



2015/2016 Demand-Side Management Plan Electric and Natural Gas

Public Service Company of Colorado
Proceeding No. 14A-1057EG

August 20, 2015



1800 Larimer Street
Denver, Colorado 80202

1-800-895-4999
xcelenergy.com

2015/2016 Demand Side Management Plan

Energy efficiency is a cornerstone of Xcel Energy's clean energy strategy. Today we help customers manage their energy consumption through one of the largest energy saving program portfolios in the United States. Customers save money, and we avoid emissions and the need to purchase or produce additional power. We've consistently outperformed our goals while keeping our energy efficiency program offerings cost effective and competitively priced.

Industry changes have forced utilities across the country to take a new look at the energy efficiency programs they offer to their customers; and as technology and standards continue to evolve, new approaches are required. These changes are helping customers use less energy and save more, but also significantly reduce energy savings opportunities that utilities can claim toward Demand Side Management (DSM) goals.

Because the energy efficiency market is always evolving, we constantly evaluate our offerings to improve performance in this area. At our regulators' request, we've created an updated plan for the coming two years that will allow us to remain a recognized national leader in electric and natural gas energy efficiency. We continue to support these programs because they allow our customers to manage their energy costs; provide customer choice; improve the environment; and help bolster our communities.

We are submitting a 2015/2016 DSM Plan to the Colorado Public Utilities Commission seeking approval for a strong, diverse portfolio of new and existing energy efficiency programs that will provide savings opportunities for all customer classes.

Plan Highlights:

- **Xcel Energy has taken the “best of the best” programs in this plan for the greatest impact.** The 2015-2016 DSM Plan is grounded in preceding years' most successful approaches, in combination with adjustments for improvements that reflect market shifts and integrate emerging technologies. The plan proposes new products, expansion of customer-preferred products and additional pilot programs.
- **Xcel Energy invests in the most cost-effective energy efficiency programs to maximize savings and benefits, while keeping energy prices affordable.** This balanced plan allows us to meet challenging goals and manage bill impacts at a time when costs are rising and energy saving impacts are shrinking. We recognize we have a responsibility to be vigilant stewards of ratepayer funds and ensure programs are both cost competitive and highly effective.
- **The plan supports a wide range of energy efficiency choices to meet different customer needs and interests.** The 2015-2016 DSM Plan outlines a broad, comprehensive portfolio of energy efficiency offerings to provide residential, business and low-income customers with opportunities to save energy. From rebate programs to energy audits to new construction, our award-winning programs provide solutions that customers value.

Our robust evaluation, measurement and verification process will ensure accountability, provide the Commission and other interested parties with verified energy savings and allow us to track ongoing effectiveness. The 2015-2016 DSM Plan is yet another example of Xcel Energy's ability to manage customer bill impacts responsibly, demonstrate environmental leadership and an ongoing commitment to providing a wide variety of choices to meet the diverse energy needs of Coloradans.

Table of Contents

Section I

Executive Summary: Plan Overview	5
Executive Summary: Electric DSM Tables	22
Executive Summary: Natural Gas DSM Tables	31
DSM Participation	40
DSM Participation Tables.....	44

Section II

Business Program.....	47
Residential Program.....	143
Low-Income Program	207
Indirect Products & Services	221
Demand Response Program.....	312

Section III

Cost-Benefit Analyses	340
-----------------------------	-----

Section IV

Appendix A – List of Acronyms.....	357
Appendix B – Key Terms	358
Appendix C – Product Rankings.....	360
Appendix D – Budget Categories	361
Appendix E – Avoided Cost Assumptions	362
Appendix F – Natural Gas DSM \$/Therm and ALR Methodology	366
Appendix G – Technical Reference Manual.....	368

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 2015/2016 DSM Plan; provides program and product level targets and budgets; identifies budgets by cost category; and addresses customer participation.
2. Program and Product Summaries – a high-level summary of each program area followed by specifics of each DSM product offering.
3. Cost-Benefit Analyses – provides the electric and natural gas Portfolio and Program cost-benefit analysis results for 2015 and 2016.
4. Appendices – presents a list of acronyms; key terms; product rankings; avoided costs; description of budget categories; natural gas DSM \$/Therm and Acknowledgement of Lost Revenue (“ALR”) methodology; 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”) submits this combined electric and natural gas 2015/2016 Demand-Side Management Plan (“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 goal by offering an inclusive and cost-effective DSM portfolio, delivered to customers via proven marketing techniques.

The Company’s 2015/16 DSM Plan is grounded in a continuance of preceding years’ successful approaches, in combination with necessary adjustments made to improve DSM offerings to reflect market shifts and integrate emerging technologies identified in the Potential Study;¹ and to be responsive to the Commission’s Decision² in the 2013 DSM Strategic Issues (Proceeding No. 13A-0686EG). That Decision resulted in lowered energy savings goals for 2015-2020,³ recognizing contracting market potential. In an attempt to combat rate impacts, the Commission instituted an energy efficiency budget cap starting in 2015⁴ and enhanced focus on ensuring achievement of 100% of the energy savings goal through changes to the Company’s financial incentive mechanism.⁵

This Plan meets the requirements of the relevant Commission Decisions and Rules,⁶ and aims to hit the Commission-approved energy savings goal (400 GWh), while overcoming the challenges presented by a dynamic and complex market that has evolved from the environment in which HB07-1037⁷ was initiated under. These challenges include stricter lighting standards and building codes that are beneficial for achieving greater naturally-occurring energy efficiency, but are reducing the level of incremental energy savings that the Company can claim through its portfolio. The DSM products will also experience lower avoided costs starting in 2015, juxtapose higher costs of market capture, making it more challenging for many DSM products to maintain cost-effectiveness. The Company was able to develop this Plan by making a series of modifications to the portfolio for 2015 and 2016.

