4,139	4,195	4,069
2034	Aug	4,436	4,142	3,923	3,602	3,317	3,270	4,068	4,797	5,286	5,788	5,908	5,843	5,687	5,540	5,461	5,396	5,212	5,130	4,683	4,998	5,219	5,199	5,002	4,769
2034	Sep	4,132	4,048	3,959	3,839	3,591	3,441	4,273	4,701	4,969	5,385	5,601	5,765	5,666	5,562	5,471	5,161	4,835	4,344	4,028	4,361	4,352	4,378	4,379	4,303
2034	Oct	4,062	3,830	3,618	3,457	3,487	3,516	3,979	4,610	4,722	4,903	5,093	5,119	5,214	5,186	5,094	5,079	4,792	4,106	4,413	4,389	4,175	4,064	4,100	3,982
2034	Nov	4,292	4,272	4,252	4,127	3,979	3,828	3,911	4,763	5,031	5,162	5,371	5,370	5,449	5,409	5,172	4,820	4,177	4,137	4,125	4,078	4,119	4,174	4,253	4,261
2034	Dec	4,315	4,227	4,158	4,205	4,383	4,337	4,246	4,564	5,261	5,518	5,624	5,713	5,748	5,893	5,644	5,079	3,938	3,841	4,082	4,268	4,447	4,466	4,436	4,323
2035	Jan	4,232	4,092	4,010	3,921	3,925	4,034	4,120	4,595	5,200	5,230	5,402	5,435	5,740	5,806	5,738	5,461	4,852	4,380	4,445	4,287	4,033	4,163	4,270	4,233
2035	Feb	4,392	4,318	4,120	4,177	4,272	4,164	4,274	5,105	5,283	5,499	5,595	5,760	5,935	6,078	6,023	5,834	5,306	4,303	4,186	4,375	4,399	4,585	4,520	4,379
2035	Mar	4,211	4,027	4,014	3,994	4,101	4,096	4,759	5,524	5,490	5,660	5,770	5,722	5,716	5,813	5,881	5,970	5,815	5,468	5,134	5,344	5,279	5,041	4,756	4,424
2035	Apr	4,666	4,658	4,644	4,511	4,493	4,644	5,028	5,134	5,222	5,392	5,263	5,323	5,341	5,330	5,395	5,400	5,339	5,087	4,578	4,812	4,894	4,715	4,729	4,576
2035	May	3,823	3,771	3,658	3,564	3,448	3,976	4,332	4,812	4,975	5,005	5,175	5,316	5,289	5,372	5,377	5,385	5,493	5,610	5,176	4,853	4,898	4,718	4,242	3,910
2035	Jun	3,883	3,697	3,755	3,554	3,482	4,480	4,810	5,039	5,251	5,515	5,720	5,792	5,694	5,724	5,559	5,638	5,491	5,172	4,385	4,120	4,193	4,461	4,298	4,170
2035	Jul	4,112	3,746	3,520	3,438	3,492	4,085	4,566	5,110	5,443	5,762	6,009	6,135	6,030	5,901	5,932	5,896	5,939	5,722	5,013	4,467	4,391	4,232	4,291	4,156
2035	Aug	4,559	4,257	4,033	3,681	3,404	3,358	4,155	4,849	5,371	5,902	6,058	6,006	5,811	5,649	5,516	5,392	5,216	5,157	4,717	5,077	5,282	5,260	5,111	4,897
2035	Sep	4,316	4,217	4,127	3,968	3,702	3,556	4,385	4,873	5,090	5,496	5,754	5,874	5,830	5,755	5,640	5,301	4,949	4,359	4,119	4,472	4,447	4,491	4,516	4,483
2035	Oct	4,201	3,969	3,724	3,555	3,583	3,615	4,035	4,666	4,806	4,983	5,161	5,190	5,302	5,289	5,203	5,171	4,856	4,195	4,497	4,500	4,297	4,184	4,236	4,123
2035	Nov	4,430	4,431	4,444	4,304	4,137	4,004	4,097	4,878	5,203	5,243	5,519	5,521	5,604	5,499	5,273	4,874	4,260	4,274	4,281	4,165	4,256	4,319	4,402	4,419
2035	Dec	4,449	4,370	4,303	4,380	4,514	4,519	4,357	4,692	5,385	5,656	5,787	5,819	5,824	5,969	5,736	5,151	4,028	3,957	4,260	4,476	4,607	4,584	4,591	4,480
2036	Jan	4,320	4,188	4,124	4,017	3,994	4,110	4,309	4,843	5,408	5,480	5,684	5,654	5,782	5,928	5,852	5,619	5,119	4,616	4,665	4,494	4,176	4,267	4,381	4,326
2036	Feb	4,546	4,465	4,268	4,319	4,429	4,305	4,443	5,194	5,475	5,606	5,747	5,873	5,993	6,081	6,107	5,915	5,379	4,408	4,411	4,621	4,591	4,768	4,628	4,489
2036	Mar	4,359	4,128	4,085	4,113	4,190	4,203	4,880	5,555	5,503	5,628	5,749	5,671	5,603	5,750	5,801	5,961	5,846	5,562	5,326	5,520	5,459	5,233	4,947	4,603
2036	Apr	4,481	4,413	4,386	4,342	4,369	4,520	5,028	5,219	5,273	5,325	5,296	5,287	5,377	5,538	5,629	5,639	5,419	5,190	4,724	4,825	4,878	4,798	4,759	4,470
2036	May	3,854	3,763	3,655	3,597	3,428	4,022	4,454	4,925	5,125	5,152	5,321	5,289	5,312	5,268	5,314	5,411	5,408	5,541	5,184	4,857	4,878	4,673	4,199	3,892

PSCo Renewable Generation

2036	Jun	3,751	3,616	3,666	3,475	3,440	4,395	4,738	5,074	5,381	5,719	5,884	5,913	5,889	5,873	5,763	5,800	5,684	5,358	4,601	4,377	4,374	4,597	4,412	4,164
2036	Jul	4,162	3,781	3,564	3,483	3,514	4,101	4,600	5,146	5,576	5,837	6,113	6,257	6,202	6,120	6,210	6,224	6,213	5,932	5,157	4,731	4,574	4,414	4,478	4,292
2036	Aug	4,635	4,284	4,040	3,759	3,471	3,415	4,236	4,899	5,322	5,924	6,079	6,077	6,029	5,841	5,810	5,723	5,485	5,402	4,917	5,254	5,469	5,503	5,278	4,988
2036	Sep	4,355	4,227	4,050	3,858	3,594	3,502	4,362	4,870	5,135	5,520	5,762	6,018	5,983	5,853	5,740	5,362	5,022	4,488	4,241	4,643	4,698	4,738	4,701	4,597
2036	Oct	4,168	3,905	3,640	3,558	3,669	3,744	4,089	4,867	4,912	5,131	5,271	5,240	5,363	5,336	5,269	5,205	4,937	4,285	4,650	4,711	4,517	4,437	4,342	4,133
2036	Nov	4,406	4,380	4,310	4,207	4,137	4,083	4,150	4,956	5,256	5,301	5,481	5,502	5,571	5,579	5,465	5,105	4,486	4,482	4,454	4,448	4,466	4,509	4,560	4,453
2036	Dec	4,465	4,384	4,294	4,411	4,568	4,650	4,560	4,966	5,624	5,781	5,846	5,890	5,981	6,114	5,979	5,400	4,316	4,236	4,472	4,655	4,867	4,809	4,729	4,552
2037	Jan	5,168	5,023	4,848	4,781	4,887	4,910	5,157	5,390	5,634	5,438	5,525	5,696	5,668	5,716	5,730	5,584	5,291	5,155	5,334	5,244	5,011	5,179	5,235	5,239
2037	Feb	5,372	5,311	4,888	4,961	5,203	5,093	5,252	5,702	5,789	5,836	5,782	5,818	5,877	6,049	6,038	6,009	5,646	5,073	5,305	5,541	5,498	5,612	5,538	5,408
2037	Mar	5,097	4,909	4,985	4,935	4,969	5,054	5,479	5,622	5,633	5,648	5,680	5,654	5,614	5,571	5,596	5,663	5,765	5,859	5,933	6,078	5,907	5,741	5,535	5,282
2037	Apr	5,292	5,119	5,186	5,230	5,267	5,342	5,201	5,090	5,187	5,168	5,131	5,114	5,123	5,207	5,260	5,379	5,357	5,421	5,200	5,468	5,513	5,440	5,335	5,284
2037	May	4,541	4,444	4,344	4,325	4,187	4,433	4,546	4,881	4,959	4,979	5,055	5,107	5,094	5,166	5,184	5,287	5,500	5,799	5,737	5,637	5,779	5,609	5,078	4,684
2037	Jun	4,620	4,494	4,575	4,425	4,354	4,998	5,018	5,123	5,252	5,531	5,828	6,086	6,160	6,160	6,070	6,107	6,122	5,976	5,224	5,312	5,351	5,494	5,357	5,071
2037	Jul	4,930	4,629	4,409	4,238	4,223	4,556	4,754	5,307	5,667	5,859	6,126	6,245	6,148	6,165	6,346	6,616	6,628	6,588	5,990	5,731	5,519	5,280	5,198	5,103
2037	Aug	5,212	4,873	4,688	4,537	4,276	4,202	4,637	5,156	5,574	6,069	6,218	6,187	6,093	6,003	5,960	5,907	5,825	5,768	5,828	6,253	6,354	6,329	6,006	5,687
2037	Sep	4,968	4,748	4,589	4,479	4,293	4,105	4,656	4,962	5,140	5,524	5,706	5,820	5,843	5,885	5,899	5,610	5,235	4,949	4,794	5,023	5,025	5,095	5,257	5,185
2037	Oct	4,788	4,606	4,397	4,363	4,236	4,292	4,505	5,012	5,082	5,119	5,187	5,118	5,237	5,272	5,260	5,240	5,087	4,806	5,061	5,068	4,904	4,954	4,905	4,749
2037	Nov	5,223	5,257	5,113	4,911	4,818	4,781	4,763	5,315	5,453	5,439	5,654	5,548	5,549	5,467	5,319	5,098	4,725	5,006	5,155	5,052	5,058	5,014	5,205	5,194
2037	Dec	5,457	5,516	5,400	5,445	5,573	5,562	5,324	5,520	5,821	5,945	5,936	6,001	5,996	6,165	6,083	5,687	4,801	4,881	5,229	5,508	5,519	5,496	5,412	5,431
2038	Jan	5,202	5,033	4,917	4,766	4,884	4,917	4,986	5,239	5,595	5,475	5,627	5,742	5,851	5,890	5,845	5,729	5,402	5,292	5,394	5,247	5,102	5,224	5,287	5,235
2038	Feb	5,401	5,358	4,943	4,883	5,094	4,987	5,105	5,656	5,779	5,865	5,883	5,967	6,009	6,096	6,115	6,066	5,581	5,081	5,321	5,558	5,515	5,718	5,673	5,464
2038	Mar	5,030	4,866	4,913	4,867	4,909	5,061	5,546	5,851	5,793	5,990	5,909	5,894	5,835	5,781	5,837	5,801	5,838	5,920	5,838	6,044	5,996	5,849	5,572	5,271
2038	Apr	5,279	5,260	5,192	5,194	5,093	5,171	5,241	5,384	5,442	5,508	5,394	5,334	5,322	5,459	5,530	5,580	5,530	5,337	5,133	5,397	5,625	5,411	5,494	5,265
2038	May	4,495	4,464	4,316	4,360	4,159	4,438	4,610	5,035	5,130	5,200	5,177	5,238	5,224	5,284	5,372	5,369	5,513	5,775	5,742	5,577	5,713	5,584	5,052	4,592
2038	Jun	4,677	4,563	4,559	4,368	4,248	4,911	5,063	5,313	5,447	5,691	5,850	6,081	6,018	6,076	5,951	6,024	6,120	5,959	5,142	5,235	5,325	5,519	5,369	5,107
2038	Jul	4,843	4,519	4,323	4,163	4,219	4,538	4,782	5,379	5,745	5,986	6,255	6,399	6,293	6,313	6,511	6,688	6,792	6,684	6,043	5,639	5,473	5,250	5,139	4,970
2038	Aug	5,378	4,966	4,792	4,567	4,296	4,206	4,607	5,120	5,590	6,077	6,295	6,306	6,193	6,063	5,992	6,003	5,926	5,942	5,938	6,300	6,360	6,388	6,063	5,741
2038	Sep	5,019	4,807	4,675	4,528	4,334	4,179	4,751	5,020	5,241	5,640	5,800	5,882	5,828	5,860	5,825	5,543	5,173	4,892	4,874	5,082	5,114	5,229	5,371	5,298
2038	Oct	4,993	4,825	4,542	4,403	4,430	4,381	4,636	5,071	5,091	5,142	5,252	5,209	5,308	5,329	5,322	5,251	5,075	4,812	5,091	5,073	4,938	4,991	5,009	4,873
2038	Nov	5,235	5,286	5,265	5,072	4,936	4,914	4,939	5,436	5,622	5,602	5,742	5,730	5,706	5,593	5,402	5,145	4,854	5,046	5,219	5,156	5,141	5,156	5,266	5,286
2038	Dec	5,592	5,552	5,421	5,540	5,645	5,656	5,384	5,558	5,994	6,056	6,109	6,094	6,110	6,259	6,145	5,648	4,817	4,855	5,196	5,502	5,572	5,585	5,529	5,516
2039	Jan	5,178	4,997	4,905	4,760	4,869	4,979	5,069	5,499	5,868	5,871	5,920	5,901	5,963	5,822	5,771	5,578	5,313	5,234	5,333	5,272	5,008	5,169	5,307	5,273
2039	Feb	5,404	5,348	4,947	4,944	5,104	5,043	5,252	5,843	6,012	6,126	6,154	6,213	6,191	6,127	6,133	5,916	5,430	5,045	5,228	5,580	5,507	5,697	5,742	5,416
2039	Mar	5,116	4,901	4,955	4,959	5,095	5,171	5,777	6,131	6,095	6,072	6,177	6,102	6,005	5,923	6,067	5,903	5,782	5,880	5,916	6,117	5,996	5,904	5,639	5,281
2039	Apr	5,467	5,392	5,304	5,122	5,083	5,312	5,566	5,747	5,711	5,782	5,707	5,639	5,513	5,590	5,559	5,497	5,506	5,311	5,182	5,456	5,650	5,457	5,500	5,337
2039	May	4,476	4,383	4,285	4,235	4,143	4,354	4,687	5,216	5,287	5,414	5,515	5,501	5,395	5,473	5,420	5,439	5,628	5,757	5,777	5,704	5,791	5,568	4,982	4,651
2039	Jun	4,762	4,522	4,565	4,377	4,176	4,926	5,100	5,474	5,600	5,934	6,064	6,145	6,150	6,223	6,062	6,099	6,127	5,904	5,180	5,208	5,310	5,558	5,452	5,131
2039	Jul	4,913	4,562	4,314	4,229	4,308	4,656	4,915	5,456	5,812	6,076	6,294	6,396	6,272	6,237	6,427	6,559	6,779	6,675	5,906	5,602	5,454	5,237	5,199	5,004
2039	Aug	5,358	5,011	4,748	4,571	4,186	4,158	4,714	5,168	5,648	6,068	6,421	6,416	6,317	6,154	6,089	6,088	6,036	6,036	5,963	6,297	6,469	6,448	6,100	5,853
2039	Sep	5,025	4,800	4,708	4,673	4,465	4,330	4,906	5,386	5,437	5,763	5,939	6,017	5,928	5,891	5,871	5,736	5,345	5,113	5,012	5,241	5,173	5,306	5,333	5,269
2039	Oct	4,992	4,866	4,557	4,351	4,456	4,467	4,726	5,173	5,269	5,360	5,402	5,349	5,420	5,399	5,318	5,328	5,233	4,853	5,215	5,195	4,950	4,981	4,963	4,817
2039	Nov	5,254	5,239	5,349	5,115	4,928	4,992	5,093	5,632	5,897	5,705	5,890	5,800	5,740	5,672	5,542	5,271	4,890	5,130	5,243	5,172	5,227	5,199	5,308	5,287
2039	Dec	5,468	5,486	5,391	5,552	5,591	5,634	5,408	5,609	6,221	6,379	6,302	6,222	6,123	6,315	6,051	5,518	4,700	4,743	5,104	5,447	5,680	5,625	5,564	5,479
2040	Jan	5,263	4,997	4,929	4,869	4,947	5,113	5,204	5,556	6,051	5,991	6,164	6,073	6,141	6,075	6,056	5,816	5,517	5,338	5,476	5,327	5,065	5,234	5,354	5,297
2040	Feb	5,476	5,454	5,048	5,049	5,180	5,191	5,389	6,019	6,165	6,257	6,301	6,342	6,295	6,302	6,183	5,946	5,458	4,988	5,296	5,585	5,528	5,746	5,691	5,462
2040	Mar	5,153	4,930	4,972	4,957	5,115	5,199	5,722	6,098	6,122	6,159	6,205	6,133	6,069	5,957	6,102	5,875	5,914	5,896	6,027	6,092	6,071	5,911	5,633	5,289
2040	Apr	5,462	5,408	5,276	5,251	5,165	5,347	5,649	5,715	5,782	5,789	5,675	5,559	5,503	5,609	5,597	5,463	5,483	5,283	5,214	5,520	5,783	5,426	5,458	5,384
2040	May	4,456	4,420	4,316	4,292	4,201	4,520	4,873	5,332	5,477	5,585	5,575	5,700	5,637	5,702	5,555	5,518	5,721	5,909	5,825	5,693	5,811	5,623	5,112	4,640
2040	Jun	4,762	4,583	4,627	4,418	4,155	4,897	5,129	5,415	5,643	5,993	6,127	6,227	6,041	6,212	6,082	6,223	6,167	5,901	5,033	5,157	5,268	5,556	5,514	5,217
2040	Jul	5,036	4,641	4,452	4,264	4,389	4,782	5,064	5,628	6,063	6,323	6,548	6,628	6,534	6,480	6,642	6,677	6,878	6,752	6,048	5,678	5,546	5,338	5,365	5,140
2040	Aug	5,574	5,176	4,874	4,600	4,264	4,212	4,796	5,247	5,745	6,243	6,571	6,536	6,365	6,225	6,124	6,032	6,028	6,088	5,921	6,488	6,632	6,579	6,317	5,957

PSCo Renewable Generation

2040	Sep	5,076	4,952	4,867	4,709	4,506	4,409	5,027	5,439	5,573	5,813	6,045	6,103	5,955	6,033	5,997	5,760	5,415	5,070	4,928	5,218	5,244	5,259	5,412	5,322
2040	Oct	5,087	4,846	4,568	4,365	4,458	4,497	4,789	5,253	5,312	5,352	5,479	5,336	5,407	5,354	5,434	5,404	5,278	4,950	5,305	5,286	4,975	5,021	5,042	4,946
2040	Nov	5,239	5,219	5,345	5,164	4,997	5,019	5,142	5,739	5,987	5,831	6,037	5,858	5,865	5,790	5,571	5,308	4,904	5,201	5,235	5,118	5,242	5,294	5,433	5,322
2040	Dec	5,459	5,497	5,373	5,484	5,639	5,606	5,421	5,660	6,269	6,449	6,301	6,239	6,188	6,344	6,116	5,470	4,664	4,814	5,103	5,532	5,705	5,605	5,547	5,490
2041	Jan	5,091	4,928	4,872	4,785	4,826	5,019	5,203	5,685	6,175	6,073	6,250	6,154	6,184	6,282	6,335	6,097	5,751	5,635	5,698	5,590	5,206	5,323	5,318	5,218
2041	Feb	5,369	5,248	4,935	4,870	5,093	5,103	5,325	6,008	6,238	6,228	6,329	6,353	6,437	6,374	6,410	6,313	5,948	5,337	5,426	5,680	5,607	5,793	5,673	5,433
2041	Mar	5,277	5,038	4,976	4,970	5,018	5,183	5,835	6,184	6,061	6,154	6,173	6,020	5,947	5,947	5,938	5,997	6,071	6,200	6,193	6,395	6,349	6,187	5,902	5,543
2041	Apr	5,222	5,169	5,066	5,014	5,037	5,291	5,804	5,904	5,889	5,846	5,760	5,608	5,685	5,807	5,942	5,994	5,850	5,656	5,372	5,571	5,620	5,580	5,651	5,240
2041	May	4,402	4,363	4,274	4,243	4,082	4,567	4,957	5,412	5,583	5,593	5,595	5,588	5,555	5,620	5,664	5,693	5,816	6,081	5,901	5,686	5,763	5,579	4,904	4,433
2041	Jun	4,520	4,367	4,437	4,285	4,156	5,005	5,219	5,507	5,741	6,079	6,294	6,443	6,414	6,462	6,304	6,363	6,359	6,067	5,173	5,209	5,253	5,539	5,392	5,005
2041	Jul	4,998	4,672	4,340	4,238	4,331	4,739	5,047	5,618	6,097	6,311	6,655	6,791	6,664	6,679	6,838	6,914	6,953	6,904	6,120	5,751	5,511	5,384	5,339	5,102
2041	Aug	5,653	5,210	4,982	4,633	4,295	4,199	4,685	5,306	5,795	6,360	6,493	6,447	6,323	6,208	6,129	6,000	5,952	6,033	5,929	6,336	6,583	6,675	6,358	5,958
2041	Sep	5,162	4,989	4,801	4,654	4,220	4,095	4,824	5,289	5,452	5,884	6,054	6,239	6,276	6,293	6,245	5,910	5,559	5,204	5,183	5,469	5,403	5,605	5,559	5,433
2041	Oct	5,022	4,704	4,396	4,227	4,425	4,527	4,875	5,344	5,408	5,474	5,489	5,531	5,561	5,547	5,526	5,437	5,308	4,912	5,296	5,496	5,190	5,258	5,302	5,006
2041	Nov	5,254	5,262	5,239	4,982	4,916	4,953	5,105	5,746	5,992	5,867	5,946	5,921	5,944	5,903	5,833	5,455	5,012	5,226	5,229	5,263	5,229	5,326	5,441	5,338
2041	Dec	5,544	5,426	5,282	5,467	5,551	5,541	5,460	5,741	6,264	6,372	6,404	6,357	6,418	6,540	6,392	5,765	4,838	5,007	5,426	5,686	5,875	5,879	5,728	5,585
2042	Jan	5,158	5,028	4,916	4,785	4,867	5,048	5,248	5,679	6,139	6,022	6,214	6,162	6,254	6,265	6,300	6,147	5,797	5,664	5,759	5,635	5,232	5,340	5,411	5,294
2042	Feb	5,468	5,366	5,013	4,987	5,218	5,124	5,368	6,057	6,153	6,280	6,366	6,477	6,516	6,542	6,470	6,291	5,826	5,309	5,417	5,692	5,622	5,816	5,784	5,531
2042	Mar	5,362	5,123	5,001	5,003	5,130	5,227	5,852	6,252	6,145	6,203	6,236	6,069	6,015	6,018	6,064	6,166	6,206	6,257	6,319	6,527	6,468	6,330	6,060	5,620
2042	Apr	5,344	5,261	5,220	5,172	5,151	5,398	5,887	6,052	6,121	5,911	5,859	5,778	5,784	5,936	6,036	6,084	5,829	5,652	5,413	5,611	5,687	5,692	5,743	5,379
2042	May	4,509	4,480	4,360	4,281	4,180	4,589	4,910	5,354	5,590	5,590	5,634	5,613	5,498	5,533	5,629	5,715	5,847	6,080	5,929	5,716	5,803	5,642	5,019	4,554
2042	Jun	4,656	4,394	4,478	4,309	4,181	4,949	5,163	5,575	5,736	6,176	6,364	6,445	6,390	6,454	6,218	6,303	6,310	5,983	5,213	5,279	5,378	5,681	5,583	5,185
2042	Jul	5,135	4,706	4,393	4,273	4,335	4,792	5,030	5,592	6,035	6,323	6,620	6,802	6,669	6,645	6,857	6,923	7,072	6,809	6,097	5,714	5,560	5,373	5,411	5,220
2042	Aug	5,724	5,330	5,057	4,657	4,321	4,170	4,685	5,202	5,743	6,307	6,504	6,452	6,251	6,153	6,162	6,081	6,102	6,206	6,068	6,541	6,678	6,721	6,474	6,143
2042	Sep	5,191	5,025	4,897	4,688	4,299	4,198	4,856	5,311	5,532	5,932	6,141	6,327	6,291	6,253	6,129	5,800	5,505	5,156	5,161	5,578	5,490	5,630	5,637	5,484
2042	Oct	5,146	4,793	4,425	4,319	4,470	4,619	4,846	5,366	5,501	5,569	5,639	5,593	5,630	5,582	5,561	5,427	5,241	4,975	5,405	5,464	5,280	5,344	5,390	5,040
2042	Nov	5,300	5,317	5,375	5,098	5,012	5,036	5,069	5,754	5,992	5,881	5,992	5,938	5,941	6,060	5,858	5,541	5,069	5,286	5,349	5,290	5,311	5,484	5,524	5,432
2042	Dec	5,592	5,493	5,316	5,538	5,638	5,692	5,550	5,860	6,480	6,459	6,511	6,483	6,470	6,561	6,400	5,799	4,950	5,075	5,475	5,722	5,858	5,951	5,834	5,675
2043	Jan	5,136	4,947	4,841	4,763	4,839	5,048	5,125	5,562	6,033	5,889	6,175	6,081	6,067	6,112	6,114	6,006	5,673	5,511	5,620	5,457	5,158	5,298	5,381	5,231
2043	Feb	5,474	5,329	4,985	4,951	5,158	5,166	5,366	6,018	6,163	6,244	6,301	6,486	6,458	6,407	6,416	6,324	5,840	5,298	5,411	5,577	5,577	5,799	5,739	5,568
2043	Mar	5,366	5,073	4,986	4,978	5,019	5,151	5,895	6,314	6,230	6,237	6,261	6,105	6,037	5,995	6,089	6,166	6,187	6,207	6,191	6,407	6,323	6,287	6,029	5,629
2043	Apr	5,441	5,306	5,155	5,117	5,129	5,384	5,855	5,998	6,054	5,911	5,815	5,725	5,735	5,894	5,989	6,056	5,846	5,631	5,358	5,549	5,670	5,710	5,758	5,401
2043	May	4,482	4,421	4,377	4,318	4,154	4,608	4,959	5,426	5,593	5,542	5,500	5,493	5,543	5,452	5,536	5,535	5,722	5,981	5,939	5,684	5,808	5,636	5,043	4,527
2043	Jun	4,729	4,420	4,488	4,264	4,165	5,000	5,204	5,527	5,822	6,089	6,232	6,345	6,328	6,369	6,226	6,265	6,260	5,936	5,178	5,297	5,393	5,689	5,599	5,208
2043	Jul	5,105	4,693	4,409	4,332	4,369	4,747	4,973	5,588	6,016	6,277	6,545	6,717	6,622	6,532	6,659	6,771	6,919	6,724	5,985	5,674	5,494	5,421	5,402	5,148
2043	Aug	5,712	5,340	5,028	4,666	4,338	4,192	4,740	5,300	5,805	6,377	6,576	6,511	6,367	6,220	6,134	6,072	6,053	6,180	6,086	6,463	6,661	6,754	6,508	6,093
2043	Sep	5,170	5,009	4,823	4,650	4,291	4,165	4,819	5,283	5,488	5,926	6,126	6,344	6,286	6,207	6,101	5,822	5,451	5,061	5,041	5,338	5,338	5,555	5,573	5,489
2043	Oct	5,148	4,783	4,439	4,276	4,433	4,565	4,834	5,350	5,535	5,597	5,595	5,605	5,491	5,490	5,448	5,297	5,205	4,927	5,310	5,440	5,187	5,335	5,377	5,023
2043	Nov	5,328	5,280	5,242	5,016	4,941	4,960	5,044	5,690	5,940	5,768	5,926	5,826	5,854	5,926	5,740	5,432	5,081	5,244	5,251	5,288	5,259	5,372	5,523	5,398
2043	Dec	5,453	5,387	5,191	5,422	5,538	5,554	5,441	5,717	6,291	6,297	6,359	6,266	6,344	6,466	6,270	5,671	4,763	4,890	5,278	5,554	5,702	5,720	5,625	5,471
2044	Jan	5,177	5,007	4,871	4,827	4,822	5,028	5,288	5,707	6,205	6,051	6,213	6,204	6,287	6,305	6,328	6,140	5,756	5,441	5,514	5,439	5,086	5,263	5,359	5,191
2044	Feb	5,480	5,351	5,071	5,041	5,264	5,130	5,389	5,988	6,200	6,233	6,357	6,427	6,419	6,484	6,398	6,334	5,839	5,186	5,323	5,533	5,510	5,758	5,701	5,446
2044	Mar	5,366	5,095	4,973	4,937	5,030	5,116	5,664	6,263	6,186	6,182	6,173	6,054	6,006	5,976	6,146	6,222	6,253	6,282	6,171	6,412	6,280	6,227	6,028	5,628
2044	Apr	5,418	5,310	5,219	5,150	5,163	5,358	5,788	5,929	5,943	5,899	5,870	5,739	5,825	5,925	6,014	6,022	5,797	5,497	5,283	5,497	5,564	5,601	5,697	5,376
2044	May	4,541	4,426	4,284	4,191	4,075	4,493	4,966	5,412	5,648	5,618	5,703	5,679	5,689	5,746	5,756	5,748	5,909	6,137	6,033	5,762	5,804	5,718	5,086	4,627
2044	Jun	4,644	4,422	4,430	4,222	4,139	4,958	5,158	5,555	5,793	6,128	6,365	6,442	6,365	6,398	6,230	6,298	6,296	5,978	5,112	5,198	5,278	5,619	5,497	5,141
2044	Jul	5,117	4,684	4,407	4,318	4,350	4,787	5,030	5,563	6,108	6,381	6,663	6,787	6,604	6,478	6,591	6,711	6,862	6,660	5,912	5,541	5,485	5,365	5,433	5,216
2044	Aug	5,767	5,431	5,099	4,627	4,262	4,116	4,654	5,304	5,851	6,532	6,805	6,730	6,527	6,344	6,298	6,167	6,136	6,173	5,895	6,436	6,615	6,635	6,420	6,137
2044	Sep	5,223	5,062	4,860	4,662	4,265	4,172	4,888	5,356	5,582	5,973	6,176	6,371	6,369	6,286	6,211	5,802	5,502	5,085	5,027	5,354	5,334	5,491	5,584	5,454
2044	Oct	5,221	4,831	4,544	4,369	4,495	4,528	4,820	5,328	5,522	5,525	5,633	5,544	5,628	5,642	5,552	5,435	5,255	4,897	5,301	5,421	5,217	5,320	5,383	5,123
2044	Nov	5,319	5,274	5,249	5,081	4,977	5,014	5,083	5,753	5,971	5,905	6,044	5,945	5,984	6,103	5,978	5,518	4,995	5,178	5,127	5,186	5,222	5,389	5,528	5,441