¹ The *Update to the Colorado DSM Market Potential Assessment*, completed in June 2013, available: https://www.dora.state.co.us/pls/efi/efi.show_document?p_dms_document_id=210745&p_session_id=2

² Decision No. C14-0731, Proceeding No. 13A-0686EG.

³ The previous electric energy saving goals were approved Decision No. C11-0442, where the goal was set at 411 GWh for 2015 and 441 GWh for 2016. Decision C14-0731 reduced the 2015 and 2016 goals to 400 GWh annually.

⁴ The energy efficiency budget cap is set at \$84.3 million; per Paragraph 5 on pages 2-3 of Decision No. C14-0997.

⁵ Beginning in 2015, the Company is eligible for a performance incentive at 100% of goal achievement per Paragraph 32 on page 13 of Decision No. C14-0731.

⁶ Commission’s Decision Nos. C11-0442 and C11-0645 issued in Docket No. 10A-554EG, Decision No. C14-0731 issued in Docket No. 13A-0686EG; and Rules 4750 to 4760 of the Commission’s Rules Regulating Gas Utilities and Pipeline Operators (the Gas DSM Rules).

⁷ An Act of the Colorado House of Representatives Concerning Measures to Promote Energy Efficiency passed in 2007, available: http://www.dora.state.co.us/puc/rulemaking/HB07-1037/HB07-1037_enr.pdf.

To meet the Commission-approved goal for the DSM portfolio, Public Service has developed the Plan under the following high-level approaches:

- Leveraging robust project pipelines (for products with long planning/construction cycles, such as Process Efficiency and New Construction);
- Testing new market channels through use of midstream rebate approaches (Cooling and Lighting Efficiency);
- Launching promising new products (for example, LED Street Lights and Energy Feedback Residential) and pilots (for example, Multifamily Buildings Pilot); and
- Accelerating market penetration in all customer classes through increased promotions and trade channel development.

Public Service also believes that successful implementation of this Plan will be the result of active participation by stakeholders. These stakeholders include our customers, the Colorado Energy Office, other state agencies, local governments, environmental groups, external consulting groups, efficient equipment manufacturers, distributors and vendors, installation contractors, and customer advocates. Each of the Company's DSM products offers their 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.⁸

2015/2016 DSM Plan

In this filing, Public Service proposes an annual DSM Plan designed to achieve energy savings of approximately 406.7 GWh in electric and 586,825 Dth in natural gas in 2015, at proposed costs of \$81.6 million and \$13.1 million, respectively. For 2016, Public Service proposes achievement of energy savings of approximately 407.1 GWh in electric and 615,040 Dth in natural gas, at proposed costs of \$78.9 million and \$13.7 million, respectively. The 2015 and 2016 electric energy savings goal, 400 GWh annually, was established by the Commission in Docket No. 13A-0686EG (Decision No. C14-0731, ¶19). The Plan is also designed to achieve incremental demand reduction from energy efficiency totaling 79.5 MW in 2015 and 76.1 MW in 2016, to meet the Commission-approved annual demand reduction goal of 65 MW from energy efficiency.⁹ (Cumulative demand reduction impacts expected from the Company's demand response (DR) programs and pilots are discussed in the Demand Response Program section of the Plan). Table 1 below provides a summary of the budgets, energy savings targets and demand savings associated with the overall portfolio of energy efficiency and DR.

⁸ 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.

⁹ Decision No. C14-0731, Proceeding No. 13A-0686EG, paragraph 60, pg. 22.

Table 1: 2015/2016 DSM Plan Budgets & Targeted Energy and Demand Savings¹⁰

	Budget	Energy Savings Target (Gen KWh or Dth)	Incremental Demand Target (Gen kW)
2015 – Electric			
Energy Efficiency Programs	\$75,676,563	403,609,626	79,285
Indirect Program	\$5,919,135	3,066,995	166
Total 2015 Electric EE	\$81,595,698	406,676,621	79,450
Demand Response Programs	\$12,801,015	174,412	13,390
Demand Response Pilots	\$930,970	52,734	2,096
Total 2015 Electric DR	\$13,731,985	227,146	15,486
2015 Electric TOTAL	\$95,327,683	406,903,766	94,936
2015 – Natural Gas			
Energy Efficiency Programs	\$11,290,813	572,179	---
Indirect Program	\$1,840,042	14,646	---
2015 Natural Gas TOTAL	\$13,130,855	586,825	---
2015 TOTAL	\$108,458,538	406,903,766 kWh 586,825 Dth	94,936
2016 – Electric			
Energy Efficiency Programs	\$72,233,595	402,893,654	74,974
Indirect Program	\$6,483,420	4,191,254	1,129
Total 2016 Electric EE	\$78,937,015	407,084,908	76,103
Demand Response Programs	\$13,166,015	174,412	13,390
Demand Response Pilots	\$334,411	0	0
Total 2016 Electric DR	\$13,500,426	174,412	13,390
2016 Electric TOTAL	\$92,437,441	407,259,321	89,493
2016 – Natural Gas			
Energy Efficiency Programs	\$11,400,812	598,396	---
Indirect Program	\$2,319,095	16,644	---
2016 Natural Gas TOTAL	\$13,719,907	615,040	---
2016 TOTAL	\$106,157,348	407,259,316 kWh 615,040 Dth	89,493

¹⁰ Decimal places associated with data and sum totals is not displayed.

Modifications in 2015 and 2016

While the majority of the DSM products included in this Plan are the same as those that have been implemented since 2009, products have naturally evolved since that time to promote cost-effectiveness and adapt to the marketplace. 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 Docket No. 08A-366EG, to afford the Company discretion to make mid-year changes to Plans in order to achieve the greatest level of energy savings.¹¹

The Plan also reflects additional noteworthy changes that include:

- Updated avoided costs and technical assumptions to reflect current data.
- New product additions to the portfolio, including:
 - Energy Feedback Business (2016)
 - LED Street Lights (Company-owned)
 - Energy Feedback Residential (transitioning the former Energy Feedback Pilot to a product within the Residential Program)
 - Home Energy Squad
- Product and measure changes, including the addition of:
 - Midstream Rebates – Cooling
 - Variable Speed Drive (VSD) Horsepower (hp) Reduction – Compressed Air Efficiency
 - Electrically Commutated (EC) Plug Fans – Data Centers
 - Energy Management Information Systems (EMIS) – Energy Management Systems
 - Area Lighting, Customer-owned LED Street Lights, Integral Automatic Controls, and Midstream rebates – Lighting Efficiency
 - Direct Install – Lighting – Small Business
 - Small- to Mid-tier Customer Offering – Process Efficiency
 - 17 Seasonal Energy Efficiency Ratio (SEER) / 13 Energy Efficiency Ratio (EER) unit rebate – High Efficiency Air Conditioning
- Measure retirement:
 - High-pressure sodium fixtures and pulse-start metal halide fixtures – Lighting Efficiency

¹¹ 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: http://www.xcelenergy.com/About_Us/Rates_&_Regulations/Regulatory_Filings/CO_DSM.

- Motors that meet, but do not exceed, NEMA Premium® efficiencies
 - 14.5 SEER new unit rebate – HEAC¹²
 - 85% Annual Fuel Utilization Efficiency (“AFUE”) boilers – Residential Heating
- New pilot additions to the portfolio, including:
 - Multifamily Building Pilot
 - Smart Thermostat Pilot
 - Small Business Smart Thermostat Pilot
 - Building Energy Optimization DR Pilot
- The Company will expand implementation of midstream rebate approaches. Recognizing that energy-efficient equipment purchase decisions are often driven by first-costs and new, higher efficiency technologies often meet market barriers, the Company believes it can deliver additional energy savings to customers through direct buy-down of retail/wholesale equipment costs for customers. ACEEE, Northwest Energy Efficiency Alliance (NEEA), and the International Energy Program Evaluation Conference (IEPEC) have documented the benefits of midstream and upstream incentive approaches for utility DSM. The Company offers mid/upstream incentives for the following DSM products: Cooling, Computer Efficiency, Lighting Efficiency, Lighting – Small Business, and Home Lighting & Recycling.
 - Relative to the 2014 DSM Plan, and due to expected performance in 2015/2016, budgets and/or savings targets for the following products have decreased: Lighting – Small Business, Motor & Drive Efficiency, and Self Direct.
 - With the increase in the energy savings goal ordered by the Commission in Decision No. C14-0731 (Proceeding No. 13A-0686EG) starting in 2015, budgets and/or savings targets for the following products have been increased: Computer Efficiency, Lighting Efficiency, New Construction, Process Efficiency, and Home Lighting & Recycling.
 - Due to concerns regarding the reduced cost-effectiveness of many natural gas DSM products given low gas commodity prices, the lack of significant system benefits from natural gas DSM, and the rate impact on non-participating customers, we have maintained our natural gas expenditures at approximately \$13 million, to achieve savings at a similar level to 2014.
 - Two products are being discontinued:
 - Segment Efficiency (Business) – The product was first implemented in 2009 to mirror the product that launched in Company’s Minnesota service territory in 2007 but discontinued in 2010. The product was designed to target the commercial real estate market segment, provide them with a comprehensive study, then suggest measures to implement and offer incentives to implement

¹² Trade-in rebates at this SEER remain available.

those measures. However, the Company already offers seven other study-related DSM products (which are more cost-effective), and customers have shown a clear preference for those over Segment Efficiency. The product has never achieved its kWh, Dth, or participation goals, even after several efforts to incite change via marketing and third-party implementer changes. Due to continual underperformance, no new studies will be accepted after the closure of the 2014 plan-year. The Company will continue to pay rebates for any measures identified in completed customer studies until December 31, 2015—which will be paid out of other DSM product budgets based on project end-use, and those products will also absorb related energy savings. The rebate will include the additional 30% bonus offered under the Segment Efficiency product, not to exceed 75% of incremental cost.

- Pool Pumps (Residential) – The Company issued a 90-Day Notice on September 22, 2014 to discontinue this product at the end of 2014.
- Early Conclusion of Standard Offer M&V – The Standard Offer product was discontinued via 90-Day Notice as of December 31, 2013. The product included a unique three-year post-implementation annual snapshot for M&V persistence. However, obtaining remaining project M&V data has been challenging due to customer staff turnover and inadequate historical data. The Company does not feel that further expenditures on M&V would be prudent given that:
 - The costs for continuing M&V are outside the recommended International Performance Measurement and Verification Protocol (IPMVP) range (10% of annual customer savings);
 - Historically, M&V conducted in the second and third years has not resulted in any change from M&V conducted in the first;
 - No additional energy savings will be realized after 2014; and
 - Few projects remain under the out-year M&V requirements.
- Conclusion of the Community Energy Efficiency Planning Pilot – Planning activities have concluded; and implementation support and pilot evaluation will be completed by the end of 2014. The Company will continue to support communities through the Partners in Energy initiative.
- Conclusion of the Electric Vehicle (EV) Charging Station Pilot – The pilot's three-year period concludes in December 2014. The results will be analyzed for potential follow-on activities.
- Conclusion of the In-Home Smart Device Pilot – The pilot concluded in December 2013 and the evaluation results were posted to the Company's DSM website in March 2014.