PSCo Renewable Generation

2044	Dec	5,526	5,419	5,252	5,436	5,524	5,562	5,370	5,635	6,192	6,346	6,341	6,319	6,297	6,382	6,208	5,557	4,652	4,773	5,169	5,501	5,716	5,745	5,696	5,544
2045	Jan	5,247	5,095	4,922	4,874	4,854	5,051	5,264	5,726	6,185	6,098	6,297	6,234	6,427	6,408	6,451	6,282	5,794	5,509	5,607	5,485	5,123	5,298	5,413	5,313
2045	Feb	5,543	5,439	5,096	5,133	5,353	5,244	5,470	6,171	6,319	6,403	6,473	6,601	6,605	6,641	6,571	6,433	5,981	5,280	5,365	5,608	5,564	5,835	5,754	5,554
2045	Mar	5,449	5,139	5,093	5,030	5,120	5,161	5,744	6,306	6,284	6,359	6,325	6,217	6,147	6,201	6,324	6,482	6,461	6,334	6,276	6,506	6,422	6,332	6,138	5,774
2045	Apr	5,585	5,438	5,345	5,317	5,294	5,472	5,905	6,033	6,059	6,043	6,016	5,898	5,974	6,010	6,098	6,266	5,990	5,686	5,444	5,604	5,725	5,734	5,884	5,485
2045	May	4,574	4,500	4,351	4,313	4,127	4,564	4,981	5,411	5,671	5,692	5,809	5,782	5,841	5,868	5,925	5,909	6,048	6,259	6,097	5,856	5,850	5,787	5,144	4,660
2045	Jun	4,717	4,510	4,501	4,261	4,197	5,042	5,244	5,637	5,922	6,242	6,452	6,541	6,433	6,445	6,280	6,293	6,321	5,988	5,111	5,256	5,286	5,673	5,573	5,212
2045	Jul	5,208	4,741	4,487	4,387	4,389	4,837	5,081	5,605	6,114	6,433	6,752	6,893	6,728	6,600	6,691	6,781	6,896	6,633	5,837	5,529	5,467	5,408	5,500	5,285
2045	Aug	5,781	5,414	5,087	4,670	4,284	4,131	4,693	5,394	5,972	6,594	6,833	6,747	6,495	6,352	6,272	6,140	6,076	6,160	5,889	6,471	6,642	6,683	6,477	6,247
2045	Sep	5,235	5,083	4,925	4,690	4,282	4,200	4,918	5,444	5,667	6,141	6,414	6,569	6,474	6,408	6,298	5,877	5,554	5,057	4,976	5,412	5,357	5,557	5,584	5,449
2045	Oct	5,155	4,867	4,609	4,426	4,460	4,448	4,670	5,283	5,471	5,621	5,776	5,744	5,787	5,715	5,585	5,448	5,327	4,902	5,285	5,464	5,235	5,271	5,252	4,987
2045	Nov	5,325	5,257	5,125	4,985	4,978	4,899	4,976	5,703	6,004	5,954	6,109	6,013	6,116	6,181	6,001	5,562	4,935	5,098	5,045	5,112	5,184	5,398	5,518	5,361
2045	Dec	5,398	5,285	5,166	5,325	5,471	5,442	5,273	5,558	6,188	6,284	6,442	6,390	6,480	6,585	6,357	5,595	4,652	4,649	5,040	5,352	5,554	5,588	5,541	5,389
2046	Jan	5,152	5,047	4,848	4,749	4,709	4,937	5,205	5,668	6,214	6,111	6,329	6,365	6,449	6,588	6,597	6,386	5,861	5,305	5,438	5,299	5,043	5,166	5,313	5,208
2046	Feb	5,489	5,346	5,063	5,135	5,239	5,116	5,375	6,008	6,276	6,381	6,529	6,615	6,699	6,788	6,744	6,517	5,958	5,030	5,100	5,402	5,346	5,595	5,562	5,463
2046	Mar	5,359	5,055	5,003	5,011	5,018	5,027	5,607	6,298	6,425	6,471	6,459	6,353	6,367	6,435	6,647	6,757	6,644	6,321	6,132	6,388	6,277	6,146	5,937	5,605
2046	Apr	5,618	5,465	5,359	5,306	5,293	5,475	5,935	6,052	6,213	6,219	6,243	6,214	6,177	6,280	6,431	6,325	6,061	5,774	5,378	5,600	5,717	5,745	5,913	5,629
2046	May	4,560	4,526	4,333	4,277	4,067	4,513	5,007	5,514	5,856	5,919	6,031	6,025	6,035	5,954	5,997	5,907	6,070	6,254	6,036	5,764	5,784	5,777	5,157	4,677
2046	Jun	4,686	4,464	4,400	4,158	4,089	4,893	5,166	5,633	5,910	6,229	6,493	6,530	6,428	6,310	6,145	6,150	6,045	5,812	4,965	4,938	4,980	5,395	5,313	5,051
2046	Jul	5,152	4,693	4,397	4,330	4,300	4,801	5,051	5,704	6,258	6,592	6,961	7,186	6,905	6,658	6,654	6,626	6,676	6,449	5,769	5,383	5,333	5,273	5,407	5,197
2046	Aug	5,675	5,277	4,902	4,455	4,081	4,009	4,651	5,398	6,039	6,646	6,901	6,844	6,597	6,463	6,289	6,072	6,009	6,041	5,587	6,086	6,293	6,354	6,219	5,978
2046	Sep	5,264	5,093	4,924	4,704	4,346	4,231	5,014	5,550	5,886	6,331	6,578	6,741	6,602	6,540	6,336	5,907	5,531	4,953	4,887	5,359	5,326	5,573	5,601	5,510
2046	Oct	5,176	4,908	4,620	4,441	4,510	4,448	4,725	5,309	5,523	5,698	5,814	5,716	5,863	5,903	5,695	5,622	5,427	4,907	5,308	5,428	5,253	5,284	5,264	4,981
2046	Nov	5,371	5,285	5,152	5,028	4,996	4,947	5,039	5,728	6,051	6,059	6,226	6,206	6,231	6,246	6,023	5,635	4,944	5,084	5,166	5,164	5,184	5,455	5,553	5,409
2046	Dec	5,420	5,336	5,192	5,371	5,503	5,523	5,327	5,597	6,282	6,439	6,538	6,558	6,644	6,706	6,478	5,670	4,659	4,686	5,016	5,371	5,569	5,581	5,591	5,386
2047	Jan	5,239	5,027	4,872	4,822	4,778	4,968	5,257	5,812	6,370	6,300	6,536	6,440	6,556	6,590	6,670	6,468	5,925	5,397	5,471	5,319	5,016	5,200	5,406	5,347
2047	Feb	5,535	5,403	5,122	5,162	5,344	5,177	5,431	6,148	6,409	6,483	6,619	6,723	6,812	6,882	6,802	6,633	6,064	5,104	5,148	5,454	5,412	5,682	5,667	5,512
2047	Mar	5,449	5,151	5,082	5,042	5,105	5,122	5,677	6,345	6,398	6,473	6,406	6,449	6,417	6,515	6,799	6,821	6,717	6,438	6,256	6,493	6,351	6,205	5,981	5,693
2047	Apr	5,733	5,553	5,435	5,409	5,392	5,646	6,073	6,208	6,367	6,341	6,302	6,284	6,409	6,501	6,582	6,434	6,144	5,817	5,456	5,709	5,740	5,888	6,059	5,776
2047	May	4,685	4,669	4,454	4,341	4,105	4,562	5,031	5,567	5,943	5,868	6,004	5,955	5,916	5,895	5,997	5,957	6,035	6,241	5,954	5,734	5,828	5,805	5,191	4,748
2047	Jun	4,756	4,542	4,476	4,255	4,202	4,999	5,226	5,660	5,931	6,305	6,599	6,661	6,515	6,487	6,312	6,324	6,283	5,898	5,023	4,967	5,029	5,450	5,347	5,082
2047	Jul	5,184	4,718	4,446	4,338	4,287	4,766	5,022	5,652	6,266	6,618	6,970	7,131	6,963	6,718	6,737	6,787	6,820	6,549	5,881	5,608	5,509	5,405	5,488	5,267
2047	Aug	5,722	5,300	4,938	4,478	4,084	4,019	4,682	5,394	5,961	6,610	6,823	6,775	6,619	6,483	6,241	6,041	5,938	6,003	5,583	6,065	6,271	6,366	6,307	6,028
2047	Sep	5,318	5,130	4,919	4,718	4,315	4,160	4,997	5,501	5,873	6,294	6,577	6,791	6,725	6,543	6,334	5,912	5,568	5,031	4,929	5,447	5,434	5,710	5,755	5,630
2047	Oct	5,147	4,865	4,621	4,457	4,525	4,509	4,758	5,428	5,568	5,754	5,933	5,820	5,970	6,041	5,933	5,790	5,555	5,032	5,418	5,506	5,283	5,315	5,271	4,986
2047	Nov	5,425	5,294	5,176	5,031	5,009	4,960	5,030	5,753	6,184	6,154	6,290	6,276	6,305	6,322	6,142	5,647	4,992	5,117	5,142	5,247	5,329	5,486	5,611	5,461
2047	Dec	5,479	5,427	5,248	5,381	5,533	5,569	5,422	5,752	6,394	6,587	6,679	6,726	6,783	6,973	6,725	5,952	4,795	4,750	5,096	5,417	5,672	5,656	5,638	5,524
2048	Jan	5,346	5,110	4,962	4,891	4,867	5,085	5,356	5,850	6,494	6,453	6,601	6,572	6,748	6,929	6,961	6,762	6,090	5,415	5,489	5,378	5,109	5,309	5,496	5,426
2048	Feb	5,558	5,508	5,215	5,260	5,386	5,318	5,513	6,214	6,533	6,672	6,764	6,882	7,002	7,058	6,977	6,658	5,991	5,036	5,116	5,423	5,432	5,692	5,648	5,559
2048	Mar	5,423	5,160	5,100	5,079	5,090	5,051	5,655	6,415	6,578	6,575	6,591	6,535	6,559	6,661	6,888	6,989	6,796	6,436	6,195	6,515	6,345	6,185	6,015	5,708
2048	Apr	5,738	5,554	5,487	5,435	5,395	5,590	6,078	6,237	6,314	6,267	6,317	6,290	6,421	6,564	6,631	6,471	6,175	5,756	5,474	5,675	5,715	5,905	6,061	5,727
2048	May	4,811	4,784	4,549	4,403	4,209	4,642	5,162	5,698	5,986	5,939	6,005	5,959	5,896	5,881	6,058	6,064	6,128	6,389	6,095	5,832	5,903	5,935	5,327	4,858
2048	Jun	4,780	4,567	4,462	4,237	4,198	4,927	5,160	5,600	5,853	6,236	6,443	6,494	6,329	6,276	6,167	6,192	6,178	5,894	5,059	5,057	5,082	5,475	5,410	5,142
2048	Jul	5,281	4,802	4,521	4,371	4,322	4,682	4,820	5,472	6,161	6,490	6,928	7,154	6,879	6,670	6,682	6,665	6,787	6,591	5,967	5,592	5,490	5,412	5,526	5,347
2048	Aug	5,850	5,390	5,057	4,563	4,120	3,993	4,559	5,230	5,805	6,445	6,714	6,780	6,547	6,372	6,199	6,080	6,019	6,116	5,729	6,238	6,466	6,508	6,386	6,180
2048	Sep	5,336	5,178	4,976	4,750	4,380	4,243	4,971	5,479	5,801	6,306	6,562	6,614	6,494	6,396	6,129	5,753	5,399	4,904	4,896	5,403	5,456	5,698	5,802	5,631
2048	Oct	5,253	4,977	4,684	4,470	4,541	4,521	4,708	5,314	5,646	5,824	5,984	5,981	6,061	5,938	5,849	5,730	5,553	5,211	5,559	5,645	5,408	5,424	5,333	5,061
2048	Nov	5,526	5,368	5,228	5,112	5,101	5,028	5,121	5,707	6,126	6,102	6,278	6,329	6,379	6,393	6,205	5,691	5,009	5,245	5,297	5,401	5,402	5,597	5,730	5,591
2048	Dec	5,529	5,427	5,335	5,498	5,685	5,615	5,479	5,748	6,411	6,593	6,706	6,813	6,973	7,079	6,784	5,924	4,887	4,865	5,212	5,486	5,656	5,675	5,628	5,491
2049	Jan	5,367	5,189	4,973	4,914	4,951	5,118	5,381	5,794	6,336	6,222	6,442	6,446	6,639	6,765	6,846	6,619	5,928	5,405	5,474	5,366	5,092	5,279	5,503	5,436
2049	Feb	5,611	5,502	5,210	5,264	5,477	5,308	5,618	6,095	6,262	6,382	6,559	6,726	6,870	6,993	6,928	6,607	6,036	5,164	5,258	5,554	5,506	5,756	5,709	5,582

PSCo Renewable Generation

2049	Mar	5,483	5,189	5,128	5,112	5,160	5,149	5,615	6,301	6,440	6,535	6,539	6,467	6,510	6,707	6,879	6,931	6,699	6,460	6,280	6,526	6,383	6,267	6,083	5,811
2049	Apr	5,822	5,696	5,605	5,588	5,508	5,737	6,104	6,240	6,402	6,471	6,483	6,542	6,538	6,704	6,639	6,428	6,096	5,776	5,470	5,709	5,789	5,929	6,108	5,852
2049	May	4,876	4,860	4,587	4,462	4,213	4,590	5,023	5,564	5,912	5,953	6,074	6,022	5,913	5,909	6,035	6,044	6,170	6,440	6,177	5,930	5,974	6,000	5,412	4,955
2049	Jun	4,851	4,587	4,519	4,312	4,254	4,915	5,180	5,659	5,913	6,265	6,513	6,558	6,397	6,388	6,267	6,302	6,251	5,985	5,126	5,106	5,129	5,550	5,453	5,193
2049	Jul	5,273	4,860	4,518	4,363	4,329	4,708	4,881	5,516	6,239	6,577	7,018	7,206	7,002	6,738	6,832	6,850	6,877	6,690	5,989	5,603	5,498	5,464	5,606	5,428
2049	Aug	5,858	5,422	5,060	4,585	4,119	3,962	4,535	5,217	5,882	6,566	6,862	6,902	6,681	6,450	6,292	6,159	6,085	6,140	5,742	6,262	6,488	6,524	6,400	6,192
2049	Sep	5,355	5,165	4,950	4,721	4,398	4,233	4,909	5,485	5,787	6,254	6,556	6,693	6,582	6,452	6,218	5,808	5,443	4,942	4,940	5,462	5,507	5,748	5,806	5,652
2049	Oct	5,325	5,058	4,772	4,602	4,565	4,555	4,738	5,363	5,636	5,791	6,020	6,020	6,045	5,925	5,870	5,752	5,551	5,203	5,620	5,692	5,436	5,435	5,391	5,100
2049	Nov	5,583	5,389	5,267	5,156	5,147	5,085	5,201	5,818	6,208	6,154	6,368	6,393	6,438	6,482	6,278	5,707	5,056	5,241	5,366	5,418	5,436	5,619	5,776	5,636
2049	Dec	5,601	5,508	5,415	5,556	5,720	5,687	5,527	5,770	6,452	6,656	6,780	6,880	6,997	7,067	6,774	5,930	4,948	4,895	5,205	5,525	5,697	5,702	5,690	5,564
2050	Jan	5,416	5,236	5,035	4,994	4,994	5,154	5,392	5,839	6,447	6,403	6,623	6,621	6,768	6,927	6,996	6,829	6,046	5,451	5,537	5,396	5,082	5,310	5,540	5,466
2050	Feb	5,674	5,575	5,315	5,328	5,513	5,394	5,672	6,224	6,480	6,563	6,711	6,911	7,121	7,214	7,189	6,887	6,235	5,168	5,261	5,547	5,537	5,811	5,777	5,623
2050	Mar	5,549	5,273	5,174	5,144	5,188	5,174	5,690	6,417	6,619	6,720	6,663	6,625	6,720	6,863	7,120	7,178	6,947	6,562	6,346	6,604	6,473	6,325	6,150	5,891
2050	Apr	6,018	5,814	5,736	5,727	5,621	5,776	6,224	6,353	6,553	6,648	6,638	6,639	6,675	6,853	6,868	6,634	6,344	5,974	5,558	5,792	5,849	6,107	6,263	6,031
2050	May	4,848	4,838	4,555	4,399	4,221	4,617	5,141	5,733	6,079	6,144	6,266	6,188	6,201	6,126	6,242	6,285	6,383	6,603	6,271	5,958	6,063	6,083	5,528	4,993
2050	Jun	4,928	4,645	4,570	4,345	4,297	5,046	5,363	5,887	6,236	6,607	6,785	6,844	6,685	6,709	6,541	6,555	6,451	6,144	5,227	5,143	5,169	5,584	5,505	5,306
2050	Jul	5,343	4,878	4,558	4,445	4,362	4,761	4,991	5,698	6,342	6,753	7,142	7,347	7,129	6,871	6,865	6,871	6,863	6,644	5,964	5,616	5,547	5,499	5,667	5,470
2050	Aug	5,890	5,446	5,074	4,591	4,158	4,060	4,713	5,493	6,142	6,860	7,182	7,242	7,007	6,758	6,483	6,341	6,209	6,219	5,754	6,262	6,482	6,515	6,409	6,214
2050	Sep	5,440	5,290	5,084	4,842	4,490	4,331	5,075	5,738	6,125	6,586	6,932	6,997	6,873	6,717	6,464	6,049	5,606	5,018	5,023	5,507	5,548	5,797	5,837	5,693
2050	Oct	5,392	5,163	4,830	4,653	4,649	4,602	4,830	5,468	5,797	5,932	6,133	6,126	6,245	6,264	6,077	5,894	5,660	5,233	5,648	5,705	5,459	5,475	5,421	5,151
2050	Nov	5,604	5,524	5,418	5,313	5,232	5,141	5,231	5,834	6,352	6,302	6,534	6,548	6,564	6,590	6,424	5,836	5,117	5,354	5,457	5,492	5,505	5,678	5,820	5,722
2050	Dec	5,660	5,615	5,503	5,629	5,814	5,762	5,520	5,802	6,533	6,786	6,904	6,964	7,106	7,171	6,897	6,019	4,943	4,903	5,208	5,537	5,710	5,764	5,757	5,635

PSCo Load Net of Renewables

PSCo Average Demand Net Renewable Generation [MWh/h] *
(Total Demand minus Total Renewables) / Number of Hours
* Negative values indicate surplus renewable energy and is either sold to external markets or stored.

Year	Month	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8	HE9	HE10	HE11	HE12	HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21	HE22	HE23	HE24
2024	Jan	1,758	1,717	1,739	1,789	1,782	1,829	2,061	2,019	1,757	1,651	1,454	1,289	1,190	1,151	1,215	1,516	2,055	2,845	2,896	2,770	2,683	2,365	2,020	1,839
2024	Feb	1,693	1,682	1,732	1,714	1,733	1,900	2,196	1,881	1,656	1,504	1,326	1,189	1,103	1,045	1,104	1,235	1,705	2,647	3,047	2,892	2,688	2,245	1,971	1,797
2024	Mar	1,721	1,686	1,697	1,698	1,765	1,897	1,865	1,536	1,413	1,273	1,234	1,221	1,201	1,031	1,030	1,057	1,220	1,775	2,168	2,231	2,183	1,983	1,807	1,721
2024	Apr	1,120	1,025	971	952	1,029	1,195	1,139	1,171	1,013	908	875	800	793	839	937	1,056	1,299	1,518	1,816	1,760	1,736	1,643	1,416	1,215
2024	May	1,400	1,352	1,321	1,315	1,384	1,263	1,235	1,119	880	958	989	1,023	1,098	1,199	1,300	1,406	1,461	1,526	1,745	1,771	1,828	1,787	1,602	1,481
2024	Jun	1,768	1,712	1,643	1,662	1,706	1,382	1,286	1,310	1,134	1,301	1,368	1,560	1,843	2,109	2,295	2,415	2,584	2,711	2,901	2,921	2,693	2,493	2,223	1,884
2024	Jul	1,923	1,963	2,009	2,058	2,082	1,943	1,725	1,603	1,366	1,583	1,712	1,979	2,417	2,832	3,097	3,255	3,287	3,210	3,325	3,221	2,995	2,837	2,385	2,063
2024	Aug	1,806	1,835	1,897	1,997	2,114	2,203	1,950	1,763	1,518	1,536	1,664	1,920	2,313	2,786	3,149	3,366	3,712	3,802	3,648	3,143	2,862	2,493	2,086	1,845
2024	Sep	1,647	1,599	1,572	1,569	1,641	1,845	1,751	1,586	1,333	1,286	1,300	1,350	1,551	1,841	2,076	2,392	2,698	2,965	2,974	2,773	2,587	2,270	1,900	1,701
2024	Oct	1,466	1,435	1,494	1,515	1,561	1,672	1,755	1,530	1,451	1,333	1,168	1,122	1,115	1,155	1,270	1,400	1,736	2,176	2,202	2,224	2,162	1,961	1,694	1,600
2024	Nov	1,251	1,199	1,221	1,253	1,389	1,594	1,858	1,480	1,333	1,207	1,043	937	919	971	1,157	1,494	2,116	2,499	2,452	2,313	2,110	1,872	1,601	1,394
2024	Dec	1,777	1,709	1,670	1,670	1,680	1,825	2,144	2,113	1,808	1,674	1,523	1,433	1,355	1,376	1,510	1,837	2,531	3,043	2,932	2,795	2,625	2,388	2,086	1,861
2025	Jan	1,846	1,796	1,795	1,850	1,856	1,882	2,115	2,092	1,765	1,638	1,445	1,296	1,189	1,166	1,240	1,516	2,091	2,948	2,965	2,848	2,752	2,436	2,078	1,887
2025	Feb	1,845	1,857	1,900	1,903	1,912	2,063	2,337	1,997	1,726	1,503	1,272	1,124	1,057	998	1,109	1,238	1,730	2,748	3,132	2,952	2,757	2,354	2,096	1,925
2025	Mar	1,770	1,753	1,770	1,777	1,843	1,994	1,974	1,607	1,431	1,257	1,183	1,164	1,122	986	949	1,017	1,216	1,843	2,307	2,346	2,264	2,063	1,880	1,792
2025	Apr	1,081	981	951	963	1,032	1,240	1,159	1,172	942	822	755	680	667	717	840	965	1,240	1,535	1,880	1,831	1,801	1,704	1,476	1,198
2025	May	1,469	1,460	1,492	1,506	1,559	1,361	1,293	1,176	920	958	946	961	1,009	1,114	1,209	1,331	1,402	1,460	1,694	1,773	1,889	1,808	1,585	1,511
2025	Jun	1,869	1,808	1,734	1,768	1,804	1,473	1,345	1,344	1,141	1,231	1,280	1,474	1,734	1,961	2,144	2,258	2,453	2,631	2,897	2,968	2,778	2,608	2,328	1,958
2025	Jul	1,966	1,981	2,015	2,052	2,080	1,942	1,724	1,586	1,331	1,567	1,698	1,962	2,381	2,806	3,077	3,265	3,327	3,272	3,420	3,331	3,094	2,960	2,506	2,163
2025	Aug	1,873	1,841	1,849	1,924	2,047	2,190	1,951	1,769	1,498	1,601	1,739	1,984	2,349	2,800	3,122	3,331	3,678	3,792	3,701	3,234	2,976	2,665	2,269	1,985
2025	Sep	1,665	1,605	1,566	1,558	1,629	1,836	1,728	1,555	1,331	1,337	1,373	1,427	1,631	1,940	2,195	2,525	2,853	3,110	3,097	2,864	2,688	2,379	1,994	1,741
2025	Oct	1,384	1,298	1,332	1,404	1,492	1,680	1,807	1,465	1,340	1,169	971	902	883	922	1,053	1,229	1,671	2,264	2,255	2,304	2,260	2,071	1,754	1,577
2025	Nov	1,203	1,148	1,157	1,232	1,392	1,626	1,929	1,457	1,197	1,038	862	783	737	759	942	1,336	2,085	2,498	2,514	2,394	2,197	1,934	1,636	1,392
2025	Dec	1,800	1,747	1,704	1,698	1,710	1,871	2,242	2,151	1,664	1,429	1,205	1,100	1,015	1,013	1,233	1,622	2,576	3,124	3,013	2,869	2,689	2,466	2,149	1,898
2026	Jan	1,515	1,459	1,476	1,549	1,549	1,579	1,800	1,611	1,158	1,027	807	713	568	511	590	875	1,548	2,568	2,591	2,511	2,440	2,157	1,803	1,603
2026	Feb	1,518	1,528	1,581	1,601	1,622	1,779	2,043	1,416	1,091	883	631	469	363	295	391	530	1,057	2,326	2,789	2,619	2,438	2,028	1,772	1,598
2026	Mar	1,343	1,347	1,380	1,388	1,437	1,607	1,494	964	800	658	606	596	538	364	300	339	526	1,135	1,763	1,806	1,744	1,574	1,437	1,363
2026	Apr	638	545	491	497	588	709	525	514	364	198	143	90	63	73	152	281	558	831	1,350	1,342	1,309	1,214	973	740
2026	May	982	985	1,020	1,039	1,080	741	584	393	115	157	161	174	239	352	407	511	601	640	1,001	1,243	1,319	1,275	1,088	1,037
2026	Jun	1,337	1,260	1,196	1,253	1,298	731	585	568	341	386	498	676	917	1,131	1,229	1,318	1,519	1,759	2,190	2,404	2,211	2,008	1,759	1,412
2026	Jul	1,363	1,413	1,451	1,502	1,513	1,155	826	635	343	544	582	768	1,128	1,505	1,796	1,984	2,059	2,083	2,423	2,553	2,375	2,311	1,888	1,528
2026	Aug	1,144	1,200	1,240	1,355	1,521	1,616	1,161	897	564	558	647	882	1,272	1,659	1,977	2,176	2,568	2,753	2,829	2,442	2,133	1,819	1,445	1,153
2026	Sep	1,039	995	1,010	1,029	1,131	1,336	938	627	415	288	312	325	512	791	1,056	1,406	1,821	2,267	2,457	2,185	1,986	1,686	1,306	1,079
2026	Oct	793	762	850	961	1,019	1,167	1,030	527	438	280	124	128	62	118	174	320	696	1,593	1,556	1,605	1,575	1,422	1,118	1,004
2026	Nov	725	663	660	738	950	1,201	1,436	734	361	273	170	13	(144)	(142)	40	362	1,348	1,859	1,853	1,784	1,615	1,408	1,108	863
2026	Dec	1,265	1,192	1,157	1,146	1,130	1,267	1,624	1,410	724	408	318	152	36	(61)	130	507	1,847	2,455	2,332	2,176	1,971	1,790	1,499	1,314
2027	Jan	1,113	1,075	1,168	1,222	1,225	1,214	1,415	1,117	539	401	187	98	(57)	(96)	(86)	83	883	2,072	2,117	2,031	1,985	1,690	1,354	1,194
2027	Feb	1,025	1,055	1,146	1,130	1,098	1,315	1,540	718	500	240	57	(114)	(228)	(384)	(367)	(314)	284	1,770	2,312	2,119	1,903	1,489	1,277	1,126
2027	Mar	1,053	1,068	1,093	1,113	1,132	1,278	1,014	298	185	70	(19)	(70)	(108)	(293)	(434)	(483)	(289)	554	1,392	1,436	1,397	1,269	1,125	1,064
2027	Apr	467	395	353	327	453	481	189	150	99	(130)	(130)	(260)	(296)	(396)	(487)	(410)	(125)	252	1,043	1,048	1,051	972	779	607
2027	May	854	874	903	915	984	401	92	(106)	(354)	(277)	(378)	(398)	(337)	(207)	(158)	(111)	39	52	592	949	1,028	1,004	883	874
2027	Jun	1,191	1,169	1,076	1,140	1,142	298	35	(17)	(179)	(119)	(62)	(12)	240	437	549	626	815	1,132	1,749	2,077	1,892	1,716	1,520	1,206
2027	Jul	1,025	1,117	1,188	1,263	1,269	699	250	(27)	(357)	(192)	(172)	(12)	307	652	881	1,078	1,181	1,271	1,816	2,140	1,986	1,939	1,500	1,186
2027	Aug	483	593	667	862	1,121	1,244	643	252	(129)	(209)	(156)	45	355	720	920	1,054	1,466	1,649	1,942	1,499	1,188	935	665	482
2027	Sep	538	488	533	628	797	1,029	494	143	(61)	(182)	(217)	(301)	(144)	53	238	615	990	1,583	1,867	1,492	1,302	1,104	805	585
2027	Oct	404	503	617	747	731	816	660	179	78	(11)	(70)	(111)	(211)	(248)	(176)	(157)	254	1,016	919	906	870	772	577	554
2027	Nov	475	434	464	545	668	871	1,006	319	91	(12)	(216)	(342)	(484)	(494)	(282)	20	861	1,341	1,337	1,294	1,099	910	698	559
2027	Dec	918	900	915	834	772	934	1,284	1,069	382	149	21	(131)	(275)	(399)	(254)	165	1,496	2,036	1,855	1,616	1,373	1,308	1,106	975

PSCo Load Net of Renewables

2028	**Jan**	957	980	1,098	1,170	1,202	1,174	1,291	987	390	257	(6)	(17)	(250)	(309)	(373)	(177)	542	1,738	1,796	1,779	1,787	1,516	1,165	1,041
2028	**Feb**	818	769	885	869	867	1,089	1,249	518	222	(21)	(225)	(346)	(485)	(632)	(544)	(445)	78	1,476	1,930	1,669	1,468	1,072	968	890
2028	**Mar**	848	909	923	868	903	1,121	857	174	119	(46)	(165)	(220)	(216)	(425)	(546)	(625)	(451)	161	860	890	872	844	788	778
2028	**Apr**	295	185	123	181	305	315	79	4	(107)	(270)	(295)	(334)	(434)	(497)	(564)	(575)	(293)	44	741	751	729	701	556	433
2028	**May**	674	656	645	673	789	339	123	(99)	(316)	(254)	(343)	(385)	(382)	(337)	(282)	(223)	(70)	17	490	825	847	824	812	803
2028	**Jun**	1,139	1,065	955	1,030	1,052	189	(108)	(166)	(383)	(299)	(240)	(117)	148	317	470	614	824	1,027	1,659	1,940	1,771	1,572	1,353	1,134
2028	**Jul**	1,032	1,144	1,181	1,228	1,199	652	235	(28)	(307)	(114)	(66)	33	338	672	936	1,186	1,310	1,424	1,913	2,119	2,010	1,947	1,491	1,212
2028	**Aug**	681	785	825	1,014	1,271	1,354	688	234	(191)	(263)	(235)	(13)	334	705	942	1,133	1,579	1,825	2,162	1,758	1,409	1,181	893	628
2028	**Sep**	658	645	678	752	937	1,134	528	67	(152)	(346)	(389)	(491)	(343)	(133)	75	510	971	1,638	1,942	1,565	1,354	1,116	805	637
2028	**Oct**	530	649	743	830	823	913	754	238	112	(33)	(148)	(205)	(355)	(306)	(249)	(136)	329	1,166	1,065	1,049	961	885	722	694
2028	**Nov**	561	558	621	636	787	1,025	1,166	438	125	5	(172)	(313)	(463)	(455)	(312)	7	922	1,374	1,335	1,292	1,177	999	805	658
2028	**Dec**	945	966	1,025	933	822	959	1,332	1,102	461	205	19	(150)	(260)	(366)	(244)	173	1,551	2,142	1,965	1,748	1,479	1,358	1,136	1,014
2029	**Jan**	868	900	1,012	1,111	1,127	1,068	1,186	893	247	68	(156)	(226)	(420)	(520)	(529)	(365)	350	1,566	1,659	1,627	1,644	1,350	1,066	931
2029	**Feb**	752	783	885	870	831	1,102	1,249	495	132	(132)	(301)	(496)	(645)	(775)	(752)	(673)	(55)	1,461	1,907	1,674	1,490	1,099	956	841
2029	**Mar**	721	777	754	737	808	1,008	661	(118)	(172)	(341)	(426)	(456)	(448)	(676)	(791)	(850)	(693)	(72)	687	702	680	646	621	640
2029	**Apr**	127	67	(8)	50	158	167	(106)	(206)	(263)	(395)	(426)	(548)	(605)	(683)	(725)	(710)	(570)	(188)	601	592	574	539	427	253
2029	**May**	605	573	580	582	731	202	(120)	(366)	(574)	(553)	(609)	(620)	(599)	(568)	(550)	(439)	(338)	(260)	281	627	644	701	661	683
2029	**Jun**	1,005	971	892	959	1,002	55	(240)	(276)	(450)	(374)	(365)	(283)	(40)	147	355	500	735	962	1,620	1,891	1,745	1,536	1,303	1,060
2029	**Jul**	894	1,034	1,109	1,138	1,096	472	(18)	(292)	(532)	(410)	(420)	(323)	46	447	744	975	1,083	1,202	1,726	2,036	1,897	1,866	1,384	1,061
2029	**Aug**	590	683	740	930	1,191	1,252	527	(2)	(433)	(533)	(487)	(310)	(6)	372	713	944	1,390	1,632	2,050	1,667	1,319	1,087	819	549
2029	**Sep**	547	534	559	635	820	1,018	319	(154)	(374)	(538)	(582)	(713)	(651)	(450)	(188)	283	787	1,507	1,860	1,496	1,284	1,036	720	550
2029	**Oct**	422	501	665	771	731	823	642	57	(43)	(155)	(341)	(413)	(570)	(545)	(465)	(358)	184	1,069	984	980	937	828	647	595
2029	**Nov**	477	450	524	526	673	915	1,078	256	(116)	(187)	(358)	(521)	(634)	(646)	(522)	(193)	804	1,307	1,279	1,188	1,028	884	647	567
2029	**Dec**	861	856	907	848	758	881	1,255	1,008	324	0	(160)	(293)	(429)	(560)	(431)	54	1,517	2,154	1,957	1,703	1,456	1,328	1,097	965
2030	**Jan**	958	960	1,097	1,157	1,105	1,108	1,221	921	214	(16)	(230)	(278)	(432)	(493)	(534)	(362)	397	1,704	1,758	1,726	1,735	1,444	1,132	1,011
2030	**Feb**	889	894	995	996	973	1,230	1,369	536	165	(126)	(355)	(512)	(592)	(698)	(659)	(578)	(27)	1,515	2,001	1,727	1,542	1,201	1,041	945
2030	**Mar**	806	849	855	887	941	1,127	807	(2)	(28)	(222)	(368)	(396)	(402)	(668)	(771)	(807)	(711)	(5)	843	837	797	746	732	748
2030	**Apr**	175	151	146	179	288	249	(21)	(164)	(243)	(355)	(500)	(537)	(653)	(721)	(742)	(684)	(468)	(73)	675	660	620	635	452	334
2030	**May**	692	656	742	749	865	316	(44)	(321)	(549)	(496)	(601)	(590)	(579)	(488)	(385)	(283)	(176)	(107)	378	694	702	718	715	769
2030	**Jun**	1,113	1,131	1,090	1,174	1,192	257	(87)	(273)	(450)	(477)	(522)	(466)	(261)	(15)	220	402	713	1,003	1,679	2,026	1,861	1,625	1,358	1,094
2030	**Jul**	990	1,106	1,211	1,237	1,198	573	47	(263)	(593)	(385)	(460)	(352)	(63)	365	634	922	1,079	1,232	1,770	2,123	1,932	1,889	1,436	1,182
2030	**Aug**	746	812	871	1,047	1,300	1,324	565	31	(343)	(420)	(388)	(208)	116	489	831	1,080	1,518	1,758	2,167	1,779	1,436	1,247	949	703
2030	**Sep**	618	596	590	652	834	1,069	349	(167)	(371)	(550)	(548)	(642)	(557)	(328)	(126)	339	891	1,658	2,019	1,626	1,403	1,151	802	600
2030	**Oct**	482	506	620	701	686	851	709	68	(11)	(180)	(359)	(372)	(513)	(538)	(492)	(348)	185	1,069	980	1,033	977	954	758	675
2030	**Nov**	538	501	539	556	749	983	1,170	344	(133)	(218)	(326)	(490)	(631)	(713)	(567)	(259)	825	1,283	1,307	1,260	1,097	983	752	612
2030	**Dec**	983	947	1,002	911	798	944	1,349	1,065	297	(7)	(156)	(282)	(467)	(642)	(475)	47	1,616	2,278	2,105	1,846	1,552	1,440	1,190	1,053
2031	**Jan**	536	639	716	792	817	750	870	652	44	(63)	(371)	(412)	(674)	(822)	(720)	(510)	176	1,215	1,184	1,190	1,226	975	705	614
2031	**Feb**	416	445	679	670	567	738	898	291	31	(287)	(493)	(690)	(845)	(900)	(924)	(784)	(186)	1,036	1,514	1,202	966	670	547	494
2031	**Mar**	450	519	483	489	454	588	290	(173)	(163)	(411)	(531)	(651)	(657)	(646)	(735)	(681)	(547)	(154)	214	148	154	248	316	359
2031	**Apr**	(154)	(240)	(282)	(172)	(92)	(43)	(170)	(201)	(253)	(408)	(347)	(363)	(465)	(590)	(566)	(666)	(525)	(200)	316	299	232	347	177	43
2031	**May**	369	371	449	474	604	62	(116)	(342)	(451)	(460)	(484)	(542)	(544)	(479)	(371)	(416)	(385)	(478)	(121)	238	267	317	456	479
2031	**Jun**	819	775	633	703	753	(176)	(390)	(405)	(622)	(575)	(565)	(475)	(210)	(66)	151	246	416	703	1,399	1,537	1,362	1,157	975	747
2031	**Jul**	608	755	821	855	796	297	(80)	(376)	(733)	(595)	(571)	(402)	(17)	241	407	510	543	772	1,261	1,501	1,383	1,462	1,135	870
2031	**Aug**	218	319	415	620	821	951	323	(94)	(510)	(574)	(534)	(271)	(37)	297	482	778	1,087	1,179	1,444	970	625	436	246	150
2031	**Sep**	171	92	130	204	488	694	101	(198)	(446)	(628)	(691)	(786)	(544)	(330)	(67)	389	774	1,277	1,468	1,029	843	675	447	142
2031	**Oct**	(85)	125	330	451	381	429	426	(128)	(204)	(382)	(534)	(559)	(677)	(638)	(557)	(446)	(121)	727	618	607	585	520	273	174
2031	**Nov**	132	69	108	194	363	549	745	27	(290)	(448)	(660)	(658)	(839)	(767)	(595)	(144)	541	966	1,024	939	759	585	422	249
2031	**Dec**	568	571	640	538	442	588	936	723	58	(263)	(372)	(490)	(631)	(836)	(635)	(91)	1,256	1,800	1,592	1,303	987	937	791	655
2032	**Jan**	563	628	716	801	809	818	1,024	752	130	7	(315)	(455)	(736)	(813)	(766)	(570)	182	1,237	1,207	1,240	1,295	1,035	731	603
2032	**Feb**	351	337	589	608	503	721	899	324	37	(309)	(491)	(727)	(956)	(1,074)	(1,041)	(858)	(151)	1,091	1,530	1,211	951	654	520	463
2032	**Mar**	414	529	490	533	499	594	289	(160)	(178)	(403)	(559)	(651)	(679)	(755)	(822)	(873)	(659)	(216)	193	195	206	256	281	375
2032	**Apr**	(185)	(329)	(356)	(215)	(178)	(104)	(157)	(152)	(271)	(405)	(327)	(447)	(463)	(520)	(606)	(565)	(478)	(206)	322	246	230	295	164	(34)
2032	**May**	396	419	453	501	642	114	(112)	(415)	(546)	(548)	(531)	(578)	(558)	(539)	(487)	(394)	(402)	(507)	(149)	132	179	311	426	457