2015/2016 Goals by Program

Public Service continues a full portfolio of electric and natural gas DSM products to serve all customer segments. Public Service will market its energy efficiency products 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 savings and participation targets, 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 targets and budgets for the Business Program in 2015 and 2016 are:

Business Electric Program (2015)

- Electric budget \$47,022,790
- Electric savings 40,424 Net Gen. kW and 260.9 Net Gen. GWh

Business Natural Gas Program (2015)

- Natural gas budget \$2,013,309; natural gas savings 187,082 Dth

Business Electric Program (2016)

- Electric budget \$44,174,864
- Electric savings 37,743 Net Gen. kW and 259.3 Net Gen. GWh

Business Natural Gas Program (2016)

- Natural gas budget \$1,806,540; natural gas savings 187,961 Dth

Although economies of scale enable the business segment to offer a comparably lower cost of DSM per unit of energy saved, business DSM is some of the most difficult 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, the majority of 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 the program offerings.

Residential Electric and Gas Programs

Public Service has approximately 1.2 million electric and 1.24 million natural gas customers in its residential market in Colorado.¹³ 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. Proposed targets and budgets for the Residential Program in 2015 and 2016 are:

Residential Electric Program (2015)

- Electric budget \$25,626,280

¹³ Electric and natural gas customers as of July 2014.

- Electric savings 38,062 Net Gen. kW and 135.6 Net Gen. GWh
- Residential Natural Gas Program (2015)*

- Natural gas budget \$5,878,245; natural gas savings 328,933 Dth
- Residential Electric Program (2016)*

- Electric budget \$25,075,480
 - Electric savings 36,428 Net Gen. kW and 136.4 Net Gen. GWh
- Residential Natural Gas Program (2016)*

- Natural gas budget \$6,209,311; natural gas savings 353,188 Dth

Low-Income Electric and Gas Programs

The primary objective of the Low-Income Program is to reduce energy consumption in low-income customers' homes and thereby reduce low-income customer bills. Proposed targets and budgets for the Low-Income Program in 2015 and 2016 are:

Low-Income Electric Program (2015)

- Electric budget \$3,027,493
- Electric savings 799 Net Gen. kW and 7.1 Net Gen. GWh

Low-Income Natural Gas Program (2015)

- Natural gas budget \$3,399,258; natural gas savings 51,164 Dth

Low-Income Electric Program (2016)

- Electric budget \$2,983,251
- Electric savings 803 Net Gen. kW and 7.1 Net Gen. GWh

Low-Income Natural Gas Program (2016)

- Natural gas budget \$3,384,960; natural gas savings 57,247 Dth

Indirect Products and Services

The Company's Indirect Products and Services, for the most part (other than a few pilots with direct savings), support the direct products in the DSM portfolio. The Education/Market Transformation area includes five customer-facing products for providing education, training, and product demonstration, and marketing DSM rebates and incentives. The Planning and Research area includes five services to support the DSM portfolio: Planning and Administration, Program Evaluations, Measurement and Verification, Market Research, and Product Development. While the majority of the Indirect Products and Services do not have savings goals, the Company is offering four pilot products, with electric and gas savings (if cost-effective). Proposed targets and budgets for Indirect Products and Services in 2015 and 2016 are:

Indirect Products & Services (2015 – Electric)

- Electric budget \$5,919,135
- Electric savings 166 Net Gen. kW and 3.0 Net Gen GWh

Indirect Products & Services (2015 – Natural Gas)

- Natural gas budget \$1,840,042; natural gas savings 14,646 Dth

Indirect Products & Services (2016 – Electric)

- Electric budget \$6,703,420
- Electric savings 1,129 Net Gen. kW and 4.1 Net Gen. GWh

Indirect Products & Services (2016 – Natural Gas)

- Natural gas budget \$2,319,095; natural gas savings 16,644 Dth

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 marketplace through market transformation and customer education. The Company believes that market transformation and customer education are 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 will have an assumed MTRC ratio of 1.0.¹⁴

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.¹⁵

In 2015 and 2016, Public Service offers five pilots in 2015 and four pilots in 2016 that are fully described in the Indirect Products & Services section of this Plan, including the Company's overall pilot requirements. These pilots include:

- Building Optimization DR Pilot (market transformation, direct savings, demand response)
- Energy Feedback Pilot – Business¹⁶ (market transformation)
- Multifamily Buildings Pilot (market transformation, direct savings)
- Small Business Smart Thermostat DR Pilot (market transformation, direct savings, demand response)

¹⁴ The Modified Total Resource Cost (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 (Docket No. 07A-420E) paragraph 141, and reaffirmed by Decision No. C11-0442 (Docket No. 10A-554EG) paragraph 99.

¹⁵ Decision No. C11-0442 (Docket No. 10A-554EG) paragraph 99.

¹⁶ A presumptive MTRC of 1.0 be applied to the Energy Feedback Pilot – Business in 2015; the pilot will transition from a pilot in 2015 to a Business product in 2016.

- Smart Thermostat Pilot (market transformation, direct savings, demand response)

Competitive Acquisition of DSM Resources: Third-Party Providers

As a result of the Commission's order in Docket No. 10A-554EG, in the Company's Strategic Issues filing, Public Service is required to identify the specific products that are open to competitive bidding for implementation.¹⁷ Additionally, Public Service is to set forth the specific criteria by which these bids will be evaluated.¹⁸ 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 & 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.

Table 2a: Bid Evaluation Factors and Weighting

Evaluation Factors	Explanation	Weighting
Cost	<ul style="list-style-type: none"> • Cost transparency • Total cost of ownership • Bid amount 	45% - 65%
Ability To Perform	<ul style="list-style-type: none"> • Prior experience • Feasible plan • Quality of project team • Ability to meet schedule 	30% - 50%
Safety	<ul style="list-style-type: none"> • Historical safety record 	5% - 15%
Terms & Conditions	<ul style="list-style-type: none"> • Adherence to Xcel Energy standards 	5% - 10%
Financial Health	<ul style="list-style-type: none"> • Pre-qualifier in RFP. 	Pre-qual only
Diversity	<ul style="list-style-type: none"> • Firm's commitment to diversity and inclusion. 	0% - 15%
Green Business Practices	<ul style="list-style-type: none"> • Firm's commitment to environmental sustainability. 	0% - 15%
Project Specific	<ul style="list-style-type: none"> • Dependent on project. <i>Examples:</i> field presence in jurisdiction, expertise with 	0% - 15%

¹⁷ Decision No. C11-0442.

¹⁸ In the matter of the application of Public Service Company of Colorado for approval of a number of strategic issues relating to its DSM plan, including long-term electric energy savings goals, and incentives. Docket No. 10A-554EG, Decision No. C11-0442, paragraph 81.

Needs	specific market segment, unique or proprietary software, etc.	
-------	---	--

The table below identifies all products that have a third-party implementer and further identifies which of these products will have new contracts bid or be sole-sourced in 2015 and 2016. 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 Annual DSM 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. C11-0645.¹⁹

¹⁹ Decision C11-0645 (Proceeding 10A-554EG), page 5 paragraph 14.

Table 2b: 2015/2016 Products with Third-Party Implementers

No Bids Planned in 2015/2016	RFP Anticipated for 2015/2016	Contract Type (existing)
	Energy Management Systems (EIS measure only)	n/a
	Home Energy Audits	Competitive Bid (2012)
	Refrigerator & Freezer Recycling	Sole-sourced (2013)
	Small Business Smart Thermostat Pilot	n/a
Behavioral Residential (frmwr. Energy Feedback Pilot)		Sole-sourced (2010)
Behavioral Business (frmwr. Energy Feedback Pilot-Business)		Competitive Bid (2013)
Building Optimization DR Pilot		Sole-Sourced (2015)*
Business Energy Analysis (Onsite Audits)		Competitive Bid (2012)
Commercial Refrigeration Efficiency		Competitive Bid (2012)
Cooling (DEPACC)		Competitive Bid (2013)
Cooling (Midstream)		Sole-sourced (2015)*
Computer Efficiency		Sole-sourced (2012)
Energy Efficient Showerhead		Sole-sourced (2014)
Energy Savings Kits		Competitive Bid (2011)
ENERGY STAR New Homes		Competitive Bid (2014)
Home Lighting & Recycling		Competitive Bid (2013)
Home Performance with ENERGY STAR		Competitive Bid (2012)
Lighting Efficiency (Midstream)		Competitive Bid (2014)
Lighting – Small Business		Competitive Bid (2013)
Multifamily Weatherization		Sole-sourced (2014)
Multifamily Building Pilot		Competitive Bid (2014)*
New Construction		Competitive Bid (2011)
Non-Profit Energy Efficiency		Sole-sourced (2014)
Third-Party Demand Response		Competitive Bid (2009)
Recommissioning		Sole-sourced (2014)
School Education Kits		Competitive Bid (2013)
Single-Family Weatherization		Competitive Bid (2014)
Smart Thermostat Pilot		Competitive Bid (2014)*

*Anticipated.

History of PSCo's DSM Activity in Colorado

Over the last sixteen years, Public Service has entered into several regulatory settlements involving demand-side management in conjunction with its integrated resource/least-cost planning process. The following paragraphs describe those settlements, as well as legislation and decisions significant to demand-side management:

- In the 1996 Integrated Resource Plan Settlement Agreement (Decision C98-1042, Docket No. 97A-297E), the Company committed up to \$10M for DSM over four years through two bid processes. The first focused on residential air conditioning load control and lighting for commercial customers ("Bid 2000") and the second followed the completion of the Bid 2000 program.
- In the 1999 integrated Resource Plan DSM Stipulation and Settlement Agreement (Decision C00-1057, Docket No. 00A-008E), the Company committed to use its best efforts to acquire 124 MW of cost-effective DSM resource through the 1999 IRP Resource Acquisition Period ending December 31, 2005. The Company was authorized to spend no more than \$75 million (Year 2000 Dollars) to obtain the 124 MW of DSM. This amount included total capital costs and operating expenses incurred by the Company, but excluded expenses for the natural gas Energy \$avings Partners ("E\$P") low-income weatherization program. The 1999 Agreement identified target savings by customer class and program type.
- As part of the 2003 Least-Cost Resource Plan Settlement Agreement (Decision C05-0049, Docket Nos. 04A-214E, 04A-215E, 04A-216E), the Company committed to obtain 320 MW and 800 GWh of cost effective conservation for \$196 million (Year 2005 Dollars) between 2006 and 2013.
- House Bill 07-1037, Concerning Measures to Promote Energy Efficiency, and Making as Appropriation Therefore, was passed by the Colorado General Assembly and signed into law by Governor Ritter in 2007. It codified in relevant part at §§ 40-1-102(5), (6) and (7), C.R.S. as well as §§ 40-3.2-101 and 104, C.R.S. That bill establishes that:

cost-effective natural gas and electricity demand-side management programs will save money for consumers and utilities and protect Colorado's environment. The general assembly further finds, determines, and declares that providing funding mechanisms to encourage Colorado's public utilities to reduce emissions or air pollutants and to increase energy efficiency are matters of statewide concern and that public interest is served by quality of life and health of Colorado citizens and an increase in the attractiveness of Colorado as a place to live and conduct business.