PSCo Load Net of Renewables

2032	**Jun**	717	725	554	628	691	(175)	(345)	(376)	(559)	(455)	(462)	(399)	(186)	(42)	165	313	466	714	1,344	1,522	1,346	1,141	970	696
2032	**Jul**	604	800	858	837	824	292	(18)	(356)	(663)	(496)	(483)	(346)	32	325	415	562	577	728	1,263	1,530	1,394	1,474	1,120	888
2032	**Aug**	146	196	308	538	865	1,011	409	(110)	(540)	(660)	(656)	(383)	(89)	283	551	742	1,048	1,076	1,414	910	590	418	299	123
2032	**Sep**	179	102	64	189	461	703	155	(137)	(323)	(572)	(548)	(647)	(428)	(246)	(9)	378	765	1,272	1,436	1,105	1,001	794	536	202
2032	**Oct**	(26)	150	385	509	464	522	361	(96)	(192)	(338)	(472)	(535)	(684)	(680)	(538)	(528)	(158)	572	529	555	538	472	222	164
2032	**Nov**	84	8	(21)	115	292	570	731	31	(230)	(419)	(679)	(799)	(895)	(871)	(612)	(201)	559	959	1,012	930	770	583	362	214
2032	**Dec**	507	526	541	496	387	568	944	793	50	(251)	(446)	(558)	(689)	(867)	(669)	(103)	1,294	1,788	1,563	1,321	975	956	776	615
2033	**Jan**	586	694	793	828	863	815	966	649	48	(118)	(343)	(461)	(749)	(813)	(602)	(335)	378	1,356	1,355	1,299	1,381	1,142	784	637
2033	**Feb**	424	419	579	643	596	801	989	361	100	(256)	(449)	(856)	(1,034)	(1,050)	(912)	(688)	(14)	1,203	1,541	1,313	1,037	727	614	500
2033	**Mar**	450	598	535	590	539	727	413	(181)	(230)	(437)	(629)	(708)	(752)	(699)	(730)	(732)	(619)	(123)	243	262	278	320	340	399
2033	**Apr**	(232)	(291)	(366)	(294)	(166)	(102)	(187)	(165)	(433)	(470)	(392)	(538)	(485)	(494)	(527)	(487)	(342)	(117)	363	346	283	379	201	7
2033	**May**	359	322	308	384	533	83	(138)	(340)	(556)	(578)	(642)	(670)	(474)	(462)	(356)	(260)	(286)	(365)	(119)	188	236	406	530	478
2033	**Jun**	745	693	541	651	753	(153)	(302)	(396)	(644)	(537)	(521)	(458)	(131)	18	251	297	493	799	1,396	1,555	1,431	1,213	1,061	779
2033	**Jul**	623	792	885	936	847	347	27	(335)	(709)	(534)	(478)	(218)	179	522	586	759	695	869	1,385	1,653	1,490	1,620	1,207	956
2033	**Aug**	152	272	362	607	899	1,062	465	(34)	(480)	(661)	(654)	(443)	(73)	310	630	764	1,211	1,219	1,491	959	584	516	334	90
2033	**Sep**	258	178	154	217	445	747	73	(235)	(490)	(677)	(694)	(697)	(526)	(253)	(45)	336	753	1,271	1,452	1,109	976	841	552	300
2033	**Oct**	31	180	351	489	534	612	361	(137)	(233)	(460)	(663)	(610)	(739)	(625)	(534)	(518)	(191)	608	577	592	574	579	308	220
2033	**Nov**	177	103	119	197	424	585	766	53	(311)	(510)	(792)	(791)	(872)	(845)	(588)	(250)	596	1,017	1,033	980	760	683	507	277
2033	**Dec**	492	528	578	462	351	554	975	826	76	(283)	(401)	(571)	(616)	(715)	(483)	29	1,375	1,978	1,719	1,440	1,107	1,006	770	664
2034	**Jan**	592	674	753	847	840	852	1,108	825	227	42	(234)	(391)	(760)	(864)	(890)	(573)	233	1,268	1,338	1,362	1,365	1,131	787	633
2034	**Feb**	475	477	669	694	563	782	977	368	90	(249)	(447)	(817)	(1,009)	(1,101)	(1,057)	(883)	(249)	1,075	1,547	1,306	1,051	770	643	536
2034	**Mar**	511	620	559	607	575	737	465	(48)	(90)	(347)	(511)	(632)	(656)	(780)	(818)	(893)	(738)	(240)	220	204	202	337	387	420
2034	**Apr**	(211)	(317)	(371)	(230)	(115)	(78)	(86)	(85)	(281)	(373)	(375)	(437)	(452)	(524)	(593)	(670)	(625)	(211)	339	260	222	395	207	42
2034	**May**	289	254	321	362	496	104	(23)	(215)	(361)	(355)	(445)	(576)	(574)	(527)	(516)	(459)	(446)	(548)	(243)	62	155	351	477	426
2034	**Jun**	813	785	618	688	746	(129)	(342)	(335)	(608)	(538)	(556)	(452)	(211)	(24)	255	293	440	755	1,503	1,654	1,429	1,240	1,063	797
2034	**Jul**	672	836	938	947	883	351	55	(235)	(634)	(485)	(463)	(312)	28	373	573	656	695	859	1,437	1,708	1,548	1,658	1,258	945
2034	**Aug**	205	306	374	627	908	1,090	503	(39)	(542)	(683)	(601)	(342)	31	410	685	883	1,151	1,219	1,500	994	630	532	381	183
2034	**Sep**	249	161	132	200	457	756	217	(85)	(369)	(624)	(747)	(840)	(628)	(375)	(143)	285	711	1,229	1,469	1,137	967	852	586	299
2034	**Oct**	35	216	390	540	513	576	435	7	(123)	(342)	(571)	(661)	(788)	(751)	(645)	(602)	(221)	594	559	622	580	576	317	203
2034	**Nov**	135	99	92	221	395	669	870	146	(144)	(386)	(676)	(778)	(920)	(900)	(649)	(247)	618	1,072	1,110	1,053	813	716	489	269
2034	**Dec**	668	668	698	657	530	738	1,144	989	268	(92)	(296)	(524)	(669)	(857)	(615)	12	1,449	2,023	1,794	1,533	1,193	1,141	976	813
2035	**Jan**	567	664	729	823	838	849	1,124	847	216	45	(246)	(429)	(846)	(969)	(926)	(619)	190	1,277	1,366	1,372	1,372	1,113	791	628
2035	**Feb**	494	524	704	653	574	803	1,059	402	194	(167)	(372)	(686)	(971)	(1,168)	(1,145)	(947)	(292)	1,080	1,591	1,347	1,087	803	664	584
2035	**Mar**	564	664	630	655	600	786	490	(114)	(102)	(378)	(571)	(644)	(717)	(842)	(927)	(1,017)	(803)	(329)	180	166	169	360	433	478
2035	**Apr**	(204)	(322)	(380)	(252)	(158)	(93)	(183)	(132)	(242)	(446)	(367)	(506)	(568)	(575)	(656)	(660)	(546)	(227)	335	220	192	431	244	67
2035	**May**	320	256	297	367	501	91	(32)	(294)	(473)	(392)	(521)	(651)	(589)	(604)	(551)	(511)	(551)	(618)	(207)	91	114	314	480	445
2035	**Jun**	826	807	596	716	768	(176)	(323)	(314)	(543)	(453)	(469)	(384)	(119)	27	339	379	601	914	1,605	1,731	1,488	1,291	1,164	850
2035	**Jul**	684	861	949	958	884	343	3	(330)	(679)	(586)	(590)	(476)	(113)	281	471	650	686	873	1,395	1,695	1,540	1,679	1,279	968
2035	**Aug**	208	311	378	659	928	1,111	533	27	(512)	(695)	(658)	(422)	(17)	372	697	951	1,213	1,261	1,543	1,005	656	591	407	182
2035	**Sep**	203	129	96	201	469	754	211	(154)	(388)	(647)	(815)	(869)	(715)	(492)	(235)	222	678	1,299	1,476	1,136	976	869	590	255
2035	**Oct**	(2)	174	378	533	504	566	482	62	(98)	(332)	(557)	(658)	(807)	(784)	(685)	(624)	(215)	579	561	600	538	560	294	167
2035	**Nov**	162	107	66	207	390	630	808	150	(200)	(366)	(729)	(842)	(995)	(913)	(675)	(229)	614	1,029	1,042	1,057	763	692	487	263
2035	**Dec**	685	673	697	625	541	698	1,181	1,012	292	(97)	(334)	(514)	(634)	(823)	(598)	49	1,471	2,029	1,745	1,461	1,165	1,179	984	808
2036	**Jan**	713	797	839	951	989	982	1,126	784	191	(36)	(366)	(492)	(736)	(942)	(888)	(624)	90	1,217	1,273	1,308	1,392	1,214	908	760
2036	**Feb**	459	494	671	624	527	765	986	410	98	(185)	(443)	(725)	(960)	(1,105)	(1,165)	(962)	(287)	1,102	1,477	1,174	957	712	670	592
2036	**Mar**	509	664	661	635	596	742	428	(86)	(58)	(308)	(520)	(574)	(596)	(777)	(850)	(1,012)	(831)	(389)	77	76	39	228	312	380
2036	**Apr**	45	2	(37)	1	37	85	(112)	(147)	(226)	(354)	(388)	(472)	(615)	(793)	(898)	(907)	(633)	(330)	199	250	248	386	248	213
2036	**May**	486	513	575	614	769	233	2	(265)	(484)	(437)	(582)	(561)	(567)	(466)	(467)	(527)	(455)	(529)	(192)	132	213	425	596	589
2036	**Jun**	1,079	1,017	819	932	943	35	(136)	(250)	(575)	(613)	(609)	(507)	(335)	(158)	92	169	366	699	1,382	1,492	1,347	1,231	1,136	944
2036	**Jul**	786	965	1,033	1,033	979	441	96	(225)	(673)	(516)	(545)	(450)	(139)	207	336	467	554	803	1,399	1,587	1,500	1,683	1,287	1,008
2036	**Aug**	302	432	497	695	965	1,149	530	71	(371)	(587)	(537)	(343)	(80)	335	553	764	1,084	1,157	1,495	979	622	546	447	273
2036	**Sep**	214	159	204	335	596	828	255	(121)	(405)	(623)	(759)	(934)	(771)	(475)	(206)	297	739	1,297	1,455	1,044	804	725	509	225
2036	**Oct**	75	241	436	503	420	508	555	(24)	(91)	(365)	(546)	(580)	(730)	(684)	(593)	(494)	(135)	624	481	487	443	481	351	252

PSCo Load Net of Renewables

2036	**Nov**	283	235	265	367	465	649	876	208	(120)	(287)	(558)	(700)	(841)	(876)	(753)	(351)	468	847	963	904	689	672	494	358
2036	**Dec**	770	762	810	699	592	676	1,108	865	178	(140)	(320)	(519)	(725)	(898)	(763)	(119)	1,272	1,840	1,627	1,381	990	1,054	952	834
2037	**Jan**	(14)	76	225	297	205	294	389	347	72	119	(98)	(436)	(534)	(650)	(695)	(520)	(12)	740	687	652	645	432	202	(15)
2037	**Feb**	(164)	(153)	246	177	(58)	159	353	73	(48)	(271)	(341)	(543)	(722)	(952)	(973)	(934)	(433)	551	715	402	197	59	(30)	(126)
2037	**Mar**	(78)	27	(101)	(49)	(42)	41	(8)	11	(26)	(183)	(311)	(423)	(474)	(463)	(507)	(577)	(612)	(552)	(401)	(341)	(267)	(106)	(97)	(137)
2037	**Apr**	(598)	(547)	(689)	(740)	(711)	(579)	(122)	144	19	(52)	(84)	(167)	(231)	(333)	(402)	(521)	(445)	(436)	(147)	(260)	(257)	(84)	(139)	(428)
2037	**May**	(60)	(35)	13	10	129	(65)	14	(125)	(224)	(179)	(234)	(301)	(273)	(289)	(261)	(327)	(469)	(707)	(656)	(553)	(599)	(380)	(131)	(59)
2037	**Jun**	339	260	20	88	131	(463)	(296)	(167)	(317)	(292)	(413)	(536)	(455)	(285)	(51)	29	93	240	914	712	509	497	360	188
2037	**Jul**	170	260	320	406	393	108	68	(255)	(634)	(415)	(443)	(334)	10	251	282	151	214	224	654	688	660	958	727	348
2037	**Aug**	(151)	(37)	(35)	30	269	467	238	(79)	(516)	(636)	(581)	(360)	(49)	272	507	687	852	902	697	100	(149)	(144)	(140)	(295)
2037	**Sep**	(256)	(225)	(205)	(159)	20	349	94	(81)	(280)	(513)	(595)	(634)	(532)	(408)	(265)	151	631	943	1,016	789	594	515	108	(219)
2037	**Oct**	(429)	(348)	(212)	(196)	(47)	55	242	(54)	(148)	(242)	(356)	(363)	(517)	(540)	(508)	(456)	(206)	191	186	254	168	95	(79)	(244)
2037	**Nov**	(401)	(510)	(409)	(207)	(89)	78	397	(18)	(187)	(322)	(635)	(657)	(732)	(674)	(515)	(249)	335	444	376	415	204	299	(12)	(250)
2037	**Dec**	(53)	(206)	(138)	(177)	(258)	(80)	503	474	141	(155)	(270)	(501)	(621)	(833)	(755)	(295)	902	1,313	996	666	477	540	453	127
2038	**Jan**	92	204	292	447	337	409	679	614	225	180	(109)	(399)	(638)	(748)	(735)	(592)	(51)	685	728	759	655	515	290	126
2038	**Feb**	(34)	(45)	342	405	196	408	649	269	108	(168)	(318)	(579)	(747)	(895)	(949)	(891)	(266)	646	816	515	309	112	4	(22)
2038	**Mar**	137	213	109	156	155	176	81	(58)	(28)	(382)	(403)	(534)	(572)	(549)	(622)	(588)	(558)	(489)	(185)	(171)	(218)	(50)	36	31
2038	**Apr**	(421)	(533)	(545)	(557)	(391)	(257)	(9)	4	(85)	(254)	(213)	(260)	(307)	(467)	(557)	(610)	(504)	(239)	38	(64)	(245)	108	(120)	(241)
2038	**May**	133	92	183	115	287	46	48	(198)	(314)	(342)	(299)	(376)	(344)	(346)	(383)	(341)	(414)	(614)	(586)	(411)	(463)	(243)	30	172
2038	**Jun**	423	319	150	251	339	(271)	(218)	(219)	(375)	(314)	(298)	(399)	(184)	(70)	199	241	225	385	1,131	932	670	640	526	311
2038	**Jul**	385	492	522	592	500	223	131	(236)	(623)	(453)	(480)	(396)	(39)	202	221	183	154	232	707	889	810	1,119	929	616
2038	**Aug**	(200)	(15)	(26)	112	357	570	382	69	(423)	(552)	(567)	(390)	(57)	310	577	696	860	834	692	163	(51)	(77)	(67)	(227)
2038	**Sep**	(167)	(152)	(166)	(86)	97	396	132	(6)	(249)	(517)	(584)	(601)	(429)	(297)	(106)	301	778	1,089	1,038	845	617	523	146	(192)
2038	**Oct**	(403)	(302)	(75)	45	1	126	191	(46)	(92)	(223)	(387)	(430)	(571)	(584)	(562)	(463)	(188)	202	205	305	170	121	(70)	(193)
2038	**Nov**	(266)	(397)	(421)	(228)	(68)	90	380	22	(198)	(350)	(596)	(721)	(776)	(688)	(485)	(182)	327	537	439	443	247	312	91	(187)
2038	**Dec**	(19)	(82)	(6)	(121)	(178)	(18)	601	594	122	(118)	(299)	(459)	(605)	(802)	(697)	(135)	1,008	1,456	1,148	801	553	623	525	225
2039	**Jan**	230	353	414	561	456	450	713	480	74	(115)	(312)	(479)	(679)	(610)	(591)	(371)	110	840	914	862	866	696	392	198
2039	**Feb**	106	105	474	479	319	486	650	236	26	(297)	(465)	(713)	(825)	(827)	(870)	(646)	(19)	779	1,028	634	450	291	97	173
2039	**Mar**	213	330	212	208	113	217	5	(187)	(182)	(332)	(544)	(621)	(624)	(573)	(736)	(574)	(388)	(341)	(160)	(131)	(97)	58	147	183
2039	**Apr**	(444)	(511)	(512)	(343)	(240)	(257)	(198)	(223)	(220)	(396)	(399)	(445)	(381)	(483)	(473)	(413)	(366)	(96)	112	5	(146)	230	63	(135)
2039	**May**	135	97	104	120	211	106	18	(280)	(375)	(427)	(499)	(496)	(367)	(379)	(269)	(243)	(357)	(423)	(443)	(358)	(370)	(26)	266	186
2039	**Jun**	491	502	277	370	534	(168)	(132)	(253)	(403)	(435)	(392)	(346)	(198)	(98)	207	285	336	559	1,218	1,092	813	763	614	445
2039	**Jul**	442	573	649	640	518	202	87	(229)	(609)	(468)	(443)	(317)	62	364	395	406	265	342	946	1,033	931	1,260	1,004	709
2039	**Aug**	(67)	57	134	226	581	730	395	137	(366)	(456)	(612)	(426)	(109)	295	562	697	836	826	752	256	(77)	(30)	14	(226)
2039	**Sep**	(28)	1	(54)	(88)	105	375	107	(245)	(320)	(538)	(629)	(653)	(452)	(253)	(79)	179	676	937	977	779	643	565	321	(27)
2039	**Oct**	(290)	(234)	15	198	72	134	201	(45)	(167)	(357)	(458)	(500)	(618)	(591)	(498)	(480)	(284)	233	175	284	250	249	100	(22)
2039	**Nov**	(89)	(156)	(315)	(83)	122	184	391	(15)	(316)	(312)	(609)	(664)	(690)	(650)	(510)	(192)	413	581	540	562	297	443	242	2
2039	**Dec**	274	146	182	24	27	149	720	686	37	(307)	(365)	(470)	(509)	(754)	(502)	94	1,225	1,676	1,358	985	573	746	667	430
2040	**Jan**	365	570	604	665	589	525	789	627	93	(61)	(386)	(487)	(693)	(696)	(708)	(442)	64	869	913	964	968	833	568	394
2040	**Feb**	128	90	461	460	328	427	617	166	(23)	(343)	(533)	(769)	(859)	(932)	(850)	(606)	21	894	1,029	725	521	349	251	221
2040	**Mar**	272	401	294	304	171	241	96	(113)	(169)	(387)	(547)	(637)	(675)	(599)	(764)	(541)	(516)	(354)	(268)	(77)	(136)	115	232	259
2040	**Apr**	(382)	(459)	(413)	(402)	(274)	(277)	(280)	(181)	(282)	(395)	(360)	(364)	(375)	(506)	(515)	(384)	(341)	(59)	97	(28)	(235)	313	148	(136)
2040	**May**	315	214	218	204	290	71	(42)	(279)	(449)	(506)	(473)	(614)	(527)	(524)	(317)	(234)	(365)	(498)	(410)	(260)	(324)	40	294	357
2040	**Jun**	566	523	301	413	627	(88)	(140)	(191)	(445)	(501)	(456)	(421)	(72)	(57)	230	211	349	610	1,404	1,175	870	811	617	430
2040	**Jul**	465	632	640	732	560	205	80	(252)	(712)	(576)	(561)	(415)	(66)	258	318	427	305	406	951	1,114	995	1,337	1,013	729
2040	**Aug**	(123)	38	141	323	627	809	464	216	(307)	(482)	(621)	(417)	(38)	337	635	857	949	883	917	212	(95)	19	(15)	(158)
2040	**Sep**	59	(5)	(67)	23	198	403	68	(226)	(386)	(545)	(705)	(721)	(471)	(395)	(210)	151	605	987	1,088	857	619	696	348	36
2040	**Oct**	(279)	(111)	102	280	161	196	253	6	(83)	(247)	(443)	(406)	(530)	(470)	(536)	(480)	(253)	219	192	300	319	330	143	(40)
2040	**Nov**	89	30	(147)	29	200	283	451	(22)	(308)	(355)	(680)	(654)	(754)	(711)	(485)	(175)	466	604	628	699	359	464	258	113
2040	**Dec**	411	266	329	218	91	270	788	717	68	(307)	(301)	(432)	(524)	(737)	(522)	186	1,308	1,683	1,447	995	636	878	801	535
2041	**Jan**	641	739	756	843	797	703	886	605	73	(59)	(399)	(508)	(685)	(855)	(937)	(669)	(90)	701	784	796	919	859	715	570
2041	**Feb**	442	500	773	837	603	689	841	332	56	(182)	(440)	(672)	(902)	(909)	(984)	(877)	(360)	707	1,056	759	556	476	475	455
2041	**Mar**	316	450	440	441	421	416	145	(48)	40	(253)	(392)	(410)	(449)	(493)	(511)	(577)	(579)	(540)	(266)	(235)	(301)	(0)	146	178

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2041	**Apr**	10	(69)	(56)	(18)	4	(60)	(246)	(188)	(209)	(314)	(320)	(303)	(456)	(604)	(758)	(813)	(609)	(330)	56	69	53	318	129	169
2041	**May**	524	479	495	495	615	175	6	(230)	(429)	(427)	(423)	(455)	(416)	(421)	(417)	(410)	(457)	(655)	(471)	(210)	(188)	140	540	644
2041	**Jun**	1,002	992	789	873	940	75	(29)	(154)	(415)	(563)	(621)	(647)	(451)	(297)	43	140	260	567	1,380	1,225	995	950	818	742
2041	**Jul**	599	700	852	857	710	324	172	(168)	(673)	(499)	(592)	(495)	(102)	166	242	321	364	380	999	1,156	1,119	1,418	1,166	881
2041	**Aug**	(55)	141	157	406	701	908	637	228	(288)	(519)	(458)	(240)	94	444	717	971	1,102	1,013	992	444	34	58	94	(21)
2041	**Sep**	53	22	47	116	512	742	290	(46)	(236)	(545)	(614)	(733)	(641)	(480)	(264)	203	663	1,044	994	741	599	516	358	50
2041	**Oct**	(159)	44	256	399	201	237	283	5	(89)	(279)	(355)	(492)	(561)	(527)	(478)	(352)	(126)	382	250	172	220	268	55	4
2041	**Nov**	151	51	14	262	335	413	577	85	(201)	(276)	(479)	(621)	(743)	(739)	(668)	(252)	395	572	704	657	471	562	373	194
2041	**Dec**	469	475	555	371	319	485	918	797	232	(113)	(294)	(445)	(647)	(818)	(676)	18	1,270	1,610	1,255	986	600	765	784	585
2042	**Jan**	679	738	806	936	847	765	934	707	202	89	(270)	(434)	(684)	(775)	(846)	(662)	(72)	738	802	840	974	964	756	616
2042	**Feb**	491	526	834	858	611	796	927	412	266	(126)	(376)	(705)	(896)	(992)	(960)	(773)	(156)	812	1,159	858	650	600	521	504
2042	**Mar**	371	499	544	535	434	497	256	12	82	(187)	(344)	(353)	(413)	(459)	(531)	(639)	(607)	(490)	(284)	(240)	(292)	18	153	252
2042	**Apr**	44	(14)	(71)	(40)	24	(31)	(191)	(200)	(309)	(264)	(310)	(370)	(453)	(632)	(752)	(802)	(487)	(226)	121	142	98	361	204	184
2042	**May**	541	484	527	570	622	243	129	(106)	(372)	(368)	(408)	(430)	(312)	(289)	(337)	(387)	(445)	(610)	(446)	(179)	(175)	180	552	648
2042	**Jun**	1,001	1,028	749	815	883	134	105	(70)	(259)	(444)	(471)	(445)	(248)	(143)	238	268	348	686	1,416	1,291	1,019	1,023	896	781
2042	**Jul**	594	791	916	935	812	374	292	(38)	(509)	(426)	(483)	(445)	(56)	246	264	347	280	512	1,071	1,261	1,141	1,540	1,223	887
2042	**Aug**	(12)	132	188	484	766	1,015	705	394	(174)	(409)	(410)	(185)	230	567	757	966	1,032	922	939	333	29	129	104	(88)
2042	**Sep**	147	105	66	195	544	753	385	60	(190)	(496)	(615)	(748)	(592)	(379)	(90)	370	774	1,152	1,087	720	593	608	407	120
2042	**Oct**	(195)	40	308	385	228	214	395	82	(86)	(290)	(426)	(485)	(570)	(504)	(459)	(290)	(5)	381	228	299	212	286	68	59
2042	**Nov**	233	122	(1)	266	349	430	702	156	(125)	(229)	(470)	(587)	(692)	(849)	(643)	(285)	401	590	663	718	475	526	423	226
2042	**Dec**	560	545	654	433	361	464	968	823	157	(75)	(283)	(465)	(601)	(744)	(590)	76	1,251	1,641	1,310	1,066	731	840	832	640
2043	**Jan**	671	779	834	911	831	720	984	724	206	107	(345)	(467)	(609)	(733)	(772)	(640)	(94)	658	717	840	899	938	764	654
2043	**Feb**	507	578	873	903	676	747	887	388	190	(171)	(393)	(798)	(922)	(941)	(989)	(892)	(272)	669	980	827	578	583	581	486
2043	**Mar**	350	506	500	505	513	580	216	(71)	(26)	(257)	(401)	(418)	(459)	(456)	(572)	(654)	(609)	(484)	(241)	(221)	(227)	75	237	262
2043	**Apr**	(14)	(43)	(6)	13	59	21	(126)	(131)	(228)	(270)	(275)	(329)	(418)	(606)	(720)	(791)	(528)	(239)	146	165	58	373	266	218
2043	**May**	589	558	517	539	646	210	50	(224)	(422)	(382)	(340)	(382)	(432)	(286)	(324)	(287)	(400)	(591)	(523)	(202)	(246)	174	548	695
2043	**Jun**	928	996	725	842	875	59	51	(29)	(354)	(373)	(355)	(363)	(204)	(75)	213	288	373	703	1,424	1,255	975	1,020	900	771
2043	**Jul**	637	812	899	871	767	404	333	(51)	(508)	(424)	(468)	(441)	(110)	241	329	353	282	451	1,058	1,206	1,124	1,457	1,228	960
2043	**Aug**	(10)	111	202	458	726	964	621	261	(273)	(535)	(544)	(318)	32	413	694	881	986	855	841	353	(13)	73	63	(47)
2043	**Sep**	186	135	147	237	550	780	420	82	(154)	(519)	(637)	(813)	(643)	(395)	(130)	276	754	1,175	1,152	922	707	687	492	129
2043	**Oct**	(188)	56	295	427	255	246	369	54	(165)	(369)	(439)	(562)	(503)	(492)	(433)	(253)	(64)	337	241	252	240	280	90	85
2043	**Nov**	141	91	60	276	346	432	645	125	(170)	(240)	(530)	(605)	(735)	(841)	(649)	(301)	256	478	599	578	395	556	363	197
2043	**Dec**	574	524	648	416	320	447	902	782	161	(109)	(331)	(453)	(684)	(861)	(676)	(17)	1,198	1,553	1,246	998	665	903	904	711
2044	**Jan**	817	888	963	1,008	1,018	930	1,016	765	217	118	(213)	(424)	(664)	(764)	(825)	(613)	(22)	844	951	1,018	1,144	1,196	1,016	898
2044	**Feb**	569	622	849	876	632	848	938	494	230	(88)	(379)	(673)	(818)	(955)	(910)	(841)	(212)	832	1,128	952	727	718	705	683
2044	**Mar**	409	552	581	610	547	635	469	12	47	(191)	(311)	(374)	(441)	(449)	(639)	(720)	(687)	(575)	(230)	(202)	(161)	168	270	300
2044	**Apr**	67	20	(1)	46	65	47	(81)	(76)	(134)	(274)	(349)	(369)	(538)	(670)	(782)	(795)	(513)	(133)	200	213	174	505	353	283
2044	**May**	560	527	550	596	679	335	100	(122)	(389)	(352)	(426)	(442)	(442)	(435)	(389)	(338)	(424)	(585)	(447)	(105)	(89)	294	690	704
2044	**Jun**	1,066	1,051	838	939	948	138	130	(30)	(299)	(411)	(493)	(471)	(254)	(113)	202	250	332	654	1,486	1,359	1,084	1,119	1,046	885
2044	**Jul**	775	956	1,021	995	887	456	361	64	(511)	(417)	(468)	(389)	33	419	521	538	464	644	1,270	1,487	1,282	1,691	1,381	1,057
2044	**Aug**	48	129	234	599	904	1,153	845	399	(179)	(568)	(654)	(422)	(14)	406	649	907	1,024	981	1,153	516	161	342	297	40
2044	**Sep**	237	193	222	339	683	868	442	92	(166)	(524)	(662)	(831)	(730)	(485)	(255)	276	683	1,133	1,162	925	724	802	554	246
2044	**Oct**	(32)	274	475	615	435	437	451	129	(101)	(273)	(462)	(498)	(644)	(656)	(555)	(414)	(136)	358	284	311	233	349	190	157
2044	**Nov**	301	249	203	360	452	510	737	188	(77)	(274)	(553)	(637)	(785)	(939)	(809)	(307)	435	655	819	782	529	671	505	300
2044	**Dec**	617	606	696	508	428	514	1,032	923	316	(100)	(258)	(460)	(599)	(746)	(589)	119	1,330	1,705	1,394	1,098	695	965	940	751
2045	**Jan**	851	910	1,022	1,069	1,084	991	1,130	838	328	129	(248)	(412)	(765)	(825)	(902)	(711)	(24)	826	939	1,057	1,178	1,248	1,052	866
2045	**Feb**	703	729	1,014	970	718	896	1,019	475	269	(128)	(377)	(744)	(912)	(1,026)	(999)	(860)	(275)	811	1,186	1,010	801	821	850	765
2045	**Mar**	472	642	584	639	584	731	532	106	86	(244)	(342)	(421)	(466)	(557)	(701)	(863)	(780)	(520)	(235)	(192)	(193)	227	340	315
2045	**Apr**	67	47	17	20	72	71	(71)	(57)	(128)	(297)	(376)	(413)	(578)	(648)	(759)	(933)	(599)	(213)	158	232	132	544	356	349
2045	**May**	638	562	586	574	721	353	176	(32)	(325)	(355)	(465)	(484)	(535)	(496)	(495)	(436)	(501)	(648)	(448)	(129)	(77)	325	749	784
2045	**Jun**	1,128	1,087	881	1,007	991	149	139	(12)	(329)	(419)	(470)	(456)	(204)	(37)	279	381	432	766	1,611	1,432	1,198	1,222	1,134	963
2045	**Jul**	794	1,006	1,043	1,025	941	495	400	111	(429)	(395)	(486)	(429)	(24)	365	492	539	502	746	1,426	1,593	1,390	1,765	1,434	1,100
2045	**Aug**	146	255	351	658	977	1,227	897	398	(212)	(559)	(616)	(378)	76	457	738	999	1,149	1,060	1,231	565	213	404	359	41