20

Section 40-3.2-104, C.R.S. further directs the Commission to:

establish energy savings and peak demand reduction goals to be achieved by an investor-owned electric utility, taking into account the utility's cost-effective DSM potential, the need for electricity resources, the benefits of DSM investments, and other factors as determined by the commission.

²⁰ § 40-3.2-101, C.R.S.

*The energy savings and peak demand reduction goals shall be at least five percent of the utility's retail system peak demand measured in megawatts in the base year and at least five percent of the utility's retail energy sales measured in megawatt-hours in the base year. The base year shall be 2006. The goals shall be met in 2018, counting savings in 2018 from DSM measures installed starting in 2006. The commission may establish interim goals and may revise the goals as it deems appropriate.*²¹

- On June 27, 2007, the Commission issued Decision No. C07-0562, opening Docket No 07I-251G to investigate issues associated with the natural gas DSM requirements contained in §40-3.2-103, C.R.S. which directs the Commission to implement rules to establish specific natural gas DSM requirement for jurisdictional natural gas utilities. Through an informal workshop and two rounds of comments on proposed rules, the Commission issued Decision No. C08-0248 adopting the Rules regarding Natural Gas Demand Side Management, pursuant to House Bill 07-1037, enacted as § 40-3.2-103, C.R.S..
- On October 31, 2007, Public Service filed its Application for Authorization to Implement an Enhanced Demand Side Management Program and to Revise its Demand Side Management Cost Adjustment Mechanism to Include Current Cost Recovery and Incentives. Public Service requested approval to implement an enhanced electric DSM program and to revise its demand-side management cost adjustment mechanism (“DSMCA”) to include current cost recovery and incentives designed to reward Public Service for successfully implementing cost-effective electric DSM programs and measures. On June 5, 2008, the Commission issued its Decision No. C08-0560 approving, in part, the enhanced DSM Plan proposed by the Company and establishing annual electric energy savings goals for Public Service from 2009 through 2020. As part of Decision No. C08-0560, the Commission also endorsed the Company’s proposal to file biennial DSM plans and to combine gas and electric DSM plans in one filing, thereby waiving the gas DSM rules’ requirement for the Company to file triennial natural gas DSM Plans.
- In compliance with Decision No. C08-0560, Public Service filed its first combined gas and electric 2009/2010, DSM Plan on August 11, 2008. In this Plan, the Company proposed a comprehensive portfolio of electric and natural gas demand-side management programs for 2009 and 2010 as well as annual budgets and annual goals for the natural gas DSM programs. The Commission initiated Docket No. 08A-366EG to consider the 2009/2010 DSM Plan filing and numerous parties intervened. However, prior to hearings, the majority of the Intervenors, the Commission Staff, and the Company entered into a Stipulation and Settlement Agreement. The Settling Parties recommended approval of the Plan subject to certain amendments and changes to specific DSM programs agreed to and described in the Appendix to the Agreement. The Settling Parties further agreed to recommend to the Commission that the Company be afforded

²¹ § 40-3.2-104(2)

- the discretion to modify the plan during the course of the plan period and agreed to a process for providing notice of plan changes to interested stakeholders.
- The Commission accepted the 2009/2010 Plan Stipulation in Decision R08-1243 issued on November 28, 2008. As agreed to in the Stipulation, in compliance with Decision No. R08-1243, on February 20, 2009, the Company filed its 2009/2010 DSM Plan Update, including all changes that had been agreed to in the Stipulation as well as corrections to certain errors made in the original plan filing. On May 1, 2009, the Company filed a further amendment to the Plan.
 - On July 1, 2010, Public Service filed its Verified Application for approval of its proposed 2011 DSM Plan and continuation of the terms of the Stipulation and Settlement Agreement entered into and approved by the Commission in Docket No. 08A-366EG, except to the extent that those terms are specific to the company's 2009/2010 Biennial DSM Plan in Docket 10A-471EG. On December 16, 2010, the Stipulation and Settlement Agreement was approved by the Commission in Decision R10-1336.
 - On August 10, 2010 Public Service filed a Verified Application for Approval of a Number of Strategic Issues relating to its DSM Plan, including long term electric energy savings goals and incentives in Docket No. 10A-554EG. The Application proposed new electric savings goals along with a new electric incentive mechanism. In addition, the application requested various other changes to the plan. Following the hearing in that proceeding, the Commission issued on April 26, 2011, Decision Nos. C11-0442, approving Public Service's Application with modifications. The Commission then issued Decision No. C11-0645 on June 14, 2011, addressing Public Service's Application for Rehearing, Reargument, or Reconsideration and granting the Company's motion for a one-month extension to file it 2012-2013 Biennial Plan to August 1, 2011.
 - On August 1, 2011 the Company filed a combined electric and natural gas 2012/2013 Biennial Demand-Side Management Plan in Docket No. 11A-631EG. On November 10, 2011 a Stipulation and Settlement Agreement along with a Joint Motion to Approve Stipulation Agreement were filed by Public Service. The Stipulation and Settlement Agreement was approved by the Administrative Law Judge by Decision No. R-11-1326 issued on December 9, 2011 without significant modification. No exceptions were filed, and, therefore, Decision No. R11-1326 became the final decision of the commission on December 29, 2011. It was ordered by the ALJ that within 60 days of the effective date of the Recommended Decision, Public Service shall file an update of its DSM Plan reflecting changes approved with approval of the Stipulation and Settlement Agreement, together with an erratum correcting errors. On February 28, 2012, Public Service filed the updated 2012/2013 DSM Plan.
 - On June 17, 2013 the Company filed a Verified Application for Approval of a Number Strategic Issues Relating to its DSM Plan (Proceeding No. 13A-0686EG), including proposed new electric savings goals along with a new electric incentive mechanism, and approval for new DSM products. Following the hearing in that proceeding, the Commission issued on July 1, 2014, Decision No. C14-0731, approving Public Service's Application with modifications. The