PSCo Load Net of Renewables

2045	**Sep**	371	312	290	441	789	955	525	115	(142)	(596)	(813)	(953)	(766)	(545)	(285)	256	687	1,220	1,288	964	795	869	700	390
2045	**Oct**	134	335	503	648	554	599	694	274	48	(290)	(531)	(632)	(743)	(667)	(526)	(366)	(146)	420	385	360	298	509	435	396
2045	**Nov**	423	392	449	576	563	728	943	334	(16)	(245)	(546)	(641)	(858)	(962)	(777)	(295)	560	816	980	943	649	777	643	502
2045	**Dec**	901	889	926	761	620	767	1,257	1,127	444	78	(249)	(429)	(686)	(857)	(647)	171	1,422	1,927	1,631	1,370	980	1,282	1,263	1,063
2046	**Jan**	1,057	1,074	1,210	1,306	1,330	1,194	1,286	998	397	193	(212)	(486)	(737)	(955)	(999)	(767)	(43)	1,096	1,191	1,327	1,328	1,474	1,255	1,075
2046	**Feb**	903	965	1,186	1,106	963	1,149	1,243	765	437	(2)	(336)	(673)	(926)	(1,094)	(1,095)	(869)	(178)	1,130	1,533	1,322	1,124	1,201	1,193	1,000
2046	**Mar**	713	867	806	788	815	996	797	239	67	(239)	(362)	(450)	(583)	(693)	(929)	(1,045)	(871)	(415)	2	30	62	571	717	643
2046	**Apr**	168	147	124	152	194	194	33	59	(149)	(355)	(488)	(621)	(675)	(811)	(985)	(885)	(564)	(194)	336	353	252	686	491	355
2046	**May**	772	651	711	713	877	490	227	(66)	(443)	(533)	(642)	(685)	(689)	(540)	(523)	(389)	(479)	(602)	(339)	21	37	428	854	883
2046	**Jun**	1,296	1,260	1,098	1,219	1,197	385	299	77	(234)	(313)	(412)	(343)	(93)	207	526	638	824	1,058	1,876	1,875	1,621	1,653	1,558	1,275
2046	**Jul**	946	1,152	1,228	1,179	1,121	620	523	100	(487)	(493)	(638)	(668)	(147)	368	594	761	791	997	1,561	1,811	1,593	1,995	1,627	1,280
2046	**Aug**	369	505	641	977	1,278	1,445	1,041	494	(182)	(534)	(614)	(418)	22	390	760	1,104	1,255	1,221	1,585	1,019	630	839	738	425
2046	**Sep**	473	434	419	552	839	1,025	521	97	(275)	(715)	(908)	(1,063)	(836)	(621)	(267)	283	769	1,388	1,456	1,116	918	979	819	458
2046	**Oct**	205	382	574	714	579	673	725	342	89	(295)	(505)	(550)	(767)	(804)	(586)	(489)	(196)	470	431	472	347	594	528	497
2046	**Nov**	520	512	569	677	674	782	967	390	16	(289)	(607)	(787)	(934)	(990)	(765)	(336)	591	890	916	952	703	813	725	581
2046	**Dec**	1,021	977	1,035	849	716	813	1,334	1,219	478	35	(240)	(501)	(757)	(888)	(678)	186	1,505	1,987	1,762	1,470	1,080	1,435	1,367	1,209
2047	**Jan**	1,103	1,226	1,317	1,361	1,375	1,257	1,315	939	324	70	(361)	(515)	(804)	(921)	(1,035)	(809)	(45)	1,109	1,225	1,381	1,431	1,547	1,280	1,053
2047	**Feb**	1,007	1,053	1,267	1,218	993	1,217	1,308	742	418	(6)	(337)	(699)	(964)	(1,114)	(1,079)	(906)	(192)	1,197	1,613	1,368	1,142	1,245	1,243	1,102
2047	**Mar**	786	924	875	905	876	1,047	869	324	223	(128)	(203)	(447)	(544)	(693)	(1,006)	(1,036)	(861)	(426)	20	53	93	661	842	718
2047	**Apr**	184	187	172	174	228	173	79	78	(132)	(347)	(431)	(590)	(812)	(939)	(1,042)	(901)	(555)	(145)	364	376	342	693	507	353
2047	**May**	784	697	806	871	1,026	574	320	(5)	(418)	(410)	(562)	(585)	(557)	(477)	(532)	(457)	(458)	(592)	(260)	77	64	440	843	876
2047	**Jun**	1,421	1,435	1,321	1,448	1,398	551	441	179	(128)	(372)	(528)	(500)	(206)	19	371	506	660	1,064	1,906	1,924	1,660	1,701	1,594	1,340
2047	**Jul**	997	1,215	1,269	1,259	1,215	720	616	214	(436)	(470)	(590)	(549)	(133)	392	607	706	756	998	1,546	1,680	1,483	1,971	1,657	1,310
2047	**Aug**	457	607	718	1,057	1,367	1,508	1,057	554	(48)	(432)	(468)	(280)	71	439	874	1,194	1,380	1,312	1,651	1,100	712	944	787	501
2047	**Sep**	487	447	458	561	886	1,107	543	162	(247)	(621)	(824)	(1,004)	(826)	(467)	(91)	460	913	1,481	1,556	1,144	929	991	808	451
2047	**Oct**	271	418	536	658	551	665	792	300	119	(277)	(541)	(561)	(769)	(824)	(690)	(514)	(184)	454	354	459	416	723	677	579
2047	**Nov**	544	565	596	722	713	840	1,072	485	(0)	(264)	(558)	(756)	(912)	(976)	(800)	(273)	583	845	1,002	968	657	917	800	630
2047	**Dec**	1,090	1,009	1,100	961	812	904	1,394	1,210	511	(10)	(285)	(578)	(805)	(1,055)	(817)	16	1,488	2,022	1,791	1,548	1,092	1,507	1,473	1,204
2048	**Jan**	1,178	1,303	1,374	1,442	1,453	1,339	1,429	1,107	403	124	(220)	(448)	(806)	(1,076)	(1,148)	(924)	(32)	1,215	1,337	1,485	1,516	1,681	1,448	1,197
2048	**Feb**	1,064	1,019	1,240	1,187	1,023	1,157	1,305	750	366	(121)	(408)	(786)	(1,083)	(1,222)	(1,185)	(863)	(56)	1,307	1,684	1,458	1,194	1,335	1,366	1,145
2048	**Mar**	863	978	923	930	934	1,135	911	282	70	(224)	(388)	(543)	(698)	(846)	(1,098)	(1,207)	(944)	(428)	88	72	133	723	847	747
2048	**Apr**	241	258	196	218	271	239	68	49	(81)	(293)	(472)	(629)	(862)	(1,040)	(1,130)	(976)	(621)	(115)	321	405	377	694	520	426
2048	**May**	840	760	883	977	1,080	634	297	(50)	(377)	(409)	(493)	(524)	(474)	(405)	(536)	(508)	(497)	(686)	(332)	56	49	440	884	949
2048	**Jun**	1,420	1,381	1,257	1,362	1,299	551	501	292	1	(205)	(266)	(236)	62	290	550	642	739	1,032	1,860	1,866	1,635	1,761	1,668	1,380
2048	**Jul**	1,098	1,305	1,346	1,365	1,316	947	974	570	(156)	(167)	(387)	(435)	67	535	736	886	839	1,014	1,545	1,817	1,640	2,152	1,833	1,430
2048	**Aug**	468	642	710	1,075	1,427	1,629	1,280	822	210	(150)	(234)	(157)	274	684	1,051	1,292	1,438	1,342	1,659	1,098	684	993	896	514
2048	**Sep**	566	501	504	633	920	1,121	671	280	(81)	(586)	(778)	(814)	(594)	(325)	108	612	1,077	1,607	1,601	1,219	928	1,061	838	531
2048	**Oct**	263	401	563	732	616	730	934	525	150	(239)	(491)	(633)	(784)	(655)	(550)	(403)	(127)	343	321	437	391	736	733	607
2048	**Nov**	590	631	678	775	758	914	1,122	658	182	(113)	(452)	(718)	(894)	(951)	(760)	(209)	683	838	955	935	707	971	853	657
2048	**Dec**	1,146	1,117	1,117	946	754	940	1,418	1,303	581	55	(248)	(615)	(954)	(1,127)	(847)	72	1,424	1,951	1,725	1,539	1,168	1,578	1,583	1,337
2049	**Jan**	1,274	1,337	1,473	1,527	1,468	1,392	1,478	1,231	627	409	(14)	(281)	(660)	(879)	(1,003)	(755)	150	1,249	1,403	1,563	1,591	1,804	1,550	1,296
2049	**Feb**	1,213	1,230	1,446	1,380	1,111	1,324	1,357	1,029	793	293	(92)	(537)	(868)	(1,076)	(1,057)	(736)	(22)	1,264	1,660	1,462	1,245	1,448	1,501	1,313
2049	**Mar**	936	1,075	1,014	1,017	986	1,171	1,095	539	348	(58)	(214)	(358)	(535)	(777)	(973)	(1,032)	(733)	(345)	104	173	210	799	945	793
2049	**Apr**	313	260	212	197	293	235	186	188	(29)	(369)	(514)	(763)	(865)	(1,069)	(1,029)	(827)	(438)	(32)	435	486	413	831	653	466
2049	**May**	911	820	976	1,046	1,195	786	517	146	(242)	(383)	(522)	(548)	(451)	(391)	(466)	(438)	(490)	(688)	(356)	25	34	476	921	978
2049	**Jun**	1,477	1,472	1,298	1,375	1,326	648	585	354	61	(111)	(214)	(182)	109	295	565	644	778	1,052	1,913	1,951	1,713	1,847	1,791	1,475
2049	**Jul**	1,215	1,349	1,443	1,464	1,391	993	978	590	(171)	(189)	(409)	(418)	14	540	662	777	825	990	1,603	1,893	1,716	2,215	1,876	1,463
2049	**Aug**	553	703	797	1,143	1,513	1,743	1,392	919	216	(208)	(321)	(220)	201	671	1,029	1,286	1,447	1,391	1,719	1,157	739	1,079	984	597
2049	**Sep**	671	629	635	763	1,000	1,231	846	387	45	(437)	(682)	(812)	(607)	(310)	88	624	1,101	1,640	1,644	1,265	979	1,146	972	635
2049	**Oct**	415	581	755	877	828	843	964	520	202	(185)	(514)	(667)	(770)	(649)	(582)	(440)	(139)	345	286	426	382	775	774	733
2049	**Nov**	637	714	740	832	808	950	1,144	650	201	(84)	(467)	(716)	(893)	(980)	(773)	(162)	707	930	971	1,007	755	1,056	919	718
2049	**Dec**	1,218	1,171	1,165	1,014	844	994	1,499	1,409	665	115	(204)	(569)	(873)	(1,013)	(739)	163	1,461	2,012	1,826	1,608	1,235	1,703	1,687	1,421
2050	**Jan**	1,380	1,444	1,562	1,597	1,572	1,499	1,615	1,332	660	350	(79)	(351)	(687)	(941)	(1,052)	(865)	127	1,300	1,460	1,668	1,734	1,933	1,677	1,418

PSCo Load Net of Renewables

2050	**Feb**	1,330	1,327	1,506	1,480	1,242	1,413	1,489	1,086	758	275	(89)	(578)	(982)	(1,164)	(1,187)	(887)	(94)	1,378	1,783	1,625	1,369	1,591	1,642	1,461
2050	**Mar**	1,068	1,172	1,137	1,153	1,134	1,340	1,220	616	359	(73)	(174)	(359)	(591)	(780)	(1,061)	(1,126)	(831)	(304)	173	235	267	948	1,109	918
2050	**Apr**	325	336	263	237	358	380	245	252	(7)	(384)	(513)	(714)	(860)	(1,078)	(1,120)	(895)	(547)	(90)	492	552	493	857	738	511
2050	**May**	957	799	928	1,020	1,125	767	480	109	(281)	(424)	(560)	(561)	(581)	(442)	(501)	(503)	(523)	(669)	(263)	187	122	616	1,011	1,051
2050	**Jun**	1,608	1,610	1,428	1,517	1,451	684	576	308	(85)	(288)	(327)	(320)	(34)	118	433	529	715	1,031	1,959	2,071	1,825	2,017	1,974	1,580
2050	**Jul**	1,328	1,511	1,577	1,551	1,517	1,089	1,009	543	(143)	(258)	(432)	(466)	(20)	502	728	857	943	1,144	1,740	1,996	1,777	2,335	2,005	1,603
2050	**Aug**	697	857	963	1,319	1,650	1,819	1,397	820	128	(379)	(533)	(471)	(41)	450	926	1,194	1,415	1,404	1,799	1,255	833	1,223	1,152	750
2050	**Sep**	800	722	719	860	1,117	1,330	873	321	(111)	(638)	(946)	(1,027)	(819)	(499)	(87)	451	1,006	1,631	1,635	1,308	1,016	1,235	1,136	793
2050	**Oct**	500	624	839	965	877	928	1,019	569	189	(217)	(532)	(699)	(904)	(924)	(727)	(522)	(184)	393	363	521	449	870	915	840
2050	**Nov**	846	819	830	911	933	1,065	1,265	779	195	(141)	(559)	(819)	(977)	(1,049)	(883)	(257)	698	912	969	1,013	744	1,109	1,053	830
2050	**Dec**	1,413	1,317	1,328	1,189	985	1,136	1,714	1,584	782	148	(183)	(532)	(871)	(1,011)	(761)	170	1,564	2,120	1,948	1,724	1,341	1,822	1,862	1,593

PSCo Total Load

PSCo Average Demand [MWh/h]
Total Demand / Number of Hours

Year	Month	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8	HE9	HE10	HE11	HE12	HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21	HE22	HE23	HE24
2024	Jan	3,552	3,528	3,521	3,526	3,557	3,676	3,983	4,158	4,155	4,137	4,083	4,015	3,952	3,919	3,909	3,940	4,108	4,623	4,720	4,544	4,339	4,057	3,767	3,614
2024	Feb	3,462	3,441	3,435	3,440	3,470	3,596	3,931	4,099	4,096	4,079	4,036	3,972	3,912	3,883	3,867	3,881	3,990	4,312	4,634	4,536	4,331	4,029	3,714	3,538
2024	Mar	3,447	3,395	3,373	3,380	3,437	3,596	3,906	4,058	4,055	4,069	4,036	3,981	3,935	3,918	3,907	3,912	3,961	4,069	4,196	4,340	4,305	4,074	3,774	3,552
2024	Apr	3,119	3,013	2,959	2,960	3,060	3,292	3,553	3,690	3,688	3,755	3,756	3,745	3,737	3,735	3,731	3,737	3,773	3,814	3,821	3,868	3,919	3,814	3,571	3,298
2024	May	3,038	2,948	2,905	2,895	2,938	3,067	3,270	3,469	3,466	3,663	3,733	3,788	3,838	3,903	3,960	4,007	4,065	4,101	4,052	3,987	4,059	3,905	3,528	3,228
2024	Jun	3,444	3,310	3,226	3,182	3,189	3,242	3,368	3,548	3,545	3,916	4,114	4,303	4,482	4,659	4,812	4,941	5,019	5,009	4,878	4,689	4,540	4,401	4,023	3,681
2024	Jul	3,630	3,527	3,468	3,441	3,448	3,495	3,587	3,732	3,729	4,126	4,369	4,640	4,913	5,189	5,426	5,586	5,665	5,619	5,380	5,075	4,865	4,633	4,205	3,865
2024	Aug	3,644	3,549	3,489	3,466	3,477	3,555	3,682	3,804	3,801	4,127	4,322	4,540	4,774	5,028	5,258	5,427	5,534	5,514	5,281	5,019	4,881	4,563	4,144	3,835
2024	Sep	3,366	3,252	3,185	3,161	3,191	3,326	3,570	3,682	3,679	3,887	3,991	4,091	4,206	4,343	4,479	4,597	4,693	4,717	4,627	4,599	4,437	4,167	3,825	3,544
2024	Oct	3,128	3,095	3,080	3,080	3,108	3,217	3,512	3,703	3,700	3,739	3,731	3,711	3,697	3,710	3,725	3,754	3,831	3,941	4,162	4,152	3,944	3,683	3,392	3,209
2024	Nov	3,275	3,240	3,229	3,236	3,277	3,400	3,640	3,754	3,751	3,753	3,725	3,688	3,657	3,649	3,668	3,718	3,925	4,299	4,272	4,131	3,967	3,761	3,532	3,368
2024	Dec	3,675	3,627	3,610	3,615	3,662	3,797	4,070	4,231	4,227	4,228	4,182	4,113	4,045	4,022	4,025	4,085	4,355	4,832	4,803	4,672	4,520	4,289	4,000	3,793
2025	Jan	3,616	3,591	3,584	3,589	3,618	3,735	4,045	4,231	4,227	4,210	4,148	4,072	4,001	3,962	3,949	3,982	4,169	4,727	4,790	4,610	4,406	4,121	3,830	3,673
2025	Feb	3,642	3,622	3,618	3,622	3,648	3,760	4,060	4,215	4,211	4,195	4,152	4,089	4,031	4,003	3,988	4,005	4,119	4,467	4,760	4,621	4,417	4,147	3,870	3,711
2025	Mar	3,533	3,479	3,456	3,466	3,529	3,699	4,023	4,170	4,166	4,163	4,126	4,067	4,016	3,996	3,984	3,987	4,041	4,170	4,335	4,455	4,386	4,159	3,867	3,643
2025	Apr	3,207	3,097	3,041	3,044	3,156	3,408	3,694	3,824	3,820	3,862	3,854	3,834	3,821	3,817	3,812	3,818	3,854	3,897	3,912	3,972	4,012	3,915	3,677	3,389
2025	May	3,169	3,131	3,117	3,116	3,134	3,214	3,394	3,582	3,579	3,745	3,798	3,833	3,865	3,918	3,961	3,998	4,058	4,105	4,055	4,007	4,121	3,924	3,540	3,290
2025	Jun	3,572	3,436	3,349	3,305	3,315	3,376	3,512	3,698	3,694	4,043	4,223	4,388	4,543	4,698	4,834	4,951	5,028	5,028	4,921	4,759	4,642	4,517	4,143	3,796
2025	Jul	3,680	3,552	3,474	3,434	3,443	3,498	3,610	3,785	3,781	4,220	4,474	4,747	5,017	5,285	5,513	5,671	5,748	5,705	5,481	5,184	4,964	4,757	4,326	3,956
2025	Aug	3,705	3,550	3,440	3,392	3,408	3,529	3,691	3,860	3,857	4,271	4,482	4,701	4,921	5,142	5,330	5,461	5,541	5,524	5,338	5,109	4,995	4,733	4,326	3,963
2025	Sep	3,395	3,259	3,176	3,141	3,172	3,321	3,572	3,697	3,693	3,945	4,073	4,194	4,330	4,487	4,637	4,761	4,856	4,872	4,750	4,689	4,538	4,275	3,922	3,612
2025	Oct	3,105	3,033	2,995	2,995	3,054	3,234	3,590	3,774	3,770	3,827	3,828	3,820	3,818	3,841	3,866	3,902	3,980	4,065	4,225	4,234	4,047	3,801	3,483	3,234
2025	Nov	3,313	3,266	3,250	3,255	3,306	3,449	3,710	3,842	3,838	3,849	3,819	3,778	3,748	3,739	3,755	3,800	3,974	4,297	4,332	4,215	4,056	3,856	3,617	3,430
2025	Dec	3,748	3,701	3,684	3,691	3,742	3,888	4,177	4,333	4,328	4,305	4,254	4,184	4,119	4,102	4,110	4,175	4,453	4,913	4,886	4,758	4,599	4,369	4,084	3,869
2026	Jan	3,566	3,534	3,524	3,531	3,568	3,691	3,984	4,153	4,148	4,139	4,082	4,008	3,938	3,898	3,882	3,914	4,092	4,596	4,659	4,497	4,309	4,064	3,799	3,640
2026	Feb	3,592	3,572	3,568	3,573	3,599	3,707	4,000	4,151	4,145	4,125	4,079	4,013	3,954	3,925	3,909	3,924	4,035	4,368	4,658	4,526	4,330	4,077	3,816	3,660
2026	Mar	3,539	3,480	3,455	3,466	3,535	3,716	4,042	4,186	4,181	4,171	4,133	4,073	4,024	4,008	3,998	4,002	4,054	4,175	4,325	4,442	4,380	4,170	3,887	3,657
2026	Apr	3,248	3,147	3,095	3,097	3,198	3,435	3,715	3,849	3,844	3,882	3,870	3,847	3,833	3,828	3,822	3,828	3,866	3,912	3,928	3,994	4,042	3,935	3,693	3,413
2026	May	3,173	3,131	3,115	3,113	3,131	3,210	3,383	3,568	3,563	3,730	3,783	3,818	3,851	3,904	3,946	3,984	4,046	4,096	4,050	4,000	4,110	3,929	3,553	3,299
2026	Jun	3,548	3,406	3,312	3,265	3,277	3,345	3,496	3,690	3,686	4,041	4,224	4,389	4,546	4,702	4,837	4,951	5,023	5,017	4,906	4,745	4,620	4,502	4,140	3,788
2026	Jul	3,641	3,503	3,417	3,372	3,381	3,442	3,561	3,743	3,738	4,167	4,405	4,654	4,900	5,144	5,349	5,488	5,558	5,521	5,321	5,052	4,852	4,671	4,276	3,914
2026	Aug	3,644	3,490	3,381	3,334	3,348	3,470	3,631	3,797	3,793	4,193	4,398	4,609	4,822	5,036	5,217	5,343	5,421	5,407	5,230	5,012	4,900	4,651	4,259	3,902
2026	Sep	3,378	3,235	3,147	3,109	3,142	3,299	3,563	3,687	3,683	3,927	4,049	4,164	4,293	4,444	4,586	4,705	4,797	4,815	4,704	4,650	4,502	4,256	3,913	3,598
2026	Oct	3,097	3,026	2,988	2,988	3,043	3,218	3,570	3,758	3,753	3,813	3,811	3,797	3,790	3,807	3,827	3,860	3,939	4,030	4,202	4,213	4,023	3,784	3,474	3,226
2026	Nov	3,345	3,294	3,276	3,284	3,343	3,499	3,768	3,893	3,888	3,884	3,852	3,809	3,781	3,776	3,795	3,840	4,011	4,317	4,341	4,231	4,080	3,897	3,666	3,472
2026	Dec	3,713	3,658	3,637	3,645	3,703	3,860	4,146	4,298	4,292	4,267	4,215	4,141	4,074	4,054	4,060	4,123	4,387	4,811	4,788	4,676	4,534	4,333	4,065	3,843
2027	Jan	3,660	3,628	3,619	3,626	3,661	3,781	4,071	4,239	4,232	4,217	4,156	4,078	4,007	3,965	3,948	3,979	4,156	4,669	4,743	4,583	4,389	4,147	3,888	3,729
2027	Feb	3,696	3,675	3,671	3,677	3,703	3,812	4,108	4,261	4,253	4,228	4,178	4,106	4,044	4,013	3,995	4,010	4,121	4,455	4,752	4,625	4,429	4,182	3,924	3,764
2027	Mar	3,630	3,571	3,546	3,558	3,628	3,815	4,155	4,304	4,298	4,281	4,240	4,176	4,125	4,109	4,100	4,105	4,157	4,275	4,421	4,546	4,485	4,278	3,993	3,755
2027	Apr	3,356	3,249	3,194	3,196	3,301	3,543	3,826	3,962	3,956	3,989	3,975	3,949	3,933	3,926	3,917	3,921	3,960	4,005	4,022	4,088	4,137	4,043	3,808	3,523
2027	May	3,273	3,232	3,217	3,214	3,227	3,296	3,454	3,624	3,619	3,773	3,826	3,862	3,899	3,954	4,001	4,042	4,103	4,152	4,108	4,059	4,159	3,997	3,637	3,391
2027	Jun	3,633	3,479	3,377	3,325	3,336	3,411	3,579	3,789	3,784	4,147	4,331	4,495	4,650	4,808	4,942	5,054	5,125	5,118	5,010	4,851	4,720	4,611	4,253	3,888
2027	Jul	3,718	3,576	3,485	3,438	3,444	3,504	3,621	3,804	3,799	4,236	4,478	4,730	4,979	5,225	5,432	5,572	5,641	5,604	5,403	5,132	4,930	4,756	4,365	3,998
2027	Aug	3,705	3,552	3,443	3,395	3,410	3,534	3,703	3,868	3,863	4,257	4,462	4,674	4,890	5,110	5,296	5,425	5,504	5,488	5,306	5,088	4,971	4,722	4,329	3,967
2027	Sep	3,461	3,311	3,220	3,180	3,214	3,379	3,656	3,782	3,776	4,011	4,129	4,238	4,363	4,511	4,652	4,770	4,863	4,883	4,781	4,733	4,583	4,345	4,005	3,681
2027	Oct	3,269	3,230	3,212	3,211	3,236	3,341	3,622	3,799	3,793	3,839	3,832	3,812	3,800	3,812	3,828	3,858	3,938	4,037	4,233	4,244	4,039	3,808	3,538	3,349
2027	Nov	3,419	3,368	3,352	3,361	3,420	3,579	3,858	3,985	3,978	3,961	3,923	3,875	3,844	3,837	3,857	3,904	4,084	4,407	4,423	4,308	4,149	3,969	3,742	3,547
2027	Dec	3,828	3,767	3,743	3,752	3,813	3,974	4,264	4,417	4,409	4,385	4,331	4,252	4,180	4,157	4,159	4,222	4,488	4,908	4,884	4,773	4,632	4,450	4,193	3,969

PSCo Total Load

2028	**Jan**	3,812	3,775	3,765	3,774	3,814	3,943	4,244	4,412	4,403	4,375	4,309	4,226	4,152	4,110	4,093	4,123	4,296	4,802	4,892	4,739	4,548	4,314	4,053	3,883
2028	**Feb**	3,768	3,746	3,742	3,748	3,777	3,896	4,216	4,376	4,367	4,328	4,272	4,193	4,125	4,091	4,072	4,086	4,198	4,531	4,846	4,736	4,533	4,281	4,011	3,840
2028	**Mar**	3,709	3,653	3,629	3,639	3,700	3,876	4,213	4,366	4,359	4,332	4,285	4,216	4,164	4,148	4,140	4,144	4,194	4,307	4,446	4,586	4,534	4,331	4,052	3,819
2028	**Apr**	3,432	3,329	3,277	3,276	3,364	3,577	3,837	3,979	3,971	4,021	4,008	3,979	3,959	3,949	3,939	3,943	3,987	4,040	4,061	4,132	4,192	4,099	3,866	3,589
2028	**May**	3,271	3,179	3,134	3,125	3,167	3,302	3,527	3,740	3,734	3,915	3,977	4,019	4,062	4,124	4,178	4,223	4,285	4,330	4,285	4,229	4,313	4,171	3,790	3,470
2028	**Jun**	3,700	3,549	3,449	3,397	3,405	3,472	3,630	3,833	3,827	4,186	4,372	4,540	4,702	4,867	5,006	5,121	5,192	5,181	5,066	4,900	4,760	4,664	4,315	3,953
2028	**Jul**	3,845	3,692	3,592	3,539	3,543	3,606	3,727	3,918	3,912	4,361	4,606	4,859	5,110	5,357	5,564	5,703	5,776	5,744	5,548	5,281	5,081	4,911	4,518	4,137
2028	**Aug**	3,817	3,657	3,543	3,493	3,509	3,646	3,836	4,008	4,002	4,391	4,595	4,802	5,016	5,236	5,423	5,553	5,632	5,615	5,436	5,225	5,104	4,861	4,466	4,093
2028	**Sep**	3,575	3,431	3,342	3,305	3,335	3,491	3,760	3,881	3,875	4,088	4,193	4,288	4,404	4,543	4,678	4,791	4,884	4,905	4,814	4,783	4,629	4,409	4,088	3,775
2028	**Oct**	3,361	3,323	3,304	3,302	3,326	3,433	3,726	3,911	3,904	3,933	3,920	3,892	3,876	3,888	3,902	3,931	4,012	4,121	4,340	4,346	4,133	3,907	3,638	3,445
2028	**Nov**	3,560	3,510	3,494	3,503	3,557	3,708	3,979	4,100	4,091	4,065	4,023	3,970	3,933	3,923	3,942	3,991	4,185	4,527	4,527	4,410	4,250	4,085	3,870	3,678
2028	**Dec**	3,933	3,875	3,853	3,860	3,911	4,053	4,325	4,478	4,469	4,448	4,390	4,304	4,227	4,197	4,196	4,256	4,525	4,975	4,958	4,846	4,701	4,528	4,279	4,060
2029	**Jan**	3,906	3,875	3,868	3,876	3,911	4,038	4,356	4,532	4,521	4,468	4,395	4,304	4,227	4,187	4,172	4,202	4,373	4,894	5,001	4,838	4,629	4,394	4,135	3,970
2029	**Feb**	3,922	3,897	3,893	3,900	3,928	4,048	4,370	4,530	4,519	4,468	4,405	4,318	4,245	4,208	4,186	4,198	4,307	4,629	4,952	4,863	4,662	4,428	4,169	3,994
2029	**Mar**	3,845	3,781	3,752	3,762	3,828	4,010	4,347	4,498	4,490	4,463	4,413	4,339	4,284	4,265	4,253	4,256	4,307	4,417	4,553	4,698	4,653	4,475	4,207	3,963
2029	**Apr**	3,550	3,442	3,387	3,388	3,480	3,704	3,974	4,119	4,110	4,152	4,137	4,103	4,082	4,073	4,063	4,067	4,111	4,164	4,186	4,255	4,312	4,237	4,009	3,722
2029	**May**	3,386	3,290	3,240	3,228	3,268	3,401	3,620	3,829	3,822	3,993	4,052	4,092	4,135	4,199	4,254	4,301	4,362	4,404	4,362	4,308	4,384	4,267	3,905	3,584
2029	**Jun**	3,820	3,659	3,550	3,492	3,497	3,560	3,717	3,926	3,919	4,294	4,487	4,660	4,828	4,997	5,141	5,258	5,330	5,319	5,203	5,034	4,887	4,806	4,462	4,088
2029	**Jul**	3,941	3,787	3,685	3,633	3,636	3,701	3,828	4,021	4,014	4,454	4,699	4,953	5,208	5,461	5,672	5,814	5,887	5,854	5,654	5,385	5,181	5,018	4,624	4,235
2029	**Aug**	3,926	3,760	3,640	3,588	3,604	3,745	3,944	4,119	4,112	4,495	4,693	4,893	5,100	5,315	5,499	5,626	5,706	5,692	5,520	5,318	5,197	4,971	4,586	4,206
2029	**Sep**	3,695	3,549	3,458	3,419	3,445	3,595	3,863	3,982	3,974	4,181	4,285	4,377	4,491	4,630	4,765	4,880	4,975	5,001	4,919	4,898	4,739	4,531	4,215	3,895
2029	**Oct**	3,458	3,420	3,400	3,398	3,419	3,524	3,827	4,020	4,012	4,026	4,007	3,972	3,953	3,965	3,979	4,007	4,089	4,202	4,433	4,437	4,215	4,000	3,737	3,541
2029	**Nov**	3,695	3,650	3,635	3,643	3,688	3,824	4,085	4,204	4,193	4,156	4,108	4,048	4,006	3,993	4,009	4,057	4,261	4,625	4,618	4,496	4,330	4,181	3,984	3,800
2029	**Dec**	4,067	4,009	3,987	3,995	4,043	4,184	4,462	4,618	4,607	4,575	4,510	4,417	4,336	4,305	4,303	4,362	4,636	5,104	5,091	4,979	4,828	4,664	4,417	4,193
2030	**Jan**	4,045	4,015	4,009	4,016	4,043	4,158	4,471	4,654	4,642	4,577	4,495	4,394	4,311	4,266	4,252	4,286	4,480	5,051	5,119	4,952	4,744	4,517	4,262	4,097
2030	**Feb**	4,081	4,055	4,051	4,058	4,083	4,197	4,513	4,671	4,657	4,595	4,526	4,431	4,353	4,314	4,292	4,307	4,430	4,803	5,115	4,987	4,771	4,561	4,321	4,149
2030	**Mar**	4,004	3,935	3,904	3,915	3,983	4,167	4,507	4,653	4,643	4,600	4,544	4,462	4,398	4,370	4,353	4,353	4,411	4,548	4,728	4,853	4,778	4,619	4,366	4,120
2030	**Apr**	3,681	3,575	3,521	3,524	3,623	3,860	4,161	4,304	4,292	4,300	4,272	4,226	4,198	4,188	4,178	4,182	4,226	4,282	4,313	4,404	4,448	4,383	4,160	3,862
2030	**May**	3,534	3,487	3,465	3,460	3,471	3,557	3,760	3,966	3,957	4,095	4,137	4,158	4,186	4,243	4,287	4,325	4,390	4,443	4,397	4,362	4,479	4,320	3,943	3,664
2030	**Jun**	3,998	3,889	3,823	3,791	3,787	3,816	3,913	4,060	4,052	4,341	4,516	4,681	4,855	5,039	5,208	5,356	5,460	5,467	5,340	5,152	5,012	4,927	4,540	4,184
2030	**Jul**	4,036	3,885	3,786	3,734	3,734	3,788	3,916	4,109	4,100	4,539	4,795	5,059	5,326	5,592	5,817	5,970	6,046	6,005	5,795	5,515	5,285	5,144	4,747	4,347
2030	**Aug**	4,072	3,895	3,765	3,706	3,715	3,847	4,029	4,214	4,205	4,602	4,805	5,009	5,220	5,435	5,616	5,737	5,813	5,798	5,629	5,418	5,299	5,111	4,739	4,348
2030	**Sep**	3,774	3,613	3,508	3,461	3,481	3,632	3,897	4,029	4,020	4,270	4,400	4,516	4,654	4,815	4,966	5,087	5,182	5,199	5,088	5,038	4,882	4,688	4,364	4,017
2030	**Oct**	3,500	3,420	3,373	3,369	3,419	3,593	3,949	4,127	4,116	4,135	4,123	4,098	4,091	4,116	4,143	4,181	4,262	4,349	4,512	4,540	4,346	4,169	3,894	3,631
2030	**Nov**	3,795	3,739	3,717	3,724	3,772	3,920	4,205	4,347	4,334	4,301	4,247	4,176	4,129	4,112	4,122	4,162	4,336	4,662	4,720	4,621	4,451	4,321	4,121	3,915
2030	**Dec**	4,215	4,156	4,134	4,143	4,194	4,344	4,639	4,790	4,776	4,708	4,635	4,538	4,458	4,433	4,438	4,502	4,786	5,248	5,239	5,133	4,970	4,817	4,575	4,340
2031	**Jan**	4,172	4,138	4,128	4,137	4,164	4,282	4,600	4,786	4,771	4,710	4,623	4,512	4,419	4,368	4,348	4,381	4,583	5,157	5,235	5,071	4,856	4,655	4,412	4,238
2031	**Feb**	4,242	4,214	4,207	4,215	4,238	4,351	4,670	4,828	4,811	4,734	4,657	4,554	4,472	4,431	4,409	4,423	4,545	4,915	5,240	5,120	4,902	4,716	4,488	4,310
2031	**Mar**	4,154	4,082	4,049	4,059	4,126	4,313	4,659	4,807	4,795	4,743	4,683	4,594	4,528	4,501	4,484	4,485	4,544	4,681	4,863	5,000	4,926	4,785	4,536	4,279
2031	**Apr**	3,843	3,731	3,672	3,673	3,772	4,014	4,318	4,461	4,447	4,440	4,407	4,354	4,324	4,313	4,304	4,307	4,352	4,408	4,442	4,537	4,580	4,542	4,329	4,020
2031	**May**	3,671	3,622	3,597	3,590	3,596	3,672	3,864	4,062	4,052	4,183	4,223	4,240	4,267	4,322	4,366	4,403	4,468	4,521	4,481	4,447	4,558	4,435	4,081	3,801
2031	**Jun**	4,148	3,974	3,852	3,788	3,788	3,853	4,020	4,238	4,228	4,578	4,756	4,906	5,057	5,211	5,344	5,454	5,531	5,534	5,443	5,304	5,177	5,145	4,812	4,412
2031	**Jul**	4,191	4,031	3,923	3,866	3,863	3,919	4,051	4,249	4,239	4,669	4,916	5,169	5,427	5,686	5,904	6,051	6,126	6,089	5,889	5,621	5,396	5,284	4,906	4,499
2031	**Aug**	4,204	4,022	3,887	3,825	3,828	3,953	4,131	4,314	4,304	4,701	4,907	5,111	5,327	5,547	5,732	5,857	5,936	5,923	5,754	5,546	5,422	5,250	4,887	4,486
2031	**Sep**	3,912	3,746	3,638	3,590	3,611	3,770	4,052	4,186	4,175	4,401	4,521	4,626	4,757	4,916	5,065	5,185	5,281	5,300	5,196	5,156	4,994	4,823	4,509	4,155
2031	**Oct**	3,609	3,527	3,479	3,474	3,521	3,695	4,067	4,257	4,245	4,254	4,236	4,202	4,189	4,210	4,234	4,269	4,353	4,447	4,631	4,662	4,454	4,288	4,014	3,742
2031	**Nov**	3,945	3,887	3,863	3,868	3,913	4,054	4,331	4,466	4,451	4,403	4,345	4,267	4,218	4,200	4,212	4,255	4,440	4,783	4,839	4,743	4,570	4,461	4,274	4,064
2031	**Dec**	4,401	4,336	4,311	4,321	4,375	4,534	4,845	5,003	4,987	4,903	4,822	4,713	4,626	4,598	4,601	4,665	4,953	5,417	5,411	5,311	5,147	5,018	4,783	4,535
2032	**Jan**	4,401	4,356	4,342	4,351	4,386	4,516	4,841	5,023	5,005	4,934	4,842	4,723	4,625	4,570	4,547	4,578	4,776	5,332	5,421	5,274	5,063	4,897	4,667	4,478
2032	**Feb**	4,400	4,369	4,360	4,367	4,388	4,498	4,816	4,974	4,955	4,871	4,789	4,678	4,592	4,548	4,523	4,536	4,660	5,029	5,370	5,262	5,045	4,877	4,655	4,469
2032	**Mar**	4,269	4,210	4,181	4,188	4,238	4,404	4,767	4,931	4,916	4,844	4,776	4,676	4,605	4,582	4,569	4,571	4,630	4,769	4,955	5,126	5,046	4,893	4,633	4,382
2032	**Apr**	3,971	3,868	3,813	3,812	3,892	4,106	4,401	4,553	4,537	4,520	4,481	4,421	4,387	4,374	4,360	4,361	4,409	4,469	4,506	4,613	4,673	4,635	4,421	4,123

PSCo Total Load

2032	**May**	3,890	3,838	3,809	3,799	3,799	3,858	4,023	4,197	4,185	4,297	4,337	4,352	4,382	4,438	4,487	4,527	4,591	4,645	4,614	4,583	4,678	4,604	4,286	4,014
2032	**Jun**	4,253	4,079	3,955	3,891	3,887	3,954	4,133	4,354	4,342	4,680	4,859	5,012	5,168	5,333	5,473	5,588	5,663	5,659	5,560	5,413	5,265	5,251	4,931	4,527
2032	**Jul**	4,411	4,232	4,108	4,041	4,034	4,094	4,232	4,445	4,433	4,878	5,123	5,368	5,618	5,869	6,077	6,215	6,286	6,252	6,065	5,810	5,593	5,512	5,153	4,734
2032	**Aug**	4,381	4,192	4,049	3,984	3,986	4,120	4,316	4,503	4,491	4,887	5,095	5,301	5,520	5,746	5,935	6,063	6,144	6,131	5,963	5,762	5,631	5,470	5,102	4,684
2032	**Sep**	4,073	3,907	3,796	3,748	3,766	3,924	4,213	4,341	4,329	4,524	4,632	4,724	4,848	5,003	5,151	5,272	5,371	5,395	5,302	5,274	5,104	4,958	4,661	4,306
2032	**Oct**	3,874	3,828	3,800	3,792	3,801	3,893	4,188	4,375	4,361	4,357	4,330	4,284	4,260	4,271	4,286	4,316	4,404	4,515	4,746	4,780	4,547	4,396	4,166	3,955
2032	**Nov**	4,114	4,054	4,030	4,037	4,083	4,234	4,531	4,665	4,647	4,568	4,501	4,416	4,365	4,351	4,367	4,414	4,613	4,977	5,014	4,913	4,730	4,639	4,458	4,240
2032	**Dec**	4,566	4,502	4,475	4,483	4,527	4,672	4,974	5,135	5,116	5,028	4,941	4,822	4,725	4,691	4,688	4,749	5,041	5,524	5,518	5,419	5,251	5,152	4,937	4,697
2033	**Jan**	4,573	4,534	4,521	4,528	4,551	4,664	4,983	5,165	5,144	5,051	4,950	4,822	4,722	4,667	4,643	4,671	4,863	5,439	5,563	5,417	5,193	5,036	4,817	4,633
2033	**Feb**	4,589	4,553	4,541	4,548	4,568	4,685	5,027	5,195	5,172	5,067	4,974	4,848	4,752	4,703	4,675	4,686	4,812	5,183	5,545	5,454	5,228	5,082	4,864	4,663
2033	**Mar**	4,459	4,391	4,356	4,363	4,414	4,588	4,955	5,118	5,101	5,014	4,940	4,834	4,760	4,736	4,723	4,724	4,782	4,915	5,096	5,276	5,203	5,083	4,837	4,574
2033	**Apr**	4,161	4,048	3,986	3,982	4,063	4,279	4,571	4,723	4,705	4,686	4,644	4,577	4,540	4,524	4,509	4,510	4,560	4,622	4,664	4,773	4,830	4,829	4,634	4,325
2033	**May**	3,907	3,799	3,737	3,718	3,746	3,873	4,109	4,333	4,319	4,462	4,511	4,531	4,567	4,630	4,685	4,730	4,798	4,853	4,825	4,794	4,879	4,831	4,481	4,120
2033	**Jun**	4,430	4,244	4,110	4,039	4,032	4,098	4,285	4,515	4,501	4,840	5,020	5,169	5,325	5,492	5,631	5,745	5,819	5,815	5,722	5,581	5,429	5,445	5,133	4,714
2033	**Jul**	4,569	4,384	4,252	4,181	4,168	4,222	4,357	4,569	4,555	4,998	5,246	5,491	5,745	6,000	6,212	6,353	6,427	6,396	6,210	5,958	5,737	5,676	5,326	4,896
2033	**Aug**	4,522	4,331	4,185	4,120	4,121	4,257	4,465	4,653	4,640	5,016	5,221	5,420	5,638	5,866	6,058	6,188	6,271	6,257	6,089	5,893	5,756	5,615	5,256	4,830
2033	**Sep**	4,238	4,070	3,956	3,906	3,921	4,077	4,371	4,499	4,485	4,661	4,762	4,844	4,964	5,117	5,263	5,382	5,480	5,503	5,416	5,401	5,226	5,107	4,825	4,466
2033	**Oct**	4,007	3,958	3,925	3,916	3,922	4,012	4,315	4,507	4,491	4,471	4,439	4,383	4,355	4,364	4,377	4,406	4,497	4,618	4,870	4,907	4,664	4,533	4,310	4,091
2033	**Nov**	4,289	4,235	4,210	4,215	4,247	4,377	4,662	4,793	4,772	4,677	4,603	4,509	4,451	4,434	4,449	4,497	4,708	5,101	5,132	5,028	4,835	4,767	4,606	4,397
2033	**Dec**	4,750	4,682	4,652	4,658	4,699	4,839	5,139	5,302	5,281	5,186	5,092	4,962	4,858	4,819	4,813	4,873	5,167	5,663	5,664	5,572	5,402	5,330	5,128	4,881
2034	**Jan**	4,695	4,655	4,640	4,647	4,666	4,780	5,118	5,307	5,283	5,164	5,054	4,917	4,811	4,757	4,734	4,762	4,958	5,556	5,695	5,544	5,304	5,159	4,943	4,753
2034	**Feb**	4,734	4,694	4,680	4,686	4,705	4,826	5,184	5,358	5,332	5,208	5,106	4,968	4,864	4,812	4,781	4,790	4,918	5,293	5,675	5,601	5,367	5,240	5,025	4,812
2034	**Mar**	4,618	4,544	4,504	4,509	4,561	4,737	5,108	5,271	5,252	5,150	5,070	4,957	4,882	4,858	4,844	4,846	4,904	5,033	5,209	5,397	5,328	5,241	5,011	4,737
2034	**Apr**	4,326	4,206	4,137	4,132	4,207	4,417	4,702	4,855	4,834	4,813	4,769	4,697	4,655	4,636	4,620	4,620	4,673	4,740	4,790	4,905	4,963	4,993	4,810	4,491
2034	**May**	4,016	3,906	3,840	3,820	3,843	3,968	4,207	4,431	4,416	4,543	4,589	4,604	4,639	4,705	4,762	4,808	4,876	4,929	4,901	4,871	4,948	4,930	4,595	4,231
2034	**Jun**	4,567	4,372	4,230	4,154	4,142	4,204	4,391	4,625	4,610	4,953	5,138	5,290	5,451	5,624	5,767	5,882	5,957	5,950	5,854	5,714	5,552	5,595	5,294	4,864
2034	**Jul**	4,686	4,498	4,363	4,291	4,274	4,326	4,462	4,673	4,658	5,088	5,333	5,575	5,831	6,089	6,305	6,447	6,524	6,495	6,312	6,062	5,837	5,797	5,453	5,014
2034	**Aug**	4,641	4,447	4,297	4,229	4,225	4,360	4,572	4,758	4,743	5,105	5,306	5,501	5,718	5,950	6,146	6,279	6,363	6,349	6,183	5,992	5,849	5,731	5,383	4,951
2034	**Sep**	4,381	4,210	4,091	4,039	4,048	4,198	4,490	4,616	4,600	4,761	4,854	4,926	5,038	5,186	5,329	5,446	5,546	5,573	5,498	5,497	5,319	5,230	4,965	4,603
2034	**Oct**	4,098	4,045	4,008	3,997	4,000	4,093	4,414	4,616	4,599	4,561	4,522	4,458	4,426	4,435	4,449	4,478	4,571	4,700	4,971	5,011	4,755	4,640	4,417	4,186
2034	**Nov**	4,427	4,371	4,344	4,347	4,374	4,497	4,781	4,910	4,887	4,775	4,695	4,592	4,529	4,509	4,523	4,572	4,796	5,208	5,234	5,131	4,932	4,890	4,742	4,530
2034	**Dec**	4,983	4,896	4,855	4,862	4,913	5,075	5,390	5,553	5,529	5,427	5,328	5,189	5,079	5,036	5,028	5,091	5,387	5,864	5,876	5,801	5,640	5,607	5,412	5,135
2035	**Jan**	4,799	4,756	4,739	4,745	4,763	4,883	5,244	5,441	5,416	5,275	5,155	5,006	4,893	4,836	4,813	4,842	5,042	5,657	5,812	5,659	5,405	5,276	5,061	4,861
2035	**Feb**	4,886	4,842	4,824	4,830	4,846	4,967	5,332	5,507	5,478	5,332	5,223	5,074	4,965	4,910	4,878	4,887	5,014	5,383	5,777	5,722	5,486	5,387	5,184	4,963
2035	**Mar**	4,775	4,691	4,644	4,648	4,701	4,882	5,249	5,410	5,389	5,282	5,199	5,079	4,999	4,970	4,954	4,953	5,012	5,139	5,314	5,510	5,448	5,401	5,189	4,902
2035	**Apr**	4,463	4,337	4,265	4,259	4,335	4,551	4,845	5,002	4,979	4,945	4,896	4,818	4,773	4,755	4,739	4,739	4,793	4,860	4,913	5,031	5,085	5,146	4,973	4,643
2035	**May**	4,143	4,028	3,955	3,931	3,949	4,067	4,300	4,519	4,501	4,613	4,654	4,665	4,700	4,768	4,827	4,874	4,942	4,992	4,969	4,944	5,012	5,033	4,722	4,355
2035	**Jun**	4,709	4,504	4,352	4,270	4,250	4,304	4,487	4,725	4,708	5,061	5,252	5,407	5,574	5,751	5,899	6,016	6,092	6,086	5,990	5,851	5,681	5,752	5,463	5,020
2035	**Jul**	4,796	4,607	4,469	4,396	4,376	4,428	4,570	4,780	4,763	5,176	5,418	5,659	5,917	6,182	6,402	6,546	6,625	6,595	6,409	6,161	5,931	5,911	5,571	5,124
2035	**Aug**	4,767	4,568	4,411	4,340	4,333	4,469	4,688	4,875	4,859	5,206	5,400	5,583	5,793	6,021	6,213	6,343	6,429	6,418	6,260	6,082	5,938	5,851	5,518	5,079
2035	**Sep**	4,519	4,346	4,223	4,169	4,171	4,310	4,597	4,719	4,702	4,850	4,939	5,005	5,115	5,262	5,405	5,523	5,627	5,658	5,595	5,608	5,423	5,361	5,106	4,738
2035	**Oct**	4,199	4,143	4,102	4,089	4,088	4,182	4,517	4,728	4,708	4,651	4,605	4,532	4,496	4,505	4,519	4,547	4,641	4,774	5,059	5,100	4,836	4,744	4,529	4,290
2035	**Nov**	4,592	4,538	4,510	4,511	4,527	4,634	4,905	5,029	5,003	4,877	4,790	4,679	4,610	4,587	4,598	4,645	4,874	5,302	5,323	5,222	5,019	5,011	4,888	4,683
2035	**Dec**	5,134	5,043	4,999	5,005	5,055	5,217	5,538	5,704	5,677	5,559	5,453	5,305	5,191	5,146	5,138	5,200	5,499	5,986	6,005	5,937	5,771	5,762	5,575	5,288
2036	**Jan**	5,032	4,985	4,964	4,969	4,982	5,093	5,434	5,627	5,598	5,444	5,318	5,162	5,045	4,986	4,964	4,995	5,209	5,833	5,938	5,802	5,567	5,481	5,289	5,086
2036	**Feb**	5,005	4,959	4,939	4,944	4,956	5,070	5,429	5,604	5,573	5,421	5,304	5,148	5,033	4,976	4,942	4,953	5,092	5,510	5,888	5,796	5,547	5,480	5,298	5,080
2036	**Mar**	4,868	4,791	4,746	4,748	4,786	4,945	5,308	5,469	5,445	5,320	5,228	5,097	5,007	4,973	4,952	4,949	5,015	5,173	5,403	5,596	5,498	5,461	5,259	4,983
2036	**Apr**	4,526	4,415	4,349	4,343	4,406	4,605	4,916	5,073	5,047	4,971	4,908	4,814	4,763	4,745	4,730	4,732	4,787	4,860	4,923	5,076	5,126	5,184	5,007	4,684
2036	**May**	4,341	4,276	4,229	4,211	4,196	4,256	4,456	4,660	4,641	4,715	4,739	4,729	4,745	4,802	4,847	4,883	4,953	5,012	4,992	4,989	5,092	5,098	4,796	4,480
2036	**Jun**	4,830	4,633	4,485	4,407	4,383	4,430	4,602	4,824	4,805	5,106	5,275	5,405	5,554	5,716	5,855	5,969	6,051	6,057	5,983	5,869	5,722	5,828	5,549	5,108
2036	**Jul**	4,947	4,746	4,597	4,517	4,493	4,542	4,696	4,920	4,902	5,322	5,569	5,807	6,063	6,327	6,546	6,691	6,767	6,734	6,556	6,318	6,074	6,096	5,765	5,300
2036	**Aug**	4,938	4,716	4,537	4,454	4,437	4,563	4,766	4,970	4,951	5,336	5,542	5,733	5,949	6,176	6,364	6,487	6,569	6,559	6,412	6,233	6,091	6,049	5,725	5,261

PSCo Total Load

2036	**Sep**	4,568	4,386	4,253	4,193	4,190	4,330	4,617	4,749	4,730	4,897	5,003	5,084	5,212	5,378	5,534	5,659	5,761	5,785	5,696	5,687	5,502	5,464	5,209	4,821
2036	**Oct**	4,243	4,145	4,076	4,061	4,089	4,251	4,644	4,843	4,822	4,766	4,726	4,660	4,633	4,653	4,676	4,711	4,803	4,909	5,131	5,198	4,961	4,918	4,693	4,384
2036	**Nov**	4,689	4,615	4,575	4,575	4,602	4,733	5,026	5,164	5,136	5,014	4,923	4,803	4,730	4,704	4,711	4,754	4,954	5,329	5,417	5,352	5,155	5,181	5,053	4,811
2036	**Dec**	5,235	5,147	5,104	5,111	5,160	5,327	5,667	5,831	5,801	5,642	5,526	5,371	5,256	5,217	5,215	5,280	5,588	6,075	6,098	6,036	5,857	5,864	5,681	5,386
2037	**Jan**	5,154	5,099	5,073	5,078	5,092	5,204	5,545	5,737	5,706	5,557	5,427	5,260	5,134	5,066	5,035	5,064	5,279	5,894	6,021	5,896	5,656	5,611	5,437	5,224
2037	**Feb**	5,208	5,158	5,134	5,138	5,144	5,252	5,605	5,775	5,741	5,566	5,441	5,275	5,156	5,097	5,065	5,075	5,213	5,624	6,020	5,943	5,695	5,671	5,508	5,282
2037	**Mar**	5,020	4,935	4,885	4,886	4,927	5,095	5,472	5,633	5,607	5,465	5,369	5,231	5,140	5,107	5,088	5,087	5,153	5,307	5,532	5,737	5,640	5,635	5,439	5,145
2037	**Apr**	4,694	4,572	4,497	4,490	4,555	4,764	5,079	5,234	5,206	5,115	5,047	4,947	4,893	4,874	4,858	4,858	4,912	4,985	5,052	5,208	5,256	5,356	5,196	4,856
2037	**May**	4,481	4,409	4,357	4,335	4,316	4,369	4,560	4,756	4,735	4,800	4,821	4,806	4,822	4,877	4,923	4,959	5,031	5,093	5,081	5,084	5,180	5,229	4,947	4,625
2037	**Jun**	4,959	4,754	4,595	4,512	4,485	4,535	4,722	4,955	4,935	5,240	5,415	5,550	5,704	5,874	6,019	6,136	6,216	6,216	6,138	6,023	5,860	5,991	5,717	5,259
2037	**Jul**	5,100	4,889	4,730	4,644	4,615	4,665	4,822	5,052	5,033	5,444	5,683	5,910	6,158	6,416	6,628	6,767	6,841	6,812	6,644	6,419	6,179	6,237	5,924	5,451
2037	**Aug**	5,061	4,836	4,653	4,567	4,545	4,669	4,875	5,077	5,057	5,433	5,637	5,827	6,044	6,275	6,467	6,594	6,678	6,670	6,525	6,353	6,205	6,185	5,866	5,392
2037	**Sep**	4,712	4,523	4,384	4,320	4,313	4,453	4,749	4,881	4,860	5,011	5,111	5,186	5,310	5,477	5,634	5,760	5,865	5,892	5,810	5,812	5,620	5,610	5,365	4,967
2037	**Oct**	4,360	4,258	4,184	4,167	4,189	4,347	4,747	4,958	4,934	4,877	4,831	4,755	4,719	4,733	4,751	4,784	4,881	4,998	5,247	5,322	5,072	5,049	4,826	4,505
2037	**Nov**	4,822	4,746	4,704	4,704	4,728	4,859	5,160	5,297	5,267	5,117	5,019	4,891	4,817	4,793	4,805	4,850	5,059	5,450	5,531	5,467	5,262	5,313	5,193	4,944
2037	**Dec**	5,404	5,310	5,262	5,268	5,315	5,482	5,827	5,994	5,961	5,789	5,666	5,499	5,376	5,332	5,327	5,392	5,703	6,194	6,225	6,174	5,997	6,036	5,864	5,558
2038	**Jan**	5,294	5,237	5,209	5,212	5,221	5,326	5,665	5,853	5,819	5,655	5,518	5,343	5,212	5,142	5,110	5,137	5,351	5,977	6,122	6,006	5,757	5,739	5,577	5,361
2038	**Feb**	5,367	5,314	5,286	5,288	5,290	5,395	5,753	5,925	5,887	5,697	5,565	5,388	5,262	5,201	5,166	5,175	5,315	5,727	6,138	6,074	5,824	5,830	5,677	5,441
2038	**Mar**	5,167	5,078	5,023	5,023	5,064	5,237	5,627	5,793	5,765	5,608	5,506	5,360	5,264	5,232	5,215	5,213	5,279	5,431	5,653	5,873	5,778	5,800	5,609	5,301
2038	**Apr**	4,858	4,728	4,647	4,637	4,703	4,914	5,232	5,388	5,358	5,255	5,181	5,073	5,015	4,992	4,973	4,970	5,025	5,098	5,171	5,333	5,380	5,518	5,375	5,024
2038	**May**	4,628	4,555	4,499	4,475	4,447	4,484	4,658	4,838	4,815	4,858	4,879	4,862	4,880	4,938	4,988	5,028	5,099	5,161	5,156	5,166	5,250	5,341	5,082	4,764
2038	**Jun**	5,101	4,881	4,709	4,619	4,587	4,640	4,846	5,094	5,072	5,378	5,552	5,682	5,834	6,006	6,150	6,265	6,344	6,345	6,273	6,167	5,995	6,159	5,895	5,418
2038	**Jul**	5,228	5,011	4,845	4,755	4,720	4,761	4,913	5,143	5,121	5,533	5,775	6,003	6,254	6,515	6,731	6,871	6,946	6,916	6,750	6,528	6,283	6,369	6,068	5,586
2038	**Aug**	5,178	4,952	4,766	4,679	4,654	4,776	4,989	5,189	5,168	5,525	5,728	5,915	6,135	6,372	6,569	6,699	6,785	6,776	6,630	6,463	6,309	6,310	5,996	5,514
2038	**Sep**	4,852	4,655	4,509	4,441	4,431	4,574	4,882	5,014	4,991	5,123	5,216	5,281	5,399	5,564	5,719	5,845	5,951	5,981	5,912	5,928	5,730	5,752	5,517	5,106
2038	**Oct**	4,590	4,523	4,467	4,448	4,431	4,506	4,827	5,024	4,999	4,919	4,865	4,779	4,737	4,745	4,759	4,789	4,887	5,014	5,295	5,378	5,108	5,112	4,939	4,680
2038	**Nov**	4,969	4,890	4,844	4,844	4,868	5,004	5,319	5,457	5,424	5,253	5,146	5,009	4,929	4,905	4,917	4,963	5,181	5,583	5,658	5,599	5,388	5,468	5,357	5,099
2038	**Dec**	5,573	5,470	5,415	5,420	5,467	5,637	5,985	6,152	6,117	5,938	5,810	5,635	5,504	5,457	5,448	5,513	5,825	6,311	6,344	6,303	6,125	6,208	6,054	5,741
2039	**Jan**	5,408	5,350	5,319	5,321	5,325	5,429	5,783	5,979	5,942	5,756	5,608	5,422	5,284	5,212	5,180	5,207	5,423	6,074	6,247	6,134	5,873	5,866	5,700	5,471
2039	**Feb**	5,510	5,453	5,421	5,423	5,423	5,529	5,902	6,079	6,038	5,829	5,689	5,500	5,366	5,300	5,263	5,270	5,411	5,824	6,256	6,214	5,957	5,989	5,839	5,589
2039	**Mar**	5,329	5,231	5,167	5,167	5,208	5,388	5,781	5,944	5,914	5,740	5,632	5,481	5,382	5,349	5,331	5,329	5,394	5,539	5,756	5,987	5,899	5,962	5,786	5,464
2039	**Apr**	5,023	4,882	4,793	4,780	4,843	5,055	5,368	5,524	5,492	5,385	5,308	5,194	5,132	5,107	5,087	5,084	5,140	5,215	5,294	5,460	5,504	5,687	5,564	5,201
2039	**May**	4,610	4,480	4,388	4,356	4,354	4,460	4,705	4,936	4,912	4,987	5,016	5,004	5,028	5,094	5,151	5,196	5,271	5,335	5,334	5,346	5,421	5,542	5,248	4,837
2039	**Jun**	5,253	5,024	4,843	4,747	4,709	4,759	4,968	5,221	5,197	5,499	5,672	5,800	5,951	6,125	6,269	6,383	6,463	6,463	6,398	6,300	6,123	6,321	6,066	5,576
2039	**Jul**	5,355	5,135	4,963	4,870	4,826	4,858	5,002	5,227	5,204	5,608	5,851	6,079	6,334	6,600	6,822	6,965	7,044	7,017	6,852	6,634	6,385	6,497	6,204	5,713
2039	**Aug**	5,291	5,068	4,882	4,796	4,767	4,888	5,108	5,305	5,282	5,612	5,809	5,989	6,207	6,449	6,651	6,784	6,872	6,862	6,715	6,554	6,392	6,418	6,113	5,628
2039	**Sep**	4,997	4,802	4,653	4,585	4,570	4,705	5,013	5,142	5,117	5,225	5,309	5,364	5,476	5,638	5,792	5,915	6,021	6,050	5,988	6,020	5,816	5,871	5,654	5,242
2039	**Oct**	4,702	4,632	4,572	4,549	4,528	4,600	4,927	5,129	5,102	5,004	4,944	4,849	4,801	4,808	4,820	4,849	4,949	5,086	5,390	5,479	5,200	5,230	5,063	4,795
2039	**Nov**	5,165	5,083	5,035	5,032	5,050	5,177	5,485	5,617	5,581	5,394	5,281	5,136	5,050	5,022	5,032	5,079	5,302	5,712	5,783	5,734	5,523	5,641	5,550	5,289
2039	**Dec**	5,741	5,632	5,573	5,576	5,618	5,783	6,128	6,295	6,258	6,072	5,937	5,752	5,614	5,561	5,549	5,612	5,926	6,419	6,462	6,432	6,254	6,371	6,231	5,909
2040	**Jan**	5,628	5,567	5,532	5,534	5,536	5,638	5,993	6,183	6,144	5,930	5,778	5,586	5,448	5,379	5,348	5,374	5,581	6,207	6,389	6,291	6,032	6,067	5,922	5,690
2040	**Feb**	5,604	5,543	5,509	5,509	5,508	5,618	6,006	6,184	6,142	5,914	5,768	5,573	5,435	5,370	5,333	5,340	5,479	5,882	6,325	6,310	6,050	6,096	5,942	5,683
2040	**Mar**	5,426	5,331	5,266	5,261	5,286	5,440	5,818	5,985	5,953	5,772	5,658	5,496	5,394	5,358	5,338	5,334	5,398	5,541	5,759	6,015	5,935	6,026	5,865	5,549
2040	**Apr**	5,080	4,949	4,863	4,849	4,891	5,069	5,369	5,535	5,500	5,394	5,316	5,196	5,128	5,103	5,082	5,079	5,141	5,224	5,311	5,492	5,548	5,739	5,606	5,248
2040	**May**	4,771	4,634	4,534	4,497	4,490	4,591	4,831	5,053	5,027	5,078	5,103	5,086	5,109	5,178	5,238	5,284	5,356	5,412	5,415	5,432	5,487	5,663	5,406	4,997
2040	**Jun**	5,328	5,106	4,928	4,832	4,783	4,808	4,989	5,223	5,198	5,491	5,671	5,806	5,970	6,155	6,312	6,434	6,516	6,512	6,436	6,332	6,137	6,367	6,131	5,648
2040	**Jul**	5,501	5,273	5,092	4,996	4,949	4,987	5,144	5,376	5,351	5,747	5,988	6,213	6,468	6,738	6,961	7,103	7,183	7,158	6,998	6,792	6,541	6,674	6,378	5,869
2040	**Aug**	5,451	5,214	5,016	4,924	4,891	5,021	5,260	5,463	5,438	5,760	5,951	6,119	6,327	6,562	6,759	6,889	6,977	6,971	6,838	6,700	6,537	6,598	6,302	5,798
2040	**Sep**	5,135	4,947	4,800	4,733	4,704	4,812	5,095	5,213	5,187	5,268	5,340	5,381	5,484	5,638	5,788	5,911	6,021	6,057	6,016	6,074	5,864	5,955	5,760	5,358
2040	**Oct**	4,808	4,735	4,669	4,645	4,619	4,693	5,042	5,258	5,229	5,105	5,036	4,930	4,877	4,885	4,897	4,925	5,025	5,169	5,497	5,586	5,295	5,350	5,185	4,906
2040	**Nov**	5,328	5,249	5,198	5,193	5,197	5,302	5,593	5,717	5,679	5,475	5,357	5,204	5,111	5,078	5,086	5,132	5,370	5,806	5,863	5,817	5,601	5,759	5,691	5,436
2040	**Dec**	5,870	5,762	5,702	5,702	5,731	5,876	6,209	6,377	6,337	6,142	6,001	5,807	5,664	5,607	5,594	5,656	5,972	6,497	6,550	6,527	6,341	6,483	6,348	6,025