- Commission then issued Decision No. C14-0997 on August 13, 2014, addressing Public Service's Application for Rehearing, Reargument, or Reconsideration.
- On July 1, 2013 the Company filed a combined electric and natural gas 2014 DSM Plan in Docket No. 13A-0773EG. On September 19, 2013, the Company filed a Joint Statement of Clarification Regarding the Interim Extension of the Company's 2013 Electric and Natural Gas DSM Plan, Pending Consideration of the Company's Proposed 2014 DSM Plan ("Joint Statement"). The purpose of the Joint Statement was to clarify the effect of the interim extension of the Company's 2013 DSM Plan on the energy savings goals and budgets during calendar year 2014, as well as the calculation of net economic benefits and associated incentives under the electric 2013 DSM Plan and 2014 DSM Plan in calendar year 2014, the calculation of lost revenues and gas bonus under the natural gas 2013 DSM Plan and 2014 DSM Plan in calendar year 2014, and the operation of the DSM tracker during 2014, among other matters. On September 27, 2013, a Recommended Decision was issued (Decision No. R13-1204-1) granting the proposed interim extension of the 2013 DSM Plan consistent with the terms set forth in the Joint Statement. On October 29, 2013 a Stipulation and Settlement Agreement along with a Joint Motion to Approve Stipulation Agreement were filed by Public Service. The Stipulation and Settlement Agreement was approved by the Administrative Law Judge by Decision No. R14-0389 issued on April 11, 2014 without significant modification following the hearing in the proceeding. No exceptions were filed, and, therefore, Decision No. R14-0389 became the final decision of the commission on May 1, 2014. On May 22, 2014, Public Service filed the updated 2014 DSM Plan, reflecting changes approved with approval of the Stipulation and Settlement Agreement.

The following figures 1 and 2 below show Public Service's electric and natural gas savings and expenditures over the past thirteen years.

Figure 1: Historical Electric Program Savings and Expenditures

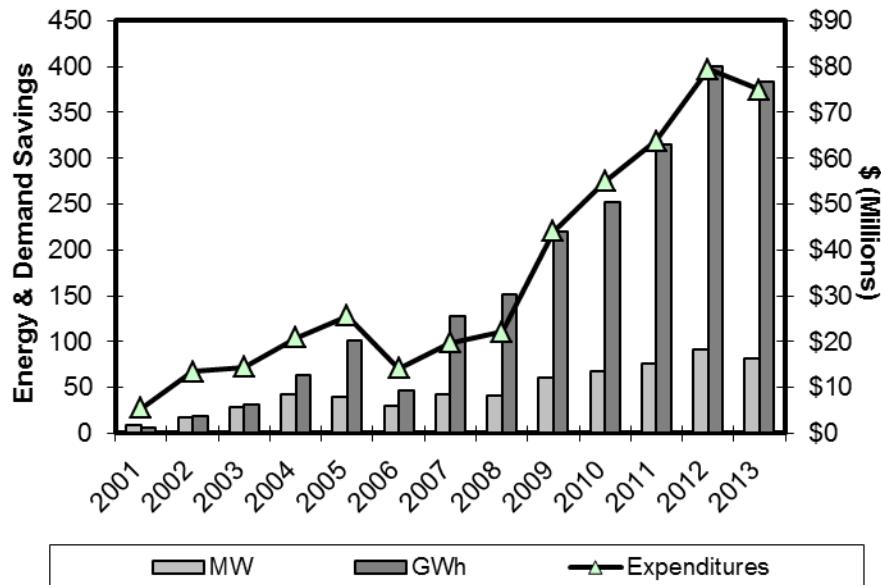
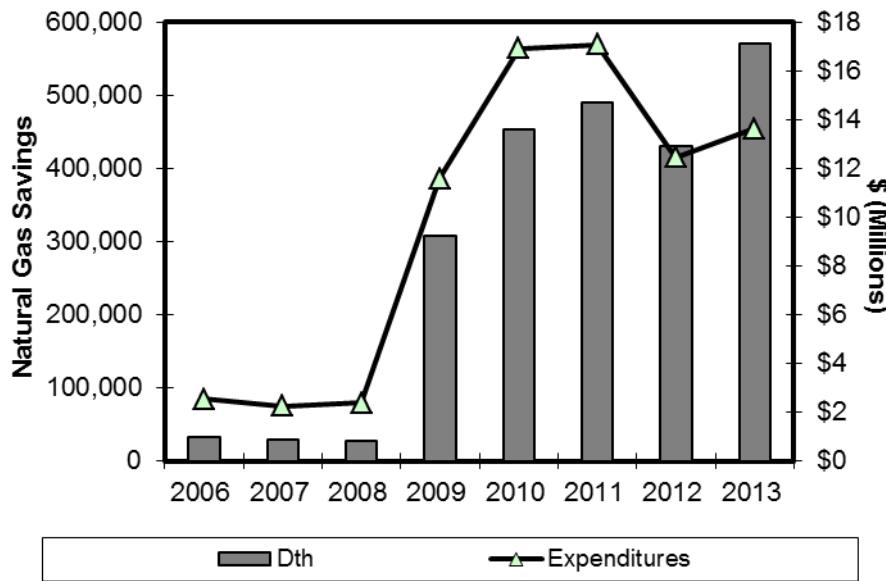


Figure 2: Historical Natural Gas Program Savings and Expenditures



Executive Summary: Electric DSM Tables

The following tables summarize the forecasted impacts of the Company's proposed electric DSM portfolio for 2015 and 2016, including anticipated expenditures, energy savings, demand response, costs by budget category, and Modified Total Resource Cost (MTRC) test ratios.