PSCo Total Load

2041	**Jan**	5,732	5,667	5,628	5,628	5,623	5,722	6,088	6,290	6,248	6,014	5,851	5,646	5,499	5,426	5,398	5,428	5,661	6,336	6,482	6,386	6,125	6,181	6,033	5,788
2041	**Feb**	5,812	5,748	5,708	5,707	5,696	5,792	6,166	6,341	6,294	6,047	5,890	5,681	5,535	5,465	5,426	5,435	5,588	6,044	6,482	6,439	6,163	6,269	6,148	5,888
2041	**Mar**	5,593	5,488	5,416	5,411	5,439	5,599	5,980	6,136	6,101	5,900	5,780	5,610	5,498	5,454	5,427	5,420	5,492	5,660	5,927	6,161	6,048	6,187	6,048	5,722
2041	**Apr**	5,232	5,099	5,010	4,996	5,041	5,230	5,558	5,716	5,679	5,532	5,439	5,305	5,229	5,204	5,184	5,182	5,241	5,326	5,428	5,640	5,673	5,899	5,779	5,409
2041	**May**	4,926	4,842	4,769	4,738	4,697	4,742	4,964	5,182	5,154	5,166	5,171	5,133	5,138	5,198	5,246	5,282	5,359	5,426	5,429	5,475	5,574	5,719	5,444	5,077
2041	**Jun**	5,523	5,359	5,226	5,158	5,096	5,080	5,190	5,353	5,326	5,516	5,672	5,796	5,963	6,164	6,347	6,503	6,619	6,634	6,552	6,434	6,248	6,489	6,209	5,747
2041	**Jul**	5,597	5,372	5,192	5,095	5,041	5,063	5,219	5,450	5,424	5,812	6,063	6,296	6,562	6,844	7,080	7,235	7,318	7,283	7,119	6,908	6,630	6,802	6,505	5,983
2041	**Aug**	5,598	5,351	5,139	5,039	4,995	5,106	5,321	5,534	5,507	5,841	6,036	6,207	6,417	6,652	6,846	6,970	7,054	7,046	6,921	6,780	6,617	6,732	6,453	5,937
2041	**Sep**	5,215	5,011	4,848	4,770	4,732	4,837	5,114	5,243	5,216	5,340	5,440	5,506	5,635	5,813	5,981	6,113	6,222	6,248	6,177	6,210	6,002	6,121	5,917	5,483
2041	**Oct**	4,864	4,748	4,653	4,626	4,626	4,764	5,157	5,349	5,319	5,194	5,134	5,039	4,999	5,020	5,048	5,085	5,182	5,295	5,546	5,668	5,410	5,526	5,357	5,010
2041	**Nov**	5,405	5,314	5,253	5,245	5,250	5,366	5,682	5,831	5,791	5,591	5,466	5,301	5,201	5,164	5,165	5,203	5,408	5,799	5,933	5,920	5,699	5,888	5,815	5,531
2041	**Dec**	6,012	5,901	5,837	5,839	5,870	6,026	6,378	6,538	6,495	6,259	6,110	5,912	5,771	5,722	5,717	5,783	6,108	6,618	6,680	6,672	6,475	6,644	6,512	6,170
2042	**Jan**	5,836	5,766	5,722	5,722	5,714	5,813	6,182	6,386	6,342	6,111	5,944	5,728	5,570	5,490	5,455	5,485	5,725	6,401	6,561	6,475	6,206	6,304	6,167	5,909
2042	**Feb**	5,959	5,892	5,848	5,845	5,829	5,920	6,295	6,469	6,419	6,154	5,990	5,772	5,621	5,550	5,510	5,518	5,670	6,121	6,576	6,549	6,271	6,416	6,305	6,035
2042	**Mar**	5,733	5,623	5,545	5,539	5,564	5,724	6,108	6,264	6,227	6,016	5,893	5,716	5,602	5,558	5,533	5,527	5,599	5,767	6,035	6,287	6,176	6,348	6,213	5,872
2042	**Apr**	5,388	5,247	5,149	5,133	5,176	5,367	5,696	5,852	5,813	5,647	5,549	5,408	5,330	5,304	5,285	5,283	5,342	5,426	5,533	5,752	5,785	6,053	5,947	5,563
2042	**May**	5,050	4,964	4,886	4,852	4,802	4,832	5,039	5,248	5,218	5,222	5,226	5,183	5,186	5,244	5,292	5,327	5,402	5,469	5,483	5,537	5,628	5,822	5,571	5,202
2042	**Jun**	5,657	5,422	5,227	5,124	5,064	5,083	5,268	5,506	5,477	5,733	5,893	6,000	6,142	6,311	6,456	6,571	6,657	6,669	6,629	6,570	6,397	6,704	6,479	5,966
2042	**Jul**	5,729	5,497	5,309	5,208	5,147	5,165	5,322	5,554	5,526	5,896	6,137	6,358	6,614	6,890	7,121	7,270	7,351	7,321	7,168	6,975	6,701	6,913	6,634	6,106
2042	**Aug**	5,712	5,462	5,245	5,141	5,087	5,185	5,391	5,597	5,569	5,898	6,095	6,267	6,480	6,720	6,919	7,047	7,134	7,128	7,006	6,874	6,706	6,850	6,578	6,055
2042	**Sep**	5,338	5,131	4,963	4,884	4,843	4,951	5,241	5,371	5,342	5,437	5,526	5,579	5,699	5,874	6,040	6,169	6,279	6,308	6,249	6,298	6,084	6,239	6,045	5,604
2042	**Oct**	4,951	4,832	4,733	4,704	4,698	4,833	5,241	5,447	5,415	5,279	5,212	5,108	5,061	5,078	5,102	5,136	5,237	5,356	5,633	5,764	5,491	5,629	5,458	5,099
2042	**Nov**	5,533	5,438	5,373	5,363	5,361	5,467	5,770	5,910	5,867	5,651	5,523	5,351	5,249	5,212	5,215	5,256	5,470	5,877	6,012	6,009	5,786	6,010	5,948	5,658
2042	**Dec**	6,152	6,038	5,970	5,970	5,999	6,156	6,517	6,683	6,638	6,384	6,228	6,018	5,869	5,817	5,809	5,875	6,202	6,716	6,784	6,788	6,589	6,791	6,667	6,314
2043	**Jan**	5,807	5,726	5,674	5,674	5,669	5,767	6,109	6,286	6,239	5,997	5,830	5,614	5,458	5,379	5,342	5,367	5,579	6,169	6,337	6,297	6,057	6,236	6,145	5,885
2043	**Feb**	5,981	5,908	5,858	5,854	5,834	5,913	6,253	6,406	6,353	6,073	5,908	5,688	5,537	5,466	5,427	5,432	5,568	5,967	6,391	6,404	6,156	6,381	6,320	6,054
2043	**Mar**	5,716	5,580	5,486	5,483	5,532	5,731	6,111	6,243	6,204	5,981	5,860	5,687	5,578	5,539	5,517	5,512	5,578	5,722	5,951	6,186	6,095	6,362	6,267	5,891
2043	**Apr**	5,427	5,263	5,149	5,131	5,188	5,405	5,730	5,867	5,826	5,641	5,540	5,395	5,317	5,289	5,269	5,265	5,318	5,393	5,504	5,714	5,728	6,082	6,024	5,620
2043	**May**	5,071	4,979	4,894	4,857	4,800	4,819	5,008	5,202	5,172	5,159	5,160	5,111	5,111	5,166	5,213	5,248	5,322	5,390	5,416	5,482	5,561	5,810	5,590	5,222
2043	**Jun**	5,657	5,416	5,213	5,106	5,041	5,059	5,255	5,498	5,468	5,715	5,877	5,982	6,124	6,294	6,439	6,553	6,633	6,639	6,602	6,553	6,369	6,710	6,499	5,980
2043	**Jul**	5,742	5,505	5,309	5,203	5,136	5,151	5,306	5,537	5,507	5,853	6,077	6,276	6,512	6,772	6,987	7,124	7,200	7,175	7,044	6,880	6,618	6,878	6,630	6,107
2043	**Aug**	5,701	5,451	5,230	5,124	5,064	5,156	5,360	5,561	5,532	5,842	6,031	6,193	6,400	6,633	6,828	6,953	7,039	7,035	6,927	6,816	6,648	6,827	6,571	6,046
2043	**Sep**	5,356	5,144	4,970	4,887	4,841	4,945	5,239	5,365	5,334	5,407	5,489	5,532	5,643	5,811	5,972	6,097	6,205	6,236	6,192	6,260	6,045	6,242	6,064	5,619
2043	**Oct**	4,959	4,838	4,734	4,702	4,688	4,811	5,203	5,404	5,370	5,228	5,156	5,043	4,988	4,998	5,015	5,044	5,142	5,263	5,551	5,693	5,428	5,615	5,467	5,108
2043	**Nov**	5,469	5,371	5,302	5,292	5,288	5,391	5,689	5,816	5,771	5,529	5,396	5,221	5,119	5,085	5,091	5,131	5,338	5,722	5,850	5,867	5,654	5,928	5,887	5,595
2043	**Dec**	6,027	5,911	5,839	5,838	5,859	6,001	6,343	6,499	6,452	6,187	6,028	5,813	5,660	5,605	5,594	5,654	5,961	6,444	6,524	6,552	6,367	6,623	6,529	6,182
2044	**Jan**	5,994	5,895	5,833	5,835	5,840	5,957	6,305	6,472	6,422	6,170	6,000	5,781	5,623	5,541	5,504	5,527	5,734	6,286	6,465	6,457	6,230	6,459	6,375	6,089
2044	**Feb**	6,049	5,973	5,921	5,917	5,896	5,978	6,327	6,482	6,430	6,145	5,978	5,754	5,601	5,529	5,489	5,492	5,627	6,018	6,451	6,484	6,237	6,476	6,406	6,129
2044	**Mar**	5,775	5,648	5,554	5,547	5,576	5,751	6,133	6,274	6,234	5,991	5,862	5,680	5,566	5,528	5,507	5,502	5,566	5,706	5,941	6,210	6,119	6,395	6,297	5,929
2044	**Apr**	5,485	5,330	5,218	5,196	5,228	5,405	5,707	5,852	5,809	5,626	5,522	5,371	5,287	5,255	5,232	5,227	5,284	5,364	5,483	5,710	5,738	6,107	6,050	5,659
2044	**May**	5,101	4,954	4,834	4,787	4,754	4,828	5,067	5,291	5,259	5,266	5,277	5,237	5,247	5,310	5,367	5,410	5,485	5,552	5,586	5,657	5,715	6,012	5,777	5,331
2044	**Jun**	5,710	5,473	5,268	5,160	5,087	5,097	5,289	5,526	5,494	5,718	5,872	5,971	6,111	6,286	6,433	6,547	6,628	6,632	6,598	6,557	6,362	6,738	6,543	6,026
2044	**Jul**	5,892	5,640	5,428	5,313	5,237	5,243	5,391	5,627	5,597	5,964	6,195	6,398	6,637	6,897	7,113	7,249	7,326	7,304	7,181	7,029	6,767	7,056	6,814	6,274
2044	**Aug**	5,815	5,560	5,333	5,226	5,166	5,269	5,499	5,703	5,672	5,964	6,151	6,308	6,513	6,750	6,947	7,074	7,159	7,154	7,048	6,952	6,776	6,977	6,717	6,177
2044	**Sep**	5,460	5,255	5,082	5,001	4,948	5,040	5,330	5,448	5,416	5,449	5,514	5,540	5,639	5,800	5,956	6,078	6,185	6,218	6,189	6,279	6,058	6,293	6,138	5,700
2044	**Oct**	5,189	5,105	5,019	4,985	4,930	4,965	5,271	5,457	5,421	5,252	5,171	5,047	4,984	4,986	4,997	5,022	5,119	5,255	5,585	5,732	5,450	5,669	5,573	5,280
2044	**Nov**	5,620	5,523	5,452	5,441	5,429	5,524	5,820	5,942	5,895	5,631	5,492	5,308	5,199	5,163	5,169	5,211	5,430	5,834	5,947	5,969	5,751	6,060	6,033	5,741
2044	**Dec**	6,142	6,024	5,948	5,944	5,953	6,076	6,402	6,558	6,508	6,246	6,083	5,859	5,698	5,636	5,619	5,676	5,982	6,478	6,563	6,599	6,411	6,710	6,635	6,295
2045	**Jan**	6,098	6,005	5,944	5,943	5,938	6,042	6,394	6,564	6,512	6,227	6,049	5,822	5,662	5,584	5,549	5,571	5,770	6,336	6,545	6,542	6,301	6,546	6,465	6,178
2045	**Feb**	6,246	6,168	6,110	6,103	6,071	6,140	6,490	6,646	6,588	6,276	6,097	5,857	5,693	5,615	5,571	5,572	5,706	6,091	6,551	6,618	6,365	6,656	6,604	6,319
2045	**Mar**	5,921	5,781	5,677	5,669	5,704	5,891	6,277	6,413	6,370	6,115	5,982	5,796	5,682	5,643	5,623	5,619	5,680	5,814	6,041	6,314	6,230	6,559	6,478	6,089
2045	**Apr**	5,653	5,485	5,362	5,337	5,366	5,542	5,835	5,976	5,930	5,745	5,640	5,485	5,396	5,362	5,338	5,333	5,391	5,473	5,602	5,836	5,857	6,278	6,240	5,834

PSCo Total Load

2045	**May**	5,212	5,062	4,937	4,887	4,848	4,917	5,157	5,380	5,346	5,337	5,343	5,298	5,306	5,372	5,431	5,473	5,547	5,610	5,649	5,727	5,774	6,112	5,893	5,444
2045	**Jun**	5,845	5,597	5,383	5,268	5,187	5,190	5,383	5,625	5,593	5,823	5,982	6,085	6,229	6,408	6,559	6,674	6,753	6,755	6,722	6,688	6,484	6,895	6,707	6,175
2045	**Jul**	6,002	5,747	5,529	5,412	5,330	5,332	5,481	5,716	5,684	6,038	6,266	6,465	6,703	6,966	7,183	7,320	7,399	7,379	7,263	7,121	6,857	7,173	6,935	6,385
2045	**Aug**	5,927	5,669	5,437	5,328	5,261	5,358	5,591	5,792	5,760	6,034	6,218	6,369	6,571	6,810	7,010	7,139	7,226	7,220	7,120	7,036	6,855	7,087	6,836	6,288
2045	**Sep**	5,605	5,395	5,215	5,131	5,071	5,155	5,443	5,559	5,525	5,544	5,602	5,617	5,708	5,862	6,014	6,133	6,241	6,277	6,264	6,376	6,152	6,426	6,284	5,839
2045	**Oct**	5,289	5,202	5,111	5,074	5,014	5,047	5,364	5,557	5,520	5,331	5,244	5,112	5,044	5,047	5,058	5,082	5,181	5,323	5,670	5,825	5,533	5,780	5,687	5,383
2045	**Nov**	5,748	5,649	5,574	5,561	5,542	5,627	5,919	6,037	5,988	5,709	5,563	5,372	5,258	5,219	5,224	5,267	5,495	5,914	6,025	6,055	5,833	6,176	6,161	5,864
2045	**Dec**	6,299	6,174	6,093	6,086	6,091	6,209	6,530	6,685	6,632	6,362	6,193	5,961	5,794	5,728	5,710	5,766	6,074	6,575	6,671	6,722	6,534	6,869	6,804	6,452
2046	**Jan**	6,209	6,120	6,058	6,055	6,039	6,131	6,491	6,666	6,612	6,304	6,117	5,879	5,712	5,633	5,598	5,619	5,818	6,401	6,629	6,626	6,371	6,639	6,568	6,283
2046	**Feb**	6,392	6,311	6,249	6,241	6,202	6,265	6,618	6,773	6,713	6,379	6,192	5,943	5,773	5,694	5,649	5,649	5,780	6,160	6,633	6,725	6,469	6,796	6,755	6,463
2046	**Mar**	6,073	5,922	5,809	5,799	5,833	6,023	6,404	6,537	6,492	6,232	6,096	5,903	5,784	5,742	5,718	5,712	5,774	5,906	6,134	6,418	6,340	6,717	6,654	6,248
2046	**Apr**	5,786	5,612	5,484	5,458	5,487	5,669	5,968	6,111	6,063	5,864	5,755	5,593	5,502	5,469	5,446	5,440	5,497	5,580	5,713	5,953	5,969	6,431	6,403	5,984
2046	**May**	5,332	5,177	5,045	4,991	4,944	5,003	5,234	5,448	5,413	5,386	5,389	5,340	5,346	5,413	5,474	5,518	5,591	5,652	5,697	5,784	5,821	6,206	6,011	5,560
2046	**Jun**	5,982	5,724	5,498	5,376	5,286	5,278	5,465	5,710	5,676	5,916	6,081	6,186	6,334	6,518	6,672	6,788	6,869	6,870	6,842	6,813	6,601	7,048	6,872	6,326
2046	**Jul**	6,098	5,845	5,626	5,509	5,421	5,421	5,574	5,805	5,771	6,099	6,323	6,518	6,758	7,026	7,248	7,387	7,467	7,446	7,330	7,194	6,925	7,268	7,034	6,477
2046	**Aug**	6,044	5,782	5,544	5,432	5,359	5,454	5,691	5,891	5,858	6,113	6,287	6,426	6,619	6,853	7,049	7,176	7,264	7,262	7,172	7,105	6,923	7,193	6,958	6,404
2046	**Sep**	5,738	5,527	5,343	5,256	5,185	5,256	5,535	5,647	5,612	5,616	5,669	5,678	5,766	5,919	6,070	6,190	6,301	6,341	6,344	6,475	6,244	6,551	6,419	5,968
2046	**Oct**	5,381	5,291	5,194	5,155	5,089	5,120	5,450	5,651	5,611	5,403	5,309	5,167	5,095	5,098	5,109	5,133	5,231	5,377	5,739	5,900	5,600	5,878	5,791	5,478
2046	**Nov**	5,891	5,797	5,720	5,704	5,669	5,730	6,005	6,118	6,067	5,770	5,619	5,419	5,298	5,256	5,258	5,299	5,535	5,974	6,082	6,116	5,887	6,268	6,278	5,990
2046	**Dec**	6,441	6,313	6,227	6,220	6,220	6,335	6,660	6,816	6,761	6,474	6,298	6,058	5,886	5,818	5,800	5,856	6,165	6,673	6,778	6,841	6,649	7,016	6,958	6,595
2047	**Jan**	6,342	6,254	6,190	6,183	6,153	6,226	6,572	6,751	6,694	6,370	6,174	5,925	5,752	5,669	5,635	5,660	5,880	6,506	6,696	6,700	6,447	6,746	6,686	6,400
2047	**Feb**	6,542	6,456	6,389	6,380	6,337	6,394	6,739	6,890	6,827	6,477	6,283	6,024	5,848	5,767	5,724	5,727	5,872	6,302	6,761	6,822	6,553	6,927	6,909	6,613
2047	**Mar**	6,235	6,075	5,957	5,947	5,982	6,169	6,546	6,668	6,621	6,345	6,203	6,001	5,873	5,823	5,794	5,785	5,856	6,012	6,276	6,546	6,444	6,866	6,823	6,411
2047	**Apr**	5,917	5,739	5,607	5,583	5,620	5,819	6,151	6,286	6,236	5,994	5,871	5,695	5,596	5,562	5,539	5,533	5,589	5,672	5,819	6,085	6,082	6,581	6,566	6,129
2047	**May**	5,469	5,366	5,260	5,212	5,131	5,136	5,351	5,562	5,525	5,458	5,442	5,370	5,359	5,417	5,466	5,500	5,577	5,649	5,694	5,811	5,892	6,245	6,034	5,624
2047	**Jun**	6,176	5,977	5,796	5,703	5,600	5,550	5,667	5,840	5,803	5,933	6,071	6,161	6,309	6,505	6,683	6,830	6,942	6,962	6,929	6,891	6,688	7,151	6,942	6,422
2047	**Jul**	6,181	5,932	5,715	5,597	5,503	5,486	5,637	5,866	5,831	6,148	6,381	6,581	6,830	7,110	7,344	7,494	7,576	7,547	7,426	7,288	6,993	7,376	7,146	6,578
2047	**Aug**	6,179	5,906	5,656	5,536	5,451	5,527	5,739	5,948	5,913	6,178	6,355	6,495	6,690	6,922	7,115	7,235	7,318	7,315	7,234	7,165	6,983	7,310	7,094	6,529
2047	**Sep**	5,805	5,578	5,377	5,279	5,200	5,267	5,540	5,663	5,626	5,673	5,753	5,787	5,899	6,076	6,244	6,372	6,480	6,512	6,485	6,591	6,364	6,701	6,563	6,081
2047	**Oct**	5,419	5,284	5,157	5,115	5,076	5,174	5,551	5,728	5,687	5,477	5,392	5,260	5,201	5,217	5,243	5,276	5,371	5,485	5,772	5,965	5,699	6,038	5,948	5,565
2047	**Nov**	5,969	5,859	5,772	5,753	5,723	5,800	6,101	6,238	6,183	5,890	5,732	5,520	5,393	5,346	5,342	5,374	5,575	5,962	6,144	6,215	5,985	6,404	6,410	6,091
2047	**Dec**	6,570	6,437	6,348	6,341	6,345	6,473	6,816	6,962	6,905	6,577	6,394	6,149	5,979	5,918	5,907	5,968	6,283	6,772	6,887	6,965	6,765	7,162	7,111	6,728
2048	**Jan**	6,524	6,412	6,336	6,333	6,320	6,424	6,784	6,957	6,897	6,577	6,381	6,124	5,942	5,853	5,813	5,838	6,058	6,631	6,827	6,863	6,625	6,990	6,944	6,623
2048	**Feb**	6,621	6,527	6,455	6,447	6,409	6,475	6,818	6,964	6,899	6,551	6,356	6,095	5,919	5,836	5,792	5,795	5,936	6,343	6,800	6,881	6,626	7,028	7,015	6,704
2048	**Mar**	6,285	6,138	6,023	6,009	6,024	6,186	6,566	6,697	6,648	6,351	6,203	5,992	5,860	5,815	5,790	5,783	5,852	6,008	6,283	6,587	6,478	6,908	6,862	6,455
2048	**Apr**	5,979	5,812	5,682	5,654	5,666	5,829	6,145	6,285	6,233	5,974	5,845	5,661	5,559	5,524	5,502	5,495	5,554	5,641	5,794	6,080	6,091	6,599	6,581	6,153
2048	**May**	5,651	5,543	5,431	5,380	5,290	5,275	5,459	5,647	5,609	5,530	5,512	5,435	5,422	5,476	5,522	5,555	5,631	5,703	5,764	5,888	5,952	6,376	6,211	5,806
2048	**Jun**	6,200	5,948	5,719	5,599	5,497	5,478	5,661	5,892	5,855	6,031	6,177	6,258	6,391	6,566	6,717	6,834	6,917	6,926	6,919	6,923	6,717	7,236	7,078	6,522
2048	**Jul**	6,380	6,107	5,866	5,737	5,638	5,629	5,795	6,042	6,005	6,324	6,541	6,720	6,946	7,205	7,418	7,550	7,626	7,605	7,512	7,408	7,130	7,564	7,359	6,777
2048	**Aug**	6,319	6,032	5,766	5,638	5,547	5,622	5,839	6,052	6,015	6,296	6,480	6,623	6,822	7,056	7,251	7,372	7,457	7,459	7,388	7,336	7,150	7,502	7,282	6,694
2048	**Sep**	5,903	5,679	5,479	5,383	5,300	5,363	5,642	5,759	5,720	5,720	5,784	5,800	5,900	6,072	6,237	6,365	6,476	6,511	6,497	6,621	6,385	6,759	6,640	6,162
2048	**Oct**	5,516	5,378	5,247	5,202	5,157	5,251	5,642	5,839	5,796	5,585	5,493	5,348	5,276	5,283	5,299	5,327	5,427	5,554	5,880	6,082	5,799	6,160	6,066	5,668
2048	**Nov**	6,116	5,999	5,906	5,887	5,859	5,941	6,243	6,365	6,308	5,988	5,826	5,611	5,485	5,442	5,445	5,482	5,692	6,082	6,252	6,336	6,110	6,568	6,583	6,248
2048	**Dec**	6,675	6,544	6,452	6,444	6,438	6,554	6,898	7,052	6,991	6,649	6,457	6,198	6,018	5,953	5,937	5,995	6,311	6,816	6,937	7,025	6,823	7,252	7,211	6,828
2049	**Jan**	6,640	6,526	6,446	6,441	6,419	6,509	6,859	7,024	6,962	6,631	6,428	6,164	5,979	5,886	5,843	5,864	6,077	6,654	6,877	6,929	6,683	7,083	7,053	6,732
2049	**Feb**	6,825	6,732	6,656	6,644	6,589	6,633	6,975	7,124	7,055	6,675	6,467	6,190	6,003	5,917	5,871	5,871	6,014	6,428	6,918	7,017	6,751	7,204	7,210	6,895
2049	**Mar**	6,419	6,263	6,142	6,128	6,146	6,319	6,710	6,840	6,789	6,477	6,325	6,109	5,974	5,929	5,906	5,899	5,966	6,115	6,384	6,699	6,594	7,066	7,028	6,604
2049	**Apr**	6,135	5,956	5,817	5,786	5,801	5,973	6,290	6,427	6,373	6,102	5,968	5,779	5,673	5,635	5,610	5,601	5,658	5,744	5,904	6,196	6,202	6,761	6,760	6,318
2049	**May**	5,788	5,680	5,563	5,508	5,408	5,376	5,540	5,710	5,670	5,570	5,551	5,473	5,462	5,518	5,570	5,606	5,680	5,752	5,821	5,955	6,008	6,477	6,333	5,933
2049	**Jun**	6,327	6,060	5,816	5,687	5,580	5,564	5,765	6,013	5,974	6,154	6,299	6,376	6,506	6,683	6,832	6,946	7,028	7,037	7,039	7,056	6,843	7,396	7,244	6,668
2049	**Jul**	6,488	6,209	5,961	5,827	5,720	5,702	5,859	6,106	6,068	6,388	6,609	6,788	7,016	7,278	7,494	7,627	7,702	7,680	7,592	7,496	7,214	7,679	7,482	6,891
2049	**Aug**	6,411	6,124	5,857	5,729	5,632	5,704	5,927	6,136	6,098	6,359	6,541	6,682	6,881	7,122	7,320	7,445	7,532	7,531	7,461	7,419	7,227	7,602	7,384	6,789

PSCo Total Load

2049	**Sep**	6,026	5,794	5,585	5,485	5,398	5,464	5,755	5,873	5,833	5,817	5,874	5,881	5,975	6,143	6,306	6,432	6,544	6,582	6,584	6,727	6,486	6,894	6,778	6,287
2049	**Oct**	5,740	5,639	5,527	5,479	5,393	5,398	5,702	5,883	5,838	5,606	5,506	5,353	5,275	5,276	5,288	5,312	5,412	5,549	5,906	6,118	5,818	6,209	6,165	5,833
2049	**Nov**	6,221	6,103	6,007	5,988	5,955	6,034	6,345	6,468	6,409	6,070	5,901	5,677	5,545	5,502	5,505	5,545	5,763	6,171	6,337	6,426	6,191	6,676	6,695	6,354
2049	**Dec**	6,819	6,679	6,580	6,571	6,564	6,681	7,026	7,179	7,117	6,771	6,576	6,311	6,124	6,054	6,035	6,093	6,409	6,906	7,031	7,133	6,932	7,405	7,376	6,985
2050	**Jan**	6,796	6,681	6,597	6,591	6,565	6,652	7,006	7,172	7,107	6,754	6,543	6,270	6,081	5,987	5,945	5,964	6,173	6,751	6,997	7,063	6,816	7,243	7,217	6,884
2050	**Feb**	7,004	6,902	6,821	6,809	6,755	6,807	7,161	7,310	7,238	6,838	6,622	6,333	6,139	6,050	6,001	6,000	6,141	6,546	7,044	7,172	6,907	7,402	7,418	7,085
2050	**Mar**	6,617	6,445	6,311	6,297	6,322	6,514	6,910	7,033	6,978	6,648	6,489	6,266	6,129	6,084	6,060	6,052	6,117	6,258	6,519	6,838	6,741	7,273	7,259	6,809
2050	**Apr**	6,343	6,150	5,999	5,964	5,980	6,156	6,470	6,605	6,546	6,264	6,125	5,925	5,815	5,774	5,748	5,739	5,797	5,884	6,050	6,344	6,342	6,964	7,001	6,542
2050	**May**	5,805	5,637	5,483	5,418	5,346	5,384	5,621	5,842	5,799	5,720	5,706	5,628	5,620	5,684	5,742	5,782	5,860	5,934	6,008	6,145	6,185	6,699	6,539	6,044
2050	**Jun**	6,536	6,255	5,999	5,862	5,748	5,730	5,939	6,195	6,152	6,319	6,458	6,524	6,651	6,827	6,974	7,084	7,166	7,175	7,186	7,214	6,995	7,601	7,479	6,886
2050	**Jul**	6,672	6,389	6,134	5,996	5,879	5,850	6,000	6,240	6,198	6,495	6,710	6,881	7,109	7,373	7,592	7,727	7,806	7,788	7,703	7,612	7,324	7,835	7,672	7,073
2050	**Aug**	6,587	6,304	6,037	5,909	5,808	5,878	6,110	6,313	6,270	6,481	6,649	6,771	6,965	7,207	7,409	7,536	7,624	7,623	7,554	7,517	7,315	7,738	7,561	6,964
2050	**Sep**	6,240	6,012	5,803	5,703	5,607	5,661	5,948	6,059	6,014	5,948	5,986	5,970	6,054	6,218	6,378	6,500	6,611	6,649	6,658	6,814	6,564	7,032	6,973	6,486
2050	**Oct**	5,893	5,786	5,669	5,618	5,526	5,531	5,849	6,037	5,987	5,716	5,601	5,427	5,341	5,340	5,350	5,372	5,477	5,626	6,011	6,226	5,908	6,345	6,336	5,990
2050	**Nov**	6,451	6,343	6,248	6,224	6,165	6,206	6,495	6,613	6,547	6,162	5,975	5,729	5,588	5,541	5,541	5,580	5,815	6,267	6,426	6,505	6,249	6,788	6,873	6,551
2050	**Dec**	7,073	6,932	6,831	6,818	6,798	6,899	7,234	7,386	7,316	6,934	6,721	6,432	6,235	6,159	6,136	6,189	6,506	7,023	7,156	7,262	7,051	7,586	7,619	7,229

PSCo Average CO2 Emissions

PSCo Average CO2 Intensity [tons/MWh]
Total Carbon Serving Customers / Total Demand

Year	Month	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8	HE9	HE10	HE11	HE12	HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21	HE22	HE23	HE24
2024	Jan	0.485	0.482	0.485	0.488	0.487	0.480	0.470	0.453	0.435	0.423	0.410	0.392	0.381	0.376	0.379	0.408	0.464	0.471	0.466	0.471	0.489	0.497	0.492	0.484
2024	Feb	0.494	0.494	0.499	0.497	0.496	0.501	0.488	0.440	0.417	0.403	0.388	0.378	0.370	0.356	0.364	0.382	0.442	0.483	0.484	0.474	0.486	0.485	0.494	0.493
2024	Mar	0.483	0.488	0.488	0.492	0.500	0.495	0.448	0.389	0.373	0.358	0.362	0.368	0.364	0.339	0.338	0.343	0.361	0.421	0.455	0.448	0.446	0.446	0.448	0.466
2024	Apr	0.411	0.410	0.410	0.406	0.407	0.400	0.361	0.354	0.337	0.322	0.319	0.307	0.301	0.310	0.327	0.341	0.373	0.403	0.438	0.422	0.408	0.405	0.401	0.402
2024	May	0.485	0.490	0.498	0.504	0.506	0.485	0.447	0.411	0.381	0.354	0.347	0.352	0.357	0.371	0.375	0.366	0.363	0.366	0.399	0.407	0.409	0.419	0.442	0.469
2024	Jun	0.485	0.497	0.505	0.517	0.520	0.486	0.469	0.449	0.426	0.392	0.377	0.381	0.389	0.406	0.408	0.400	0.407	0.418	0.449	0.471	0.463	0.458	0.470	0.468
2024	Jul	0.508	0.527	0.543	0.553	0.560	0.551	0.520	0.484	0.464	0.427	0.416	0.414	0.432	0.443	0.442	0.438	0.437	0.437	0.462	0.482	0.481	0.489	0.486	0.489
2024	Aug	0.498	0.515	0.530	0.552	0.561	0.555	0.520	0.491	0.469	0.430	0.415	0.418	0.433	0.448	0.458	0.451	0.472	0.483	0.495	0.483	0.470	0.467	0.473	0.480
2024	Sep	0.489	0.496	0.508	0.515	0.519	0.524	0.499	0.470	0.441	0.411	0.391	0.383	0.393	0.415	0.424	0.433	0.453	0.474	0.494	0.488	0.487	0.467	0.458	0.470
2024	Oct	0.501	0.502	0.512	0.513	0.519	0.518	0.495	0.450	0.444	0.420	0.389	0.387	0.391	0.392	0.405	0.416	0.449	0.464	0.445	0.448	0.477	0.490	0.500	0.517
2024	Nov	0.444	0.446	0.453	0.451	0.464	0.478	0.479	0.438	0.423	0.412	0.397	0.372	0.377	0.382	0.392	0.443	0.496	0.464	0.463	0.458	0.467	0.471	0.469	0.457
2024	Dec	0.467	0.465	0.463	0.465	0.458	0.455	0.462	0.445	0.419	0.408	0.400	0.394	0.389	0.391	0.410	0.439	0.486	0.468	0.462	0.462	0.465	0.471	0.472	0.463
2025	Jan	0.474	0.472	0.471	0.481	0.479	0.471	0.460	0.442	0.411	0.400	0.385	0.373	0.361	0.355	0.356	0.393	0.451	0.468	0.461	0.468	0.485	0.489	0.485	0.472
2025	Feb	0.472	0.477	0.483	0.494	0.491	0.491	0.482	0.439	0.407	0.386	0.364	0.344	0.335	0.322	0.329	0.354	0.411	0.478	0.484	0.475	0.487	0.479	0.481	0.477
2025	Mar	0.493	0.499	0.505	0.507	0.512	0.506	0.463	0.404	0.378	0.359	0.357	0.362	0.361	0.342	0.335	0.341	0.364	0.436	0.469	0.464	0.464	0.466	0.470	0.478
2025	Apr	0.377	0.376	0.383	0.384	0.385	0.383	0.339	0.329	0.303	0.292	0.283	0.269	0.266	0.275	0.296	0.311	0.344	0.382	0.419	0.407	0.400	0.389	0.386	0.376
2025	May	0.423	0.424	0.432	0.437	0.443	0.428	0.392	0.354	0.323	0.302	0.295	0.293	0.296	0.303	0.314	0.311	0.311	0.313	0.347	0.370	0.387	0.386	0.395	0.413
2025	Jun	0.469	0.477	0.484	0.494	0.497	0.460	0.426	0.409	0.390	0.353	0.344	0.349	0.362	0.368	0.380	0.372	0.380	0.398	0.432	0.458	0.458	0.454	0.464	0.449
2025	Jul	0.494	0.514	0.537	0.547	0.550	0.538	0.503	0.468	0.438	0.407	0.398	0.399	0.413	0.428	0.434	0.429	0.424	0.423	0.454	0.479	0.480	0.486	0.482	0.483
2025	Aug	0.492	0.507	0.525	0.547	0.559	0.550	0.509	0.472	0.449	0.413	0.398	0.400	0.414	0.440	0.453	0.453	0.473	0.482	0.496	0.483	0.470	0.464	0.465	0.474
2025	Sep	0.479	0.494	0.503	0.512	0.513	0.515	0.485	0.450	0.422	0.400	0.379	0.370	0.380	0.403	0.418	0.430	0.447	0.469	0.491	0.482	0.480	0.477	0.467	0.461
2025	Oct	0.382	0.377	0.384	0.394	0.398	0.402	0.376	0.333	0.316	0.293	0.271	0.262	0.260	0.262	0.275	0.288	0.330	0.365	0.350	0.356	0.372	0.382	0.383	0.389
2025	Nov	0.421	0.419	0.420	0.425	0.443	0.452	0.445	0.401	0.378	0.355	0.339	0.323	0.328	0.329	0.348	0.389	0.454	0.441	0.431	0.432	0.439	0.442	0.440	0.434
2025	Dec	0.470	0.469	0.467	0.466	0.460	0.459	0.456	0.436	0.401	0.386	0.366	0.354	0.350	0.357	0.381	0.415	0.477	0.458	0.448	0.451	0.458	0.469	0.470	0.466
2026	Jan	0.302	0.297	0.295	0.300	0.296	0.289	0.284	0.264	0.231	0.215	0.204	0.200	0.190	0.191	0.199	0.221	0.274	0.321	0.305	0.311	0.324	0.316	0.308	0.300
2026	Feb	0.289	0.290	0.298	0.298	0.293	0.295	0.297	0.240	0.216	0.194	0.180	0.170	0.166	0.161	0.175	0.181	0.217	0.310	0.318	0.309	0.313	0.301	0.300	0.297
2026	Mar	0.265	0.263	0.271	0.267	0.266	0.266	0.228	0.181	0.170	0.160	0.161	0.160	0.157	0.148	0.146	0.152	0.162	0.209	0.251	0.248	0.243	0.244	0.252	0.255
2026	Apr	0.160	0.156	0.151	0.151	0.158	0.154	0.127	0.122	0.110	0.092	0.087	0.085	0.084	0.086	0.091	0.102	0.123	0.152	0.193	0.189	0.189	0.177	0.170	0.160
2026	May	0.203	0.207	0.209	0.208	0.209	0.192	0.163	0.136	0.116	0.103	0.100	0.103	0.105	0.117	0.121	0.118	0.122	0.124	0.158	0.182	0.185	0.189	0.192	0.205
2026	Jun	0.241	0.242	0.245	0.243	0.240	0.209	0.186	0.172	0.162	0.149	0.147	0.153	0.160	0.170	0.175	0.173	0.180	0.200	0.230	0.256	0.252	0.244	0.242	0.233
2026	Jul	0.282	0.292	0.306	0.306	0.305	0.288	0.256	0.227	0.206	0.191	0.186	0.185	0.196	0.209	0.226	0.229	0.232	0.237	0.265	0.289	0.290	0.291	0.281	0.273
2026	Aug	0.270	0.282	0.298	0.302	0.315	0.310	0.269	0.243	0.234	0.209	0.205	0.214	0.224	0.234	0.235	0.236	0.258	0.269	0.288	0.282	0.266	0.258	0.253	0.259
2026	Sep	0.257	0.259	0.262	0.265	0.266	0.263	0.225	0.202	0.193	0.175	0.170	0.168	0.170	0.177	0.190	0.198	0.235	0.255	0.278	0.272	0.265	0.257	0.249	0.249
2026	Oct	0.229	0.231	0.234	0.235	0.229	0.223	0.197	0.161	0.149	0.138	0.132	0.129	0.128	0.131	0.146	0.153	0.172	0.219	0.209	0.211	0.223	0.223	0.227	0.234
2026	Nov	0.217	0.215	0.212	0.216	0.217	0.214	0.204	0.174	0.160	0.153	0.143	0.136	0.135	0.137	0.144	0.164	0.223	0.225	0.215	0.219	0.225	0.226	0.224	0.221
2026	Dec	0.248	0.249	0.246	0.240	0.233	0.228	0.224	0.208	0.179	0.156	0.154	0.153	0.151	0.150	0.163	0.184	0.258	0.240	0.236	0.234	0.237	0.241	0.242	0.246
2027	Jan	0.251	0.248	0.245	0.246	0.243	0.229	0.218	0.198	0.171	0.152	0.148	0.144	0.145	0.150	0.150	0.159	0.198	0.239	0.222	0.224	0.232	0.237	0.241	0.244
2027	Feb	0.211	0.214	0.213	0.208	0.202	0.197	0.189	0.150	0.135	0.119	0.109	0.107	0.105	0.106	0.117	0.118	0.132	0.211	0.215	0.203	0.208	0.207	0.208	0.218
2027	Mar	0.169	0.172	0.174	0.166	0.162	0.152	0.121	0.089	0.082	0.076	0.072	0.069	0.069	0.066	0.069	0.073	0.077	0.110	0.158	0.143	0.145	0.154	0.159	0.161
2027	Apr	0.144	0.144	0.141	0.138	0.131	0.124	0.102	0.095	0.085	0.074	0.072	0.073	0.074	0.073	0.074	0.075	0.082	0.099	0.157	0.150	0.149	0.152	0.145	0.148
2027	May	0.159	0.164	0.163	0.160	0.155	0.134	0.101	0.078	0.066	0.062	0.062	0.063	0.063	0.067	0.068	0.073	0.074	0.080	0.113	0.140	0.138	0.147	0.147	0.160
2027	Jun	0.211	0.215	0.215	0.219	0.216	0.170	0.144	0.127	0.125	0.115	0.112	0.109	0.111	0.118	0.123	0.124	0.144	0.156	0.172	0.197	0.196	0.191	0.202	0.205
2027	Jul	0.230	0.238	0.248	0.247	0.237	0.208	0.177	0.152	0.142	0.133	0.128	0.125	0.133	0.144	0.146	0.148	0.151	0.161	0.190	0.214	0.210	0.212	0.211	0.227
2027	Aug	0.202	0.213	0.222	0.226	0.226	0.223	0.194	0.168	0.161	0.148	0.144	0.145	0.154	0.157	0.155	0.160	0.166	0.172	0.189	0.185	0.178	0.175	0.173	0.184
2027	Sep	0.182	0.183	0.181	0.183	0.193	0.188	0.152	0.129	0.127	0.118	0.111	0.107	0.107	0.111	0.112	0.123	0.146	0.167	0.177	0.168	0.167	0.175	0.172	0.176
2027	Oct	0.172	0.184	0.189	0.187	0.180	0.169	0.155	0.130	0.120	0.116	0.113	0.113	0.111	0.114	0.115	0.123	0.136	0.150	0.146	0.148	0.156	0.163	0.166	0.177
2027	Nov	0.181	0.177	0.174	0.172	0.176	0.167	0.160	0.137	0.125	0.120	0.112	0.104	0.102	0.106	0.110	0.125	0.158	0.158	0.154	0.157	0.165	0.170	0.170	0.180

PSCo Average CO2 Emissions

2027	**Dec**	0.200	0.202	0.201	0.195	0.185	0.182	0.177	0.164	0.137	0.126	0.120	0.118	0.122	0.119	0.129	0.150	0.203	0.186	0.182	0.185	0.184	0.188	0.193	0.197
2028	**Jan**	0.211	0.208	0.207	0.209	0.211	0.194	0.179	0.161	0.137	0.126	0.118	0.116	0.116	0.118	0.117	0.121	0.156	0.184	0.175	0.180	0.189	0.194	0.190	0.210
2028	**Feb**	0.155	0.157	0.155	0.149	0.146	0.142	0.132	0.107	0.094	0.079	0.068	0.069	0.069	0.070	0.077	0.083	0.097	0.143	0.152	0.142	0.147	0.151	0.151	0.162
2028	**Mar**	0.165	0.167	0.171	0.165	0.161	0.152	0.129	0.093	0.089	0.083	0.077	0.072	0.074	0.071	0.075	0.075	0.077	0.093	0.127	0.117	0.121	0.126	0.140	0.149
2028	**Apr**	0.104	0.105	0.101	0.099	0.092	0.087	0.074	0.065	0.056	0.047	0.046	0.047	0.047	0.047	0.047	0.048	0.050	0.062	0.096	0.094	0.100	0.103	0.098	0.101
2028	**May**	0.140	0.142	0.144	0.143	0.136	0.115	0.092	0.071	0.062	0.058	0.056	0.054	0.054	0.054	0.057	0.059	0.062	0.066	0.094	0.112	0.119	0.125	0.124	0.138
2028	**Jun**	0.185	0.185	0.185	0.184	0.182	0.143	0.123	0.108	0.103	0.097	0.096	0.096	0.096	0.099	0.108	0.108	0.123	0.147	0.158	0.179	0.179	0.171	0.175	0.182
2028	**Jul**	0.215	0.220	0.228	0.226	0.219	0.191	0.162	0.139	0.132	0.125	0.121	0.117	0.128	0.135	0.141	0.143	0.154	0.165	0.188	0.213	0.204	0.203	0.203	0.212
2028	**Aug**	0.197	0.208	0.215	0.219	0.220	0.214	0.184	0.160	0.145	0.133	0.134	0.131	0.141	0.149	0.151	0.155	0.162	0.168	0.200	0.195	0.184	0.177	0.176	0.179
2028	**Sep**	0.174	0.177	0.178	0.178	0.176	0.179	0.136	0.109	0.103	0.093	0.090	0.085	0.085	0.090	0.095	0.110	0.135	0.161	0.175	0.165	0.165	0.161	0.162	0.167
2028	**Oct**	0.161	0.169	0.174	0.172	0.166	0.157	0.139	0.115	0.104	0.101	0.097	0.095	0.093	0.096	0.099	0.105	0.123	0.150	0.142	0.141	0.150	0.154	0.158	0.169
2028	**Nov**	0.167	0.166	0.164	0.161	0.161	0.156	0.148	0.125	0.111	0.103	0.096	0.092	0.090	0.091	0.097	0.107	0.148	0.150	0.149	0.147	0.155	0.159	0.161	0.167
2028	**Dec**	0.185	0.186	0.188	0.182	0.173	0.164	0.164	0.151	0.129	0.118	0.111	0.107	0.108	0.109	0.116	0.143	0.200	0.188	0.182	0.179	0.177	0.180	0.176	0.180
2029	**Jan**	0.157	0.156	0.156	0.158	0.155	0.143	0.129	0.117	0.091	0.076	0.070	0.069	0.069	0.071	0.071	0.075	0.107	0.134	0.128	0.133	0.139	0.145	0.142	0.151
2029	**Feb**	0.115	0.122	0.119	0.116	0.113	0.111	0.106	0.081	0.063	0.047	0.040	0.036	0.038	0.037	0.042	0.050	0.066	0.133	0.139	0.124	0.124	0.125	0.122	0.126
2029	**Mar**	0.083	0.083	0.085	0.083	0.077	0.074	0.049	0.029	0.022	0.013	0.010	0.008	0.010	0.010	0.012	0.012	0.014	0.032	0.069	0.053	0.056	0.059	0.068	0.072
2029	**Apr**	0.036	0.034	0.033	0.033	0.028	0.027	0.018	0.011	0.006	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.002	0.011	0.039	0.037	0.040	0.046	0.038	0.041
2029	**May**	0.075	0.074	0.073	0.072	0.067	0.044	0.020	0.006	0.002	0.001	0.001	0.000	0.001	0.001	0.002	0.004	0.006	0.006	0.037	0.054	0.056	0.061	0.064	0.072
2029	**Jun**	0.140	0.138	0.134	0.133	0.131	0.086	0.060	0.051	0.050	0.046	0.045	0.047	0.048	0.055	0.067	0.067	0.092	0.101	0.126	0.138	0.139	0.133	0.140	0.136
2029	**Jul**	0.153	0.157	0.165	0.159	0.153	0.126	0.092	0.073	0.069	0.066	0.064	0.066	0.075	0.087	0.096	0.099	0.107	0.117	0.142	0.162	0.156	0.156	0.151	0.158
2029	**Aug**	0.144	0.155	0.160	0.162	0.159	0.149	0.124	0.098	0.089	0.080	0.075	0.075	0.088	0.099	0.100	0.112	0.115	0.125	0.144	0.142	0.135	0.131	0.126	0.132
2029	**Sep**	0.116	0.118	0.117	0.117	0.117	0.118	0.082	0.055	0.048	0.043	0.041	0.039	0.038	0.039	0.044	0.058	0.088	0.117	0.129	0.123	0.120	0.119	0.115	0.115
2029	**Oct**	0.102	0.110	0.115	0.112	0.106	0.096	0.091	0.065	0.053	0.049	0.046	0.045	0.044	0.044	0.048	0.053	0.081	0.101	0.098	0.097	0.102	0.106	0.103	0.111
2029	**Nov**	0.115	0.113	0.108	0.104	0.107	0.105	0.102	0.076	0.061	0.056	0.048	0.046	0.048	0.048	0.049	0.065	0.108	0.118	0.107	0.106	0.109	0.109	0.110	0.115
2029	**Dec**	0.144	0.147	0.147	0.143	0.133	0.133	0.130	0.118	0.095	0.082	0.076	0.075	0.075	0.073	0.079	0.105	0.165	0.157	0.150	0.145	0.147	0.151	0.144	0.148
2030	**Jan**	0.155	0.154	0.156	0.159	0.156	0.141	0.129	0.114	0.084	0.072	0.064	0.062	0.062	0.065	0.065	0.070	0.107	0.141	0.133	0.136	0.141	0.146	0.148	0.156
2030	**Feb**	0.135	0.140	0.139	0.132	0.129	0.126	0.120	0.093	0.072	0.056	0.048	0.046	0.047	0.046	0.051	0.060	0.080	0.138	0.142	0.136	0.138	0.137	0.136	0.143
2030	**Mar**	0.092	0.099	0.100	0.098	0.086	0.081	0.058	0.036	0.029	0.019	0.015	0.014	0.014	0.014	0.015	0.017	0.019	0.036	0.075	0.061	0.067	0.070	0.083	0.085
2030	**Apr**	0.039	0.036	0.034	0.034	0.030	0.027	0.018	0.008	0.006	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.003	0.012	0.041	0.039	0.043	0.051	0.042	0.042
2030	**May**	0.073	0.071	0.070	0.068	0.067	0.043	0.021	0.007	0.003	0.002	0.003	0.002	0.002	0.004	0.005	0.008	0.009	0.014	0.040	0.064	0.061	0.066	0.075	0.077
2030	**Jun**	0.141	0.138	0.135	0.133	0.130	0.086	0.055	0.047	0.041	0.036	0.035	0.035	0.037	0.040	0.048	0.059	0.079	0.091	0.124	0.138	0.137	0.133	0.138	0.140
2030	**Jul**	0.156	0.161	0.170	0.163	0.154	0.130	0.096	0.075	0.069	0.062	0.059	0.060	0.073	0.084	0.095	0.097	0.104	0.113	0.132	0.157	0.153	0.153	0.149	0.156
2030	**Aug**	0.155	0.165	0.173	0.172	0.172	0.160	0.126	0.103	0.095	0.084	0.085	0.084	0.103	0.105	0.110	0.120	0.126	0.139	0.155	0.154	0.144	0.142	0.139	0.144
2030	**Sep**	0.117	0.120	0.122	0.120	0.120	0.122	0.083	0.059	0.053	0.048	0.046	0.042	0.044	0.049	0.053	0.069	0.094	0.120	0.142	0.127	0.122	0.116	0.111	0.112
2030	**Oct**	0.097	0.105	0.107	0.106	0.103	0.090	0.084	0.057	0.044	0.040	0.037	0.036	0.035	0.035	0.037	0.044	0.069	0.092	0.091	0.091	0.100	0.102	0.100	0.106
2030	**Nov**	0.111	0.109	0.106	0.102	0.102	0.102	0.098	0.071	0.056	0.050	0.043	0.040	0.041	0.041	0.044	0.059	0.104	0.110	0.103	0.106	0.111	0.108	0.108	0.111
2030	**Dec**	0.151	0.157	0.156	0.150	0.142	0.134	0.133	0.120	0.097	0.080	0.075	0.073	0.072	0.073	0.079	0.103	0.175	0.160	0.153	0.150	0.155	0.151	0.148	0.152
2031	**Jan**	0.087	0.087	0.085	0.092	0.083	0.077	0.074	0.065	0.044	0.035	0.032	0.028	0.029	0.029	0.029	0.033	0.058	0.078	0.071	0.071	0.076	0.074	0.078	0.089
2031	**Feb**	0.056	0.057	0.063	0.059	0.056	0.058	0.056	0.038	0.026	0.014	0.007	0.005	0.005	0.004	0.009	0.011	0.024	0.064	0.063	0.061	0.061	0.057	0.053	0.056
2031	**Mar**	0.039	0.041	0.044	0.041	0.035	0.031	0.022	0.012	0.007	0.004	0.001	0.000	0.000	0.001	0.001	0.001	0.002	0.005	0.026	0.019	0.026	0.026	0.030	0.036
2031	**Apr**	0.018	0.017	0.016	0.017	0.015	0.013	0.008	0.004	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.019	0.017	0.025	0.027	0.021	0.023
2031	**May**	0.046	0.045	0.047	0.045	0.042	0.028	0.016	0.004	0.003	0.002	0.002	0.002	0.001	0.002	0.003	0.003	0.003	0.003	0.017	0.029	0.033	0.039	0.045	0.047
2031	**Jun**	0.080	0.077	0.075	0.073	0.069	0.036	0.020	0.015	0.012	0.009	0.010	0.010	0.011	0.014	0.020	0.024	0.043	0.049	0.063	0.070	0.076	0.074	0.074	0.078
2031	**Jul**	0.099	0.097	0.103	0.097	0.089	0.073	0.048	0.034	0.029	0.028	0.027	0.029	0.039	0.047	0.048	0.048	0.052	0.061	0.076	0.096	0.093	0.095	0.093	0.096
2031	**Aug**	0.068	0.073	0.078	0.079	0.078	0.077	0.062	0.048	0.038	0.033	0.033	0.035	0.050	0.049	0.051	0.055	0.060	0.071	0.076	0.069	0.065	0.058	0.053	0.052
2031	**Sep**	0.055	0.055	0.055	0.056	0.056	0.060	0.038	0.022	0.018	0.016	0.014	0.014	0.014	0.015	0.018	0.025	0.051	0.061	0.074	0.067	0.064	0.061	0.053	0.053
2031	**Oct**	0.033	0.041	0.047	0.041	0.039	0.038	0.036	0.024	0.017	0.014	0.012	0.011	0.009	0.008	0.009	0.016	0.029	0.040	0.035	0.040	0.040	0.047	0.036	0.041
2031	**Nov**	0.052	0.048	0.041	0.043	0.043	0.041	0.043	0.023	0.016	0.012	0.008	0.008	0.007	0.007	0.009	0.022	0.047	0.052	0.049	0.050	0.054	0.053	0.051	0.054
2031	**Dec**	0.072	0.073	0.075	0.073	0.068	0.060	0.065	0.054	0.037	0.028	0.024	0.022	0.021	0.020	0.027	0.043	0.093	0.084	0.078	0.079	0.080	0.078	0.077	0.078
2032	**Jan**	0.091	0.090	0.089	0.090	0.085	0.079	0.075	0.067	0.049	0.041	0.036	0.033	0.032	0.032	0.033	0.038	0.057	0.081	0.073	0.073	0.077	0.075	0.077	0.091
2032	**Feb**	0.050	0.055	0.056	0.055	0.050	0.051	0.050	0.034	0.024	0.014	0.007	0.005	0.004	0.004	0.012	0.011	0.019	0.053	0.060	0.054	0.050	0.050	0.047	0.049

PSCo Average CO2 Emissions

2032	**Mar**	0.038	0.039	0.038	0.037	0.033	0.027	0.018	0.011	0.007	0.003	0.001	0.000	0.001	0.000	0.001	0.001	0.002	0.006	0.026	0.019	0.023	0.025	0.028	0.034
2032	**Apr**	0.018	0.016	0.016	0.016	0.016	0.014	0.010	0.007	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.017	0.016	0.025	0.027	0.022	0.022
2032	**May**	0.044	0.043	0.044	0.043	0.040	0.030	0.017	0.004	0.002	0.002	0.002	0.002	0.002	0.003	0.004	0.003	0.003	0.004	0.015	0.027	0.031	0.036	0.039	0.044
2032	**Jun**	0.070	0.070	0.068	0.066	0.063	0.036	0.025	0.020	0.017	0.016	0.016	0.016	0.017	0.026	0.027	0.031	0.047	0.052	0.059	0.066	0.066	0.068	0.065	0.068
2032	**Jul**	0.093	0.094	0.100	0.095	0.088	0.075	0.057	0.039	0.036	0.036	0.032	0.032	0.042	0.046	0.048	0.046	0.049	0.057	0.071	0.094	0.089	0.090	0.089	0.092
2032	**Aug**	0.065	0.069	0.074	0.075	0.073	0.072	0.060	0.045	0.040	0.035	0.035	0.038	0.045	0.044	0.045	0.051	0.056	0.057	0.064	0.058	0.057	0.052	0.050	0.053
2032	**Sep**	0.060	0.057	0.055	0.052	0.056	0.056	0.038	0.025	0.022	0.019	0.017	0.017	0.018	0.021	0.027	0.030	0.054	0.067	0.073	0.069	0.067	0.067	0.060	0.059
2032	**Oct**	0.034	0.038	0.040	0.038	0.036	0.035	0.033	0.023	0.016	0.014	0.013	0.011	0.009	0.010	0.010	0.015	0.028	0.033	0.033	0.040	0.040	0.041	0.036	0.040
2032	**Nov**	0.050	0.044	0.041	0.040	0.040	0.037	0.039	0.025	0.017	0.013	0.008	0.007	0.006	0.006	0.009	0.018	0.045	0.048	0.048	0.050	0.050	0.051	0.050	0.052
2032	**Dec**	0.068	0.068	0.068	0.070	0.062	0.056	0.063	0.055	0.041	0.031	0.028	0.027	0.025	0.022	0.033	0.045	0.092	0.079	0.074	0.072	0.070	0.072	0.070	0.072
2033	**Jan**	0.094	0.094	0.093	0.095	0.091	0.081	0.075	0.065	0.048	0.040	0.035	0.031	0.031	0.032	0.031	0.037	0.057	0.086	0.077	0.078	0.080	0.077	0.077	0.095
2033	**Feb**	0.053	0.056	0.059	0.060	0.055	0.054	0.053	0.034	0.026	0.016	0.008	0.006	0.006	0.006	0.011	0.017	0.029	0.063	0.061	0.058	0.054	0.055	0.053	0.056
2033	**Mar**	0.046	0.044	0.045	0.042	0.037	0.032	0.021	0.012	0.010	0.004	0.003	0.002	0.002	0.001	0.002	0.002	0.003	0.008	0.033	0.024	0.027	0.031	0.036	0.038
2033	**Apr**	0.021	0.020	0.020	0.019	0.018	0.016	0.012	0.009	0.004	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.021	0.017	0.024	0.027	0.023	0.023
2033	**May**	0.046	0.047	0.047	0.046	0.042	0.032	0.019	0.006	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.019	0.024	0.034	0.039	0.040	0.047
2033	**Jun**	0.073	0.074	0.070	0.069	0.066	0.040	0.028	0.021	0.018	0.016	0.017	0.018	0.018	0.024	0.028	0.031	0.043	0.052	0.060	0.069	0.072	0.069	0.069	0.070
2033	**Jul**	0.095	0.096	0.103	0.098	0.089	0.078	0.060	0.043	0.039	0.040	0.036	0.036	0.047	0.056	0.055	0.053	0.054	0.062	0.074	0.101	0.095	0.095	0.094	0.098
2033	**Aug**	0.069	0.073	0.074	0.075	0.076	0.075	0.057	0.047	0.038	0.034	0.030	0.033	0.045	0.044	0.046	0.051	0.054	0.062	0.072	0.066	0.064	0.057	0.053	0.055
2033	**Sep**	0.062	0.061	0.058	0.059	0.056	0.058	0.034	0.020	0.017	0.014	0.013	0.014	0.015	0.016	0.022	0.027	0.046	0.064	0.067	0.061	0.064	0.065	0.060	0.062
2033	**Oct**	0.035	0.043	0.045	0.042	0.040	0.038	0.037	0.025	0.016	0.014	0.013	0.012	0.009	0.009	0.010	0.015	0.027	0.038	0.037	0.041	0.046	0.043	0.039	0.043
2033	**Nov**	0.054	0.049	0.043	0.045	0.043	0.041	0.042	0.027	0.019	0.016	0.010	0.009	0.008	0.008	0.009	0.021	0.046	0.052	0.047	0.053	0.054	0.054	0.055	0.054
2033	**Dec**	0.071	0.073	0.076	0.072	0.065	0.059	0.067	0.061	0.044	0.037	0.031	0.028	0.028	0.027	0.032	0.058	0.099	0.083	0.077	0.080	0.081	0.075	0.074	0.077
2034	**Jan**	0.092	0.091	0.090	0.093	0.089	0.079	0.075	0.066	0.048	0.040	0.034	0.030	0.031	0.031	0.031	0.036	0.059	0.080	0.075	0.077	0.077	0.075	0.076	0.089
2034	**Feb**	0.054	0.058	0.058	0.058	0.054	0.054	0.050	0.034	0.021	0.014	0.007	0.005	0.005	0.005	0.011	0.015	0.025	0.059	0.062	0.057	0.058	0.057	0.051	0.056
2034	**Mar**	0.043	0.045	0.048	0.042	0.037	0.034	0.025	0.016	0.010	0.005	0.003	0.001	0.001	0.002	0.002	0.002	0.003	0.007	0.032	0.020	0.024	0.030	0.034	0.038
2034	**Apr**	0.024	0.019	0.019	0.019	0.018	0.014	0.011	0.009	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.018	0.016	0.022	0.027	0.022	0.021
2034	**May**	0.043	0.044	0.047	0.043	0.040	0.031	0.019	0.005	0.002	0.001	0.001	0.001	0.002	0.001	0.002	0.002	0.002	0.001	0.014	0.023	0.033	0.041	0.036	0.044
2034	**Jun**	0.076	0.074	0.069	0.068	0.063	0.038	0.024	0.018	0.015	0.015	0.019	0.018	0.019	0.023	0.028	0.032	0.042	0.053	0.065	0.071	0.077	0.073	0.074	0.075
2034	**Jul**	0.093	0.096	0.098	0.095	0.088	0.076	0.057	0.040	0.037	0.039	0.035	0.036	0.043	0.049	0.048	0.051	0.054	0.063	0.079	0.103	0.095	0.094	0.093	0.097
2034	**Aug**	0.071	0.071	0.074	0.078	0.073	0.072	0.055	0.046	0.038	0.034	0.034	0.038	0.044	0.047	0.053	0.057	0.060	0.064	0.074	0.066	0.063	0.058	0.054	0.055
2034	**Sep**	0.056	0.057	0.055	0.052	0.053	0.054	0.033	0.020	0.016	0.015	0.013	0.012	0.013	0.014	0.018	0.025	0.051	0.060	0.064	0.065	0.063	0.060	0.051	0.052
2034	**Oct**	0.032	0.038	0.042	0.041	0.037	0.037	0.033	0.022	0.015	0.012	0.011	0.011	0.009	0.010	0.011	0.017	0.035	0.037	0.036	0.040	0.043	0.047	0.039	0.041
2034	**Nov**	0.055	0.051	0.044	0.047	0.047	0.044	0.042	0.028	0.019	0.016	0.010	0.009	0.010	0.009	0.011	0.022	0.045	0.049	0.055	0.052	0.053	0.054	0.055	0.056
2034	**Dec**	0.075	0.079	0.083	0.079	0.070	0.066	0.074	0.064	0.052	0.041	0.036	0.033	0.032	0.032	0.040	0.062	0.100	0.089	0.085	0.082	0.083	0.083	0.078	0.081
2035	**Jan**	0.089	0.089	0.089	0.092	0.087	0.077	0.073	0.064	0.047	0.039	0.035	0.032	0.032	0.032	0.032	0.036	0.058	0.072	0.075	0.072	0.074	0.076	0.074	0.090
2035	**Feb**	0.053	0.059	0.058	0.059	0.055	0.054	0.050	0.036	0.026	0.017	0.008	0.007	0.008	0.007	0.012	0.016	0.027	0.053	0.060	0.061	0.058	0.057	0.051	0.056
2035	**Mar**	0.039	0.039	0.040	0.038	0.034	0.030	0.021	0.014	0.010	0.005	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.005	0.026	0.018	0.022	0.027	0.031	0.035
2035	**Apr**	0.018	0.017	0.017	0.017	0.016	0.013	0.010	0.008	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.014	0.014	0.022	0.025	0.020	0.020
2035	**May**	0.047	0.046	0.048	0.046	0.043	0.032	0.017	0.005	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.013	0.025	0.032	0.037	0.039	0.044
2035	**Jun**	0.078	0.077	0.074	0.073	0.067	0.039	0.025	0.021	0.020	0.019	0.021	0.021	0.021	0.023	0.029	0.033	0.048	0.050	0.070	0.071	0.074	0.073	0.073	0.078
2035	**Jul**	0.090	0.093	0.099	0.093	0.085	0.075	0.052	0.035	0.032	0.030	0.031	0.029	0.036	0.043	0.044	0.046	0.053	0.063	0.077	0.097	0.094	0.091	0.088	0.092
2035	**Aug**	0.071	0.075	0.079	0.077	0.077	0.073	0.060	0.048	0.040	0.037	0.034	0.035	0.043	0.048	0.049	0.053	0.054	0.060	0.071	0.063	0.061	0.059	0.056	0.060
2035	**Sep**	0.052	0.051	0.050	0.046	0.047	0.047	0.031	0.018	0.013	0.011	0.010	0.012	0.010	0.011	0.015	0.022	0.045	0.057	0.065	0.063	0.064	0.061	0.056	0.055
2035	**Oct**	0.029	0.037	0.040	0.037	0.034	0.033	0.033	0.025	0.018	0.014	0.013	0.011	0.010	0.010	0.011	0.014	0.035	0.035	0.034	0.039	0.039	0.043	0.036	0.037
2035	**Nov**	0.054	0.051	0.043	0.044	0.043	0.042	0.040	0.025	0.019	0.015	0.008	0.008	0.008	0.008	0.010	0.023	0.043	0.050	0.050	0.051	0.050	0.051	0.049	0.051
2035	**Dec**	0.075	0.077	0.079	0.077	0.070	0.066	0.070	0.060	0.049	0.041	0.037	0.034	0.034	0.032	0.039	0.063	0.091	0.083	0.080	0.079	0.078	0.081	0.078	0.080
2036	**Jan**	0.088	0.087	0.087	0.089	0.085	0.075	0.071	0.062	0.044	0.036	0.033	0.030	0.030	0.030	0.030	0.033	0.059	0.074	0.070	0.071	0.075	0.072	0.076	0.088
2036	**Feb**	0.049	0.052	0.053	0.052	0.049	0.050	0.048	0.033	0.024	0.014	0.008	0.007	0.007	0.007	0.009	0.012	0.022	0.053	0.048	0.049	0.049	0.049	0.049	0.050
2036	**Mar**	0.035	0.037	0.036	0.037	0.033	0.029	0.021	0.012	0.008	0.005	0.002	0.001	0.001	0.001	0.001	0.001	0.000	0.002	0.022	0.017	0.024	0.023	0.028	0.031
2036	**Apr**	0.016	0.015	0.015	0.016	0.015	0.012	0.009	0.004	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.013	0.013	0.018	0.025	0.019	0.019
2036	**May**	0.045	0.045	0.045	0.045	0.041	0.031	0.020	0.007	0.004	0.003	0.003	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.016	0.026	0.029	0.037	0.043	0.044

PSCo Average CO2 Emissions

2036	**Jun**	0.075	0.075	0.074	0.072	0.066	0.041	0.024	0.018	0.015	0.013	0.012	0.013	0.014	0.016	0.019	0.024	0.040	0.043	0.058	0.060	0.069	0.067	0.069	0.076
2036	**Jul**	0.090	0.093	0.096	0.093	0.085	0.073	0.053	0.034	0.030	0.031	0.027	0.028	0.033	0.043	0.043	0.047	0.047	0.052	0.066	0.093	0.090	0.090	0.086	0.090
2036	**Aug**	0.064	0.068	0.074	0.074	0.073	0.069	0.059	0.048	0.037	0.033	0.032	0.034	0.045	0.048	0.048	0.053	0.055	0.060	0.064	0.058	0.057	0.053	0.048	0.049
2036	**Sep**	0.051	0.051	0.052	0.051	0.052	0.053	0.035	0.022	0.018	0.014	0.013	0.014	0.013	0.013	0.015	0.017	0.039	0.052	0.058	0.053	0.053	0.054	0.049	0.047
2036	**Oct**	0.030	0.033	0.038	0.036	0.033	0.033	0.031	0.021	0.015	0.013	0.011	0.013	0.010	0.010	0.011	0.016	0.027	0.030	0.030	0.035	0.034	0.038	0.038	0.038
2036	**Nov**	0.052	0.049	0.041	0.042	0.041	0.040	0.042	0.024	0.018	0.015	0.009	0.007	0.007	0.007	0.009	0.025	0.041	0.044	0.047	0.050	0.048	0.052	0.050	0.050
2036	**Dec**	0.072	0.075	0.077	0.076	0.066	0.058	0.063	0.056	0.040	0.033	0.030	0.029	0.030	0.028	0.032	0.048	0.084	0.074	0.072	0.072	0.075	0.074	0.076	0.076
2037	**Jan**	0.055	0.048	0.052	0.055	0.050	0.052	0.053	0.048	0.033	0.029	0.025	0.022	0.021	0.022	0.022	0.026	0.034	0.048	0.049	0.044	0.043	0.042	0.043	0.050
2037	**Feb**	0.020	0.024	0.036	0.030	0.027	0.031	0.032	0.020	0.014	0.007	0.003	0.001	0.001	0.001	0.002	0.006	0.006	0.023	0.024	0.019	0.018	0.017	0.016	0.018
2037	**Mar**	0.014	0.016	0.017	0.019	0.015	0.012	0.007	0.006	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.005	0.009	0.012	0.015	0.016
2037	**Apr**	0.006	0.007	0.007	0.007	0.007	0.005	0.004	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.003	0.004	0.014	0.007	0.008
2037	**May**	0.031	0.029	0.030	0.028	0.025	0.018	0.011	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.003	0.015	0.012	0.019	0.025	0.026
2037	**Jun**	0.043	0.046	0.042	0.039	0.036	0.020	0.012	0.008	0.007	0.007	0.006	0.006	0.007	0.010	0.009	0.012	0.022	0.023	0.033	0.029	0.037	0.041	0.041	0.042
2037	**Jul**	0.054	0.056	0.059	0.057	0.055	0.051	0.037	0.023	0.018	0.018	0.018	0.019	0.023	0.027	0.028	0.027	0.030	0.030	0.041	0.063	0.058	0.064	0.058	0.058
2037	**Aug**	0.036	0.040	0.041	0.041	0.041	0.042	0.033	0.023	0.020	0.017	0.016	0.021	0.023	0.028	0.027	0.030	0.037	0.039	0.035	0.024	0.020	0.021	0.022	0.024
2037	**Sep**	0.031	0.031	0.032	0.033	0.035	0.036	0.022	0.015	0.013	0.009	0.008	0.008	0.008	0.008	0.010	0.013	0.026	0.043	0.045	0.046	0.042	0.041	0.034	0.031
2037	**Oct**	0.010	0.015	0.016	0.014	0.013	0.017	0.015	0.010	0.010	0.008	0.006	0.005	0.005	0.004	0.004	0.006	0.014	0.016	0.016	0.021	0.021	0.022	0.018	0.018
2037	**Nov**	0.024	0.020	0.018	0.020	0.020	0.020	0.019	0.010	0.006	0.004	0.001	0.000	0.000	0.000	0.002	0.009	0.024	0.018	0.023	0.026	0.027	0.024	0.024	0.024
2037	**Dec**	0.032	0.027	0.029	0.030	0.030	0.032	0.033	0.034	0.027	0.018	0.016	0.011	0.009	0.008	0.015	0.026	0.049	0.045	0.036	0.038	0.033	0.038	0.036	0.034
2038	**Jan**	0.059	0.053	0.056	0.057	0.053	0.055	0.053	0.048	0.036	0.031	0.027	0.024	0.024	0.024	0.025	0.029	0.040	0.053	0.051	0.048	0.047	0.045	0.047	0.057
2038	**Feb**	0.025	0.028	0.037	0.036	0.031	0.036	0.037	0.025	0.018	0.010	0.005	0.002	0.002	0.002	0.005	0.009	0.011	0.031	0.029	0.024	0.020	0.020	0.018	0.021
2038	**Mar**	0.021	0.021	0.020	0.023	0.018	0.014	0.009	0.006	0.003	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.007	0.015	0.013	0.016	0.021
2038	**Apr**	0.008	0.009	0.010	0.010	0.010	0.007	0.006	0.004	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.004	0.007	0.018	0.009	0.010
2038	**May**	0.031	0.031	0.032	0.030	0.025	0.021	0.014	0.006	0.002	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.005	0.013	0.014	0.024	0.028	0.031
2038	**Jun**	0.049	0.051	0.047	0.043	0.040	0.025	0.018	0.013	0.013	0.010	0.011	0.012	0.012	0.020	0.018	0.020	0.031	0.030	0.041	0.036	0.042	0.046	0.044	0.048
2038	**Jul**	0.056	0.059	0.063	0.060	0.060	0.055	0.042	0.026	0.022	0.021	0.021	0.020	0.023	0.028	0.027	0.027	0.029	0.030	0.040	0.060	0.060	0.061	0.058	0.060
2038	**Aug**	0.040	0.045	0.043	0.045	0.044	0.043	0.037	0.030	0.026	0.023	0.020	0.024	0.025	0.027	0.025	0.030	0.035	0.033	0.029	0.022	0.022	0.022	0.026	0.027
2038	**Sep**	0.034	0.033	0.034	0.035	0.038	0.039	0.025	0.018	0.015	0.013	0.012	0.012	0.013	0.015	0.018	0.019	0.034	0.047	0.048	0.047	0.043	0.043	0.036	0.033
2038	**Oct**	0.013	0.017	0.015	0.014	0.013	0.017	0.016	0.012	0.009	0.009	0.007	0.006	0.006	0.005	0.006	0.007	0.016	0.017	0.018	0.023	0.021	0.023	0.018	0.020
2038	**Nov**	0.026	0.022	0.017	0.018	0.017	0.017	0.017	0.010	0.008	0.004	0.002	0.002	0.001	0.002	0.002	0.013	0.024	0.023	0.025	0.029	0.031	0.027	0.027	0.027
2038	**Dec**	0.036	0.031	0.033	0.034	0.034	0.032	0.037	0.038	0.029	0.022	0.020	0.016	0.015	0.015	0.022	0.037	0.058	0.055	0.044	0.044	0.039	0.044	0.040	0.042
2039	**Jan**	0.063	0.058	0.061	0.062	0.057	0.057	0.054	0.048	0.037	0.032	0.028	0.025	0.024	0.025	0.026	0.029	0.042	0.057	0.052	0.050	0.049	0.046	0.048	0.057
2039	**Feb**	0.029	0.032	0.039	0.039	0.034	0.038	0.038	0.024	0.018	0.010	0.006	0.002	0.002	0.003	0.007	0.009	0.013	0.039	0.038	0.031	0.027	0.025	0.022	0.025
2039	**Mar**	0.022	0.023	0.020	0.025	0.020	0.015	0.010	0.006	0.004	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.012	0.010	0.018	0.015	0.019	0.022
2039	**Apr**	0.013	0.013	0.013	0.014	0.012	0.009	0.007	0.005	0.003	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.008	0.007	0.011	0.019	0.014	0.014
2039	**May**	0.032	0.033	0.034	0.031	0.026	0.022	0.015	0.007	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.006	0.015	0.017	0.023	0.029	0.031
2039	**Jun**	0.054	0.056	0.052	0.047	0.047	0.029	0.020	0.016	0.012	0.011	0.011	0.014	0.014	0.019	0.021	0.024	0.032	0.035	0.042	0.038	0.045	0.052	0.046	0.054
2039	**Jul**	0.063	0.065	0.067	0.065	0.063	0.057	0.046	0.028	0.024	0.023	0.023	0.023	0.027	0.033	0.034	0.032	0.035	0.036	0.047	0.070	0.069	0.069	0.066	0.068
2039	**Aug**	0.044	0.049	0.047	0.049	0.048	0.045	0.040	0.030	0.024	0.021	0.020	0.023	0.027	0.028	0.026	0.031	0.035	0.041	0.042	0.031	0.033	0.030	0.031	0.033
2039	**Sep**	0.037	0.035	0.037	0.036	0.039	0.042	0.024	0.016	0.011	0.010	0.008	0.008	0.010	0.012	0.015	0.016	0.031	0.047	0.046	0.045	0.044	0.044	0.037	0.036
2039	**Oct**	0.016	0.018	0.019	0.017	0.016	0.018	0.018	0.012	0.009	0.008	0.007	0.006	0.006	0.006	0.005	0.008	0.020	0.022	0.023	0.026	0.024	0.027	0.022	0.022
2039	**Nov**	0.031	0.028	0.021	0.025	0.024	0.023	0.023	0.014	0.010	0.008	0.003	0.003	0.003	0.003	0.004	0.014	0.027	0.024	0.030	0.031	0.035	0.033	0.031	0.031
2039	**Dec**	0.045	0.040	0.044	0.042	0.044	0.038	0.046	0.046	0.036	0.026	0.023	0.018	0.019	0.019	0.025	0.049	0.072	0.068	0.056	0.054	0.050	0.053	0.049	0.049
2040	**Jan**	0.064	0.062	0.061	0.063	0.062	0.058	0.054	0.049	0.031	0.027	0.021	0.018	0.016	0.016	0.017	0.021	0.037	0.050	0.049	0.049	0.048	0.047	0.047	0.059
2040	**Feb**	0.031	0.036	0.040	0.038	0.035	0.039	0.036	0.024	0.017	0.010	0.005	0.003	0.003	0.004	0.007	0.009	0.014	0.034	0.035	0.032	0.032	0.028	0.024	0.028
2040	**Mar**	0.026	0.026	0.023	0.026	0.022	0.017	0.013	0.008	0.005	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.011	0.007	0.014	0.015	0.020	0.023
2040	**Apr**	0.010	0.011	0.011	0.012	0.010	0.008	0.006	0.005	0.003	0.000	0.001	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.004	0.005	0.009	0.021	0.012	0.011
2040	**May**	0.039	0.038	0.038	0.036	0.031	0.024	0.016	0.005	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.000	0.004	0.015	0.021	0.025	0.031	0.036
2040	**Jun**	0.061	0.063	0.057	0.054	0.051	0.029	0.017	0.013	0.012	0.010	0.012	0.014	0.014	0.016	0.017	0.022	0.034	0.036	0.050	0.047	0.054	0.055	0.055	0.058
2040	**Jul**	0.059	0.061	0.064	0.060	0.058	0.050	0.038	0.021	0.013	0.013	0.013	0.013	0.021	0.024	0.025	0.025	0.032	0.036	0.046	0.071	0.070	0.067	0.066	0.065
2040	**Aug**	0.042	0.046	0.045	0.046	0.045	0.046	0.038	0.029	0.022	0.020	0.019	0.020	0.023	0.029	0.028	0.035	0.040	0.045	0.043	0.031	0.030	0.027	0.026	0.028

PSCo Average CO2 Emissions

2040	**Sep**	0.036	0.033	0.033	0.032	0.035	0.038	0.026	0.017	0.012	0.009	0.008	0.009	0.009	0.009	0.010	0.013	0.032	0.045	0.056	0.047	0.049	0.049	0.042	0.036
2040	**Oct**	0.018	0.019	0.023	0.020	0.019	0.022	0.024	0.016	0.014	0.012	0.009	0.008	0.007	0.007	0.007	0.010	0.023	0.025	0.025	0.029	0.029	0.031	0.027	0.026
2040	**Nov**	0.036	0.034	0.027	0.030	0.029	0.027	0.027	0.016	0.013	0.010	0.006	0.005	0.005	0.005	0.007	0.021	0.030	0.031	0.034	0.037	0.038	0.036	0.035	0.036
2040	**Dec**	0.052	0.047	0.052	0.050	0.050	0.047	0.051	0.050	0.042	0.031	0.028	0.024	0.024	0.024	0.029	0.054	0.075	0.071	0.063	0.059	0.057	0.058	0.054	0.057
2041	**Jan**	0.054	0.053	0.053	0.056	0.051	0.048	0.045	0.039	0.026	0.020	0.017	0.013	0.013	0.014	0.015	0.016	0.030	0.045	0.043	0.041	0.043	0.041	0.043	0.055
2041	**Feb**	0.033	0.037	0.042	0.040	0.038	0.041	0.040	0.028	0.019	0.011	0.008	0.005	0.005	0.006	0.006	0.010	0.017	0.035	0.031	0.030	0.029	0.031	0.028	0.031
2041	**Mar**	0.028	0.028	0.025	0.028	0.022	0.018	0.016	0.009	0.007	0.004	0.003	0.002	0.002	0.003	0.002	0.002	0.001	0.001	0.008	0.008	0.017	0.016	0.021	0.024
2041	**Apr**	0.010	0.010	0.010	0.011	0.009	0.006	0.006	0.004	0.002	0.001	0.002	0.003	0.003	0.002	0.002	0.002	0.001	0.001	0.006	0.006	0.008	0.020	0.012	0.012
2041	**May**	0.036	0.036	0.037	0.036	0.033	0.025	0.017	0.007	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.001	0.001	0.004	0.015	0.020	0.024	0.033	0.035
2041	**Jun**	0.061	0.062	0.059	0.058	0.054	0.032	0.020	0.013	0.011	0.009	0.009	0.009	0.009	0.011	0.014	0.016	0.030	0.033	0.044	0.040	0.052	0.055	0.051	0.061
2041	**Jul**	0.054	0.055	0.059	0.058	0.053	0.046	0.032	0.019	0.012	0.012	0.012	0.012	0.015	0.019	0.021	0.022	0.028	0.032	0.043	0.061	0.062	0.062	0.058	0.059
2041	**Aug**	0.036	0.041	0.041	0.040	0.042	0.041	0.034	0.024	0.019	0.016	0.019	0.020	0.025	0.032	0.030	0.038	0.045	0.044	0.039	0.028	0.027	0.022	0.022	0.025
2041	**Sep**	0.033	0.033	0.034	0.034	0.039	0.042	0.029	0.020	0.015	0.010	0.010	0.009	0.009	0.011	0.011	0.013	0.028	0.043	0.046	0.043	0.042	0.041	0.035	0.032
2041	**Oct**	0.016	0.017	0.023	0.020	0.018	0.023	0.021	0.014	0.011	0.010	0.009	0.007	0.007	0.005	0.006	0.009	0.016	0.017	0.018	0.022	0.025	0.028	0.024	0.027
2041	**Nov**	0.033	0.031	0.023	0.027	0.027	0.025	0.023	0.014	0.011	0.010	0.005	0.005	0.005	0.004	0.006	0.017	0.028	0.027	0.028	0.032	0.035	0.033	0.030	0.030
2041	**Dec**	0.045	0.041	0.045	0.044	0.045	0.038	0.045	0.044	0.032	0.024	0.020	0.017	0.018	0.016	0.022	0.039	0.064	0.060	0.048	0.049	0.046	0.051	0.048	0.052
2042	**Jan**	0.055	0.051	0.053	0.051	0.054	0.049	0.047	0.042	0.030	0.024	0.020	0.016	0.015	0.015	0.015	0.017	0.031	0.042	0.041	0.038	0.040	0.039	0.041	0.049
2042	**Feb**	0.033	0.035	0.044	0.042	0.040	0.042	0.041	0.031	0.022	0.012	0.008	0.005	0.005	0.005	0.007	0.009	0.013	0.037	0.034	0.035	0.031	0.033	0.031	0.033
2042	**Mar**	0.024	0.027	0.023	0.026	0.023	0.018	0.015	0.011	0.006	0.005	0.005	0.004	0.004	0.003	0.004	0.003	0.002	0.002	0.007	0.009	0.014	0.015	0.021	0.024
2042	**Apr**	0.011	0.010	0.010	0.010	0.010	0.007	0.006	0.003	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.001	0.001	0.009	0.006	0.009	0.021	0.013	0.013
2042	**May**	0.039	0.035	0.037	0.034	0.032	0.026	0.019	0.009	0.005	0.005	0.004	0.005	0.004	0.004	0.004	0.004	0.002	0.002	0.006	0.015	0.016	0.025	0.034	0.034
2042	**Jun**	0.058	0.062	0.059	0.055	0.054	0.033	0.021	0.015	0.013	0.011	0.011	0.011	0.014	0.015	0.017	0.019	0.028	0.038	0.047	0.043	0.050	0.051	0.054	0.057
2042	**Jul**	0.053	0.055	0.059	0.054	0.054	0.047	0.035	0.020	0.012	0.012	0.011	0.010	0.017	0.016	0.020	0.023	0.028	0.030	0.042	0.061	0.060	0.063	0.061	0.059
2042	**Aug**	0.037	0.043	0.041	0.043	0.042	0.045	0.037	0.028	0.022	0.018	0.020	0.021	0.026	0.027	0.031	0.033	0.039	0.039	0.038	0.028	0.025	0.023	0.024	0.023
2042	**Sep**	0.032	0.032	0.032	0.034	0.036	0.042	0.028	0.022	0.016	0.012	0.011	0.010	0.010	0.011	0.012	0.014	0.030	0.043	0.045	0.043	0.043	0.041	0.035	0.031
2042	**Oct**	0.017	0.019	0.024	0.021	0.019	0.022	0.022	0.017	0.012	0.009	0.006	0.005	0.005	0.005	0.005	0.010	0.015	0.020	0.021	0.027	0.026	0.028	0.024	0.025
2042	**Nov**	0.029	0.027	0.021	0.025	0.023	0.022	0.021	0.013	0.009	0.008	0.005	0.004	0.005	0.005	0.008	0.016	0.027	0.026	0.027	0.032	0.033	0.032	0.030	0.030
2042	**Dec**	0.043	0.043	0.043	0.040	0.041	0.039	0.042	0.041	0.033	0.022	0.016	0.014	0.014	0.014	0.019	0.035	0.056	0.058	0.045	0.046	0.048	0.048	0.047	0.049
2043	**Jan**	0.047	0.045	0.046	0.045	0.046	0.043	0.041	0.037	0.026	0.021	0.017	0.012	0.011	0.011	0.012	0.017	0.023	0.037	0.034	0.035	0.035	0.033	0.035	0.044
2043	**Feb**	0.028	0.032	0.038	0.034	0.033	0.037	0.034	0.027	0.018	0.009	0.005	0.004	0.003	0.004	0.005	0.007	0.010	0.027	0.029	0.029	0.026	0.027	0.027	0.028
2043	**Mar**	0.021	0.024	0.020	0.023	0.020	0.015	0.014	0.008	0.005	0.004	0.003	0.003	0.002	0.003	0.002	0.002	0.002	0.001	0.008	0.008	0.013	0.013	0.019	0.021
2043	**Apr**	0.010	0.010	0.010	0.010	0.011	0.008	0.007	0.004	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.001	0.001	0.008	0.006	0.008	0.021	0.013	0.013
2043	**May**	0.032	0.033	0.035	0.032	0.031	0.025	0.019	0.009	0.004	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.001	0.006	0.013	0.016	0.023	0.028	0.031
2043	**Jun**	0.050	0.054	0.052	0.048	0.047	0.030	0.020	0.015	0.013	0.011	0.011	0.011	0.012	0.014	0.016	0.017	0.026	0.032	0.041	0.037	0.037	0.046	0.047	0.049
2043	**Jul**	0.046	0.048	0.051	0.048	0.047	0.042	0.032	0.017	0.010	0.010	0.009	0.010	0.013	0.017	0.020	0.020	0.025	0.027	0.038	0.052	0.052	0.055	0.053	0.052
2043	**Aug**	0.027	0.033	0.030	0.033	0.032	0.034	0.028	0.018	0.013	0.010	0.013	0.014	0.015	0.020	0.020	0.028	0.031	0.034	0.031	0.022	0.020	0.018	0.019	0.018
2043	**Sep**	0.029	0.030	0.030	0.031	0.033	0.036	0.024	0.019	0.013	0.010	0.009	0.008	0.008	0.009	0.012	0.016	0.028	0.039	0.043	0.041	0.042	0.039	0.034	0.030
2043	**Oct**	0.014	0.017	0.019	0.017	0.015	0.019	0.018	0.012	0.008	0.006	0.005	0.004	0.005	0.004	0.004	0.008	0.015	0.016	0.019	0.022	0.024	0.026	0.022	0.023
2043	**Nov**	0.024	0.021	0.016	0.020	0.018	0.017	0.016	0.012	0.008	0.006	0.004	0.003	0.003	0.003	0.004	0.011	0.022	0.020	0.022	0.028	0.027	0.028	0.025	0.024
2043	**Dec**	0.036	0.036	0.036	0.033	0.033	0.033	0.035	0.036	0.029	0.019	0.014	0.013	0.013	0.012	0.016	0.030	0.050	0.050	0.037	0.037	0.037	0.041	0.039	0.040
2044	**Jan**	0.045	0.044	0.046	0.046	0.046	0.041	0.039	0.034	0.025	0.020	0.015	0.012	0.011	0.011	0.011	0.015	0.023	0.035	0.036	0.034	0.035	0.033	0.035	0.042
2044	**Feb**	0.026	0.028	0.034	0.032	0.032	0.033	0.030	0.025	0.018	0.011	0.007	0.006	0.006	0.006	0.009	0.009	0.013	0.029	0.027	0.026	0.027	0.026	0.025	0.025
2044	**Mar**	0.021	0.024	0.022	0.022	0.019	0.016	0.013	0.007	0.005	0.004	0.003	0.003	0.002	0.003	0.002	0.002	0.002	0.002	0.009	0.007	0.013	0.013	0.020	0.021
2044	**Apr**	0.011	0.011	0.011	0.011	0.011	0.008	0.007	0.005	0.003	0.003	0.002	0.003	0.002	0.002	0.002	0.002	0.001	0.001	0.008	0.009	0.011	0.017	0.013	0.013
2044	**May**	0.027	0.027	0.028	0.027	0.025	0.020	0.016	0.008	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.003	0.007	0.011	0.016	0.020	0.026	0.027
2044	**Jun**	0.045	0.048	0.046	0.043	0.043	0.029	0.019	0.013	0.012	0.010	0.010	0.011	0.010	0.013	0.018	0.020	0.025	0.029	0.036	0.035	0.040	0.040	0.047	0.044
2044	**Jul**	0.047	0.047	0.049	0.048	0.045	0.040	0.032	0.019	0.011	0.010	0.010	0.010	0.016	0.018	0.019	0.020	0.020	0.027	0.038	0.049	0.051	0.054	0.050	0.050
2044	**Aug**	0.030	0.036	0.032	0.034	0.033	0.031	0.030	0.020	0.016	0.012	0.011	0.013	0.017	0.017	0.017	0.021	0.026	0.029	0.030	0.023	0.023	0.020	0.021	0.021
2044	**Sep**	0.028	0.027	0.027	0.027	0.029	0.034	0.021	0.014	0.009	0.007	0.005	0.005	0.007	0.009	0.010	0.010	0.023	0.038	0.036	0.034	0.037	0.035	0.031	0.029
2044	**Oct**	0.014	0.016	0.019	0.018	0.017	0.017	0.016	0.011	0.008	0.005	0.004	0.005	0.004	0.004	0.004	0.006	0.014	0.018	0.019	0.024	0.025	0.025	0.020	0.021
2044	**Nov**	0.023	0.023	0.018	0.018	0.018	0.018	0.017	0.011	0.008	0.006	0.004	0.003	0.003	0.003	0.004	0.013	0.019	0.021	0.020	0.028	0.027	0.027	0.026	0.026

PSCo Average CO2 Emissions

2044	**Dec**	0.032	0.031	0.033	0.030	0.032	0.030	0.033	0.033	0.026	0.017	0.015	0.012	0.013	0.012	0.017	0.030	0.048	0.048	0.038	0.037	0.037	0.039	0.037	0.037
2045	**Jan**	0.038	0.036	0.037	0.038	0.038	0.034	0.032	0.028	0.021	0.016	0.013	0.011	0.009	0.009	0.009	0.013	0.021	0.026	0.027	0.030	0.029	0.028	0.029	0.037
2045	**Feb**	0.023	0.026	0.031	0.028	0.026	0.027	0.025	0.019	0.013	0.008	0.006	0.005	0.005	0.005	0.008	0.007	0.013	0.023	0.022	0.023	0.027	0.024	0.024	0.024
2045	**Mar**	0.017	0.019	0.018	0.018	0.017	0.014	0.011	0.007	0.005	0.004	0.004	0.002	0.002	0.003	0.002	0.002	0.002	0.001	0.008	0.006	0.009	0.010	0.015	0.015
2045	**Apr**	0.009	0.008	0.008	0.009	0.009	0.007	0.006	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.005	0.008	0.010	0.014	0.010	0.010
2045	**May**	0.025	0.025	0.026	0.026	0.024	0.019	0.016	0.007	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.005	0.009	0.013	0.018	0.021	0.024
2045	**Jun**	0.040	0.041	0.039	0.038	0.036	0.024	0.016	0.012	0.011	0.010	0.011	0.011	0.011	0.013	0.016	0.016	0.022	0.024	0.029	0.030	0.035	0.034	0.039	0.039
2045	**Jul**	0.038	0.039	0.041	0.039	0.037	0.034	0.027	0.016	0.011	0.011	0.010	0.010	0.013	0.014	0.016	0.019	0.019	0.026	0.033	0.044	0.044	0.044	0.042	0.042
2045	**Aug**	0.027	0.029	0.027	0.029	0.029	0.027	0.026	0.019	0.015	0.012	0.013	0.014	0.016	0.019	0.018	0.021	0.024	0.025	0.025	0.020	0.021	0.019	0.018	0.018
2045	**Sep**	0.026	0.024	0.024	0.024	0.026	0.028	0.019	0.014	0.010	0.007	0.006	0.006	0.006	0.006	0.009	0.010	0.017	0.029	0.030	0.027	0.029	0.029	0.026	0.025
2045	**Oct**	0.015	0.017	0.018	0.017	0.018	0.017	0.016	0.012	0.008	0.005	0.004	0.004	0.004	0.004	0.004	0.009	0.014	0.019	0.017	0.020	0.024	0.021	0.020	0.020
2045	**Nov**	0.024	0.022	0.019	0.020	0.019	0.019	0.018	0.013	0.009	0.008	0.006	0.005	0.005	0.005	0.006	0.015	0.019	0.020	0.022	0.026	0.025	0.026	0.024	0.025
2045	**Dec**	0.035	0.033	0.034	0.035	0.032	0.030	0.032	0.032	0.027	0.020	0.016	0.014	0.013	0.012	0.016	0.029	0.044	0.043	0.039	0.038	0.039	0.038	0.037	0.038
2046	**Jan**	0.035	0.033	0.033	0.036	0.033	0.031	0.028	0.025	0.019	0.015	0.012	0.010	0.009	0.009	0.010	0.012	0.019	0.023	0.026	0.026	0.026	0.027	0.028	0.034
2046	**Feb**	0.024	0.024	0.028	0.028	0.027	0.025	0.024	0.020	0.016	0.010	0.007	0.006	0.006	0.007	0.009	0.008	0.015	0.021	0.022	0.025	0.026	0.026	0.026	0.024
2046	**Mar**	0.017	0.018	0.018	0.018	0.017	0.014	0.011	0.007	0.005	0.004	0.004	0.003	0.003	0.003	0.002	0.002	0.002	0.003	0.010	0.008	0.009	0.012	0.014	0.014
2046	**Apr**	0.008	0.008	0.008	0.008	0.008	0.006	0.005	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.005	0.007	0.009	0.012	0.009	0.009
2046	**May**	0.018	0.018	0.019	0.019	0.018	0.015	0.011	0.005	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.006	0.009	0.012	0.015	0.016	0.018
2046	**Jun**	0.036	0.037	0.038	0.037	0.036	0.025	0.018	0.014	0.013	0.012	0.012	0.012	0.012	0.013	0.016	0.018	0.025	0.026	0.031	0.031	0.033	0.032	0.035	0.036
2046	**Jul**	0.033	0.034	0.037	0.035	0.032	0.029	0.022	0.014	0.009	0.009	0.009	0.008	0.011	0.012	0.015	0.016	0.017	0.023	0.029	0.038	0.037	0.037	0.035	0.037
2046	**Aug**	0.025	0.027	0.027	0.028	0.030	0.027	0.024	0.019	0.015	0.013	0.012	0.012	0.015	0.017	0.016	0.019	0.020	0.022	0.026	0.021	0.021	0.020	0.019	0.021
2046	**Sep**	0.022	0.020	0.019	0.019	0.019	0.021	0.015	0.011	0.008	0.006	0.004	0.004	0.004	0.004	0.006	0.010	0.019	0.024	0.026	0.026	0.029	0.026	0.024	0.023
2046	**Oct**	0.014	0.014	0.017	0.015	0.015	0.015	0.014	0.011	0.008	0.006	0.005	0.004	0.004	0.004	0.003	0.007	0.013	0.015	0.015	0.017	0.018	0.018	0.017	0.017
2046	**Nov**	0.021	0.019	0.018	0.016	0.016	0.016	0.014	0.011	0.008	0.006	0.005	0.005	0.005	0.005	0.006	0.012	0.015	0.016	0.018	0.021	0.020	0.020	0.020	0.020
2046	**Dec**	0.029	0.028	0.027	0.028	0.026	0.024	0.026	0.024	0.022	0.017	0.015	0.012	0.012	0.011	0.014	0.027	0.034	0.035	0.033	0.033	0.033	0.032	0.031	0.034
2047	**Jan**	0.027	0.025	0.026	0.027	0.025	0.023	0.020	0.018	0.013	0.010	0.009	0.007	0.007	0.007	0.007	0.008	0.014	0.017	0.019	0.019	0.020	0.020	0.021	0.026
2047	**Feb**	0.019	0.019	0.023	0.022	0.022	0.021	0.020	0.016	0.012	0.007	0.005	0.004	0.004	0.004	0.006	0.006	0.012	0.017	0.017	0.018	0.019	0.020	0.020	0.019
2047	**Mar**	0.013	0.014	0.015	0.015	0.013	0.011	0.010	0.007	0.005	0.004	0.003	0.003	0.002	0.002	0.002	0.001	0.001	0.002	0.007	0.007	0.008	0.010	0.012	0.012
2047	**Apr**	0.006	0.006	0.006	0.006	0.006	0.005	0.004	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.007	0.009	0.007	0.007
2047	**May**	0.014	0.014	0.014	0.014	0.013	0.012	0.008	0.005	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.006	0.007	0.011	0.012	0.014	0.014
2047	**Jun**	0.028	0.028	0.029	0.029	0.027	0.021	0.014	0.011	0.010	0.009	0.009	0.009	0.009	0.009	0.011	0.013	0.017	0.019	0.022	0.024	0.026	0.026	0.028	0.027
2047	**Jul**	0.026	0.027	0.029	0.027	0.025	0.024	0.018	0.012	0.008	0.007	0.007	0.007	0.008	0.010	0.011	0.012	0.013	0.017	0.021	0.026	0.028	0.028	0.026	0.028
2047	**Aug**	0.020	0.021	0.022	0.024	0.023	0.022	0.019	0.015	0.011	0.010	0.011	0.011	0.013	0.015	0.015	0.017	0.018	0.019	0.021	0.017	0.016	0.015	0.015	0.016
2047	**Sep**	0.017	0.017	0.017	0.017	0.018	0.019	0.015	0.010	0.007	0.005	0.004	0.004	0.004	0.006	0.006	0.008	0.014	0.020	0.020	0.019	0.020	0.019	0.017	0.017
2047	**Oct**	0.011	0.011	0.014	0.012	0.012	0.012	0.011	0.009	0.006	0.004	0.004	0.003	0.003	0.003	0.003	0.005	0.008	0.009	0.010	0.011	0.013	0.013	0.012	0.014
2047	**Nov**	0.016	0.015	0.014	0.013	0.013	0.013	0.012	0.009	0.007	0.006	0.004	0.004	0.004	0.004	0.005	0.010	0.012	0.013	0.013	0.016	0.016	0.017	0.015	0.016
2047	**Dec**	0.023	0.022	0.021	0.022	0.020	0.019	0.020	0.018	0.016	0.012	0.010	0.008	0.008	0.008	0.009	0.019	0.025	0.025	0.023	0.024	0.024	0.024	0.023	0.026
2048	**Jan**	0.018	0.017	0.018	0.019	0.018	0.016	0.014	0.013	0.010	0.008	0.007	0.006	0.005	0.005	0.005	0.006	0.010	0.012	0.013	0.014	0.014	0.014	0.015	0.017
2048	**Feb**	0.013	0.013	0.015	0.014	0.014	0.013	0.013	0.011	0.008	0.005	0.003	0.003	0.003	0.003	0.004	0.004	0.007	0.011	0.011	0.011	0.012	0.013	0.013	0.012
2048	**Mar**	0.008	0.009	0.009	0.009	0.008	0.007	0.006	0.004	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.004	0.005	0.006	0.007	0.007
2048	**Apr**	0.004	0.004	0.004	0.004	0.004	0.004	0.003	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.003	0.004	0.005	0.006	0.004	0.005
2048	**May**	0.009	0.009	0.010	0.009	0.009	0.008	0.006	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.004	0.005	0.006	0.008	0.009	0.009
2048	**Jun**	0.019	0.020	0.020	0.020	0.019	0.014	0.011	0.008	0.007	0.007	0.007	0.007	0.007	0.008	0.009	0.010	0.013	0.013	0.017	0.016	0.017	0.017	0.019	0.019
2048	**Jul**	0.019	0.020	0.020	0.020	0.018	0.017	0.015	0.010	0.007	0.006	0.006	0.006	0.007	0.009	0.010	0.010	0.010	0.013	0.015	0.020	0.020	0.020	0.019	0.020
2048	**Aug**	0.013	0.014	0.015	0.016	0.015	0.015	0.013	0.010	0.009	0.007	0.008	0.008	0.010	0.011	0.011	0.012	0.012	0.013	0.014	0.011	0.011	0.011	0.010	0.011
2048	**Sep**	0.013	0.012	0.012	0.012	0.012	0.013	0.010	0.008	0.006	0.005	0.004	0.004	0.004	0.005	0.007	0.008	0.012	0.014	0.014	0.014	0.015	0.015	0.012	0.012
2048	**Oct**	0.007	0.007	0.008	0.007	0.007	0.007	0.007	0.005	0.004	0.003	0.003	0.003	0.003	0.003	0.005	0.007	0.008	0.008	0.008	0.008	0.009	0.009	0.009	0.010
2048	**Nov**	0.011	0.010	0.010	0.009	0.009	0.008	0.008	0.007	0.005	0.004	0.003	0.003	0.003	0.003	0.004	0.007	0.008	0.009	0.010	0.011	0.011	0.011	0.011	0.011
2048	**Dec**	0.016	0.015	0.015	0.015	0.014	0.013	0.013	0.012	0.011	0.008	0.007	0.006	0.006	0.006	0.007	0.013	0.016	0.016	0.015	0.016	0.017	0.016	0.016	0.017
2049	**Jan**	0.009	0.009	0.009	0.010	0.010	0.009	0.008	0.007	0.006	0.005	0.004	0.004	0.003	0.003	0.003	0.004	0.006	0.008	0.008	0.008	0.008	0.008	0.008	0.009
2049	**Feb**	0.007	0.008	0.008	0.008	0.008	0.008	0.007	0.006	0.005	0.003	0.002	0.002	0.002	0.002	0.003	0.003	0.005	0.007	0.006	0.007	0.007	0.008	0.007	0.007

PSCo Average CO2 Emissions

2049	**Mar**	0.005	0.005	0.006	0.005	0.005	0.005	0.004	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.003	0.002	0.003	0.004	0.004	0.004
2049	**Apr**	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.002	0.002	0.003	0.003	0.003	0.003
2049	**May**	0.005	0.005	0.005	0.005	0.005	0.004	0.004	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.003	0.003	0.004	0.005	0.005
2049	**Jun**	0.010	0.010	0.010	0.010	0.010	0.007	0.006	0.004	0.004	0.004	0.003	0.004	0.004	0.004	0.005	0.006	0.007	0.008	0.009	0.009	0.009	0.009	0.010	0.010
2049	**Jul**	0.009	0.010	0.010	0.010	0.009	0.009	0.008	0.005	0.004	0.004	0.003	0.003	0.003	0.004	0.005	0.005	0.005	0.007	0.008	0.010	0.010	0.010	0.009	0.010
2049	**Aug**	0.007	0.007	0.008	0.008	0.008	0.008	0.007	0.005	0.005	0.004	0.004	0.004	0.005	0.005	0.005	0.006	0.006	0.006	0.007	0.005	0.005	0.006	0.005	0.006
2049	**Sep**	0.007	0.006	0.006	0.006	0.006	0.007	0.005	0.004	0.003	0.003	0.002	0.002	0.002	0.003	0.004	0.005	0.007	0.007	0.007	0.008	0.008	0.008	0.007	0.007
2049	**Oct**	0.004	0.004	0.005	0.004	0.004	0.004	0.004	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.003	0.004	0.004	0.004	0.005	0.005	0.005	0.005
2049	**Nov**	0.006	0.006	0.005	0.004	0.004	0.004	0.004	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.004	0.005	0.005	0.005	0.006	0.006	0.006	0.006	0.006
2049	**Dec**	0.008	0.008	0.008	0.008	0.007	0.007	0.007	0.006	0.006	0.004	0.004	0.003	0.003	0.003	0.004	0.007	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009
2050	**Jan**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2050	**Feb**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2050	**Mar**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2050	**Apr**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2050	**May**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2050	**Jun**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2050	**Jul**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2050	**Aug**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2050	**Sep**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2050	**Oct**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2050	**Nov**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2050	**Dec**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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