Table 3a: Public Service's 2015 Electric DSM Budgets and Targets

2015	Electric Budget	Net Generator kW	Net Generator kWh	Electric MTRC Test Ratio
Business Program				
Commercial Refrigeration Efficiency	\$1,755,953	819	8,906,511	1.43
Compressed Air Efficiency	\$773,251	496	3,173,698	1.48
Computer Efficiency	\$916,554	1,228	9,147,862	1.50
Cooling	\$3,454,564	3,076	9,842,168	1.46
Custom Efficiency	\$1,622,590	871	7,745,756	1.34
Data Center Efficiency	\$1,286,182	863	8,310,341	1.85
Energy Management Systems	\$1,289,835	210	8,185,221	1.54
Heating Efficiency	\$0	0	0	
LED Street Lights	\$31,000	0	1,000,960	1.33
Lighting Efficiency	\$12,161,368	12,570	81,922,710	1.71
Lighting - Small Business	\$3,625,780	3,128	20,754,224	1.69
Motor & Drive Efficiency	\$3,015,493	1,701	11,100,875	1.65
New Construction	\$11,622,121	11,441	43,383,388	1.39
Process Efficiency	\$3,590,088	2,808	35,293,136	2.12
Recommissioning	\$979,014	350	6,449,641	1.30
Self Direct	\$898,997	864	5,676,889	1.54
Business Program Total	\$47,022,790	40,424	260,893,380	1.62
Residential Program				
Energy Efficient Showerhead	\$55,455	54	706,159	7.98
Energy Feedback Residential	\$3,212,779	12,744	14,381,570	1.78
ENERGY STAR New Homes	\$813,716	869	2,535,469	1.38
Evaporative Cooling	\$2,993,071	5,641	5,078,655	5.89
High Efficiency Air Conditioning	\$2,615,406	2,283	2,058,796	0.80
Home Energy Squad	\$346,156	222	522,927	1.65
Home Lighting & Recycling	\$12,053,117	14,636	98,760,793	2.11
Home Performance with ENERGY STAR	\$362,031	288	594,532	1.05
Insulation & Air Sealing	\$84,548	150	179,911	0.97
Refrigerator & Freezer Recycling	\$1,282,631	458	4,008,195	1.50
Residential Heating	\$321,715	242	2,557,160	1.39
School Education Kits	\$1,448,430	454	4,106,097	1.50
Water Heating	\$37,224	22	111,307	0.82
Residential Program Total	\$25,626,280	38,062	135,601,572	2.28
Low-Income Program				
Energy Savings Kit	\$289,831	112	1,008,759	2.02
Multifamily Weatherization	\$816,964	252	1,917,554	1.12
Non-Profit	\$518,267	216	1,838,130	1.62
Single-Family Weatherization	\$1,402,432	219	2,350,230	0.98
Low-Income Program Total	\$3,027,493	799	7,114,674	1.22

Table 3a: (Cont.)

2015	Electric Budget	Net Generator kW	Net Generator kWh	Electric MTRC Test Ratio
Indirect Products & Services				
Education/Market Transformation				
Business Education	\$152,457			
Business Energy Analysis	\$986,149			
Consumer Education	\$1,082,674			
Energy Efficiency Financing	\$60,000			
Home Energy Audit	\$580,543			
Education/Market Transformation Total	\$2,861,823			
Planning and Research				
DSM Planning & Administration	\$482,174			
Program Evaluations	\$297,496			
Market Research	\$328,046			
Measurement & Verification	\$15,140			
Product Development	\$1,210,582			
Energy Feedback Pilot - Business	\$149,163	86	2,586,342	2.12
Multifamily Buildings Pilot - EE	\$146,644	80	480,653	1.71
Smart Thermostat Pilot - EE	\$353,363			
Building Optimization DR Pilot	\$74,704			
Product Development Total	\$1,934,456	166	3,066,995	0.42
Planning and Research Total	\$3,057,312	166	3,066,995	0.27
Indirect Products & Services Total	\$5,919,135	166	3,066,995	0.18
EE PORTFOLIO TOTAL	\$81,595,698	79,450	406,676,621	1.72
Demand Response Program				
Saver's Switch	\$12,801,015	13,390	174,412	1.92
Smart Thermostat Pilot - DR	\$373,850	638	8,310	0.35
Small Business Smart Thermostat Pilot	\$374,226	624	17,726	2.12
Building Optimization DR Pilot	\$182,894	834	26,698	0.53
DR PORTFOLIO TOTAL	\$13,731,985	15,486	227,146	1.80
PORTFOLIO TOTAL	\$95,327,683	94,936	406,903,766	1.73

Table 3b: Public Service's 2015 Electric DSM Costs by Category

2015	Program Planning & Design	Administration & Program Delivery	Advertising/Promotion/Customer Ed	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Business Program							
Commercial Refrigeration Efficiency	\$0	\$977,926	\$144,608	\$609,419	\$0	\$24,000	\$1,755,953
Compressed Air Efficiency	\$12,000	\$193,614	\$112,456	\$430,781	\$0	\$24,400	\$773,251
Computer Efficiency	\$0	\$878,904	\$4,000	\$26,650	\$0	\$7,000	\$916,554
Cooling	\$15,902	\$1,788,522	\$114,804	\$1,523,336	\$0	\$12,000	\$3,454,564
Custom Efficiency	\$10,254	\$614,818	\$156,363	\$799,155	\$0	\$42,000	\$1,622,590
Data Center Efficiency	\$0	\$180,411	\$173,450	\$910,241	\$0	\$22,080	\$1,286,182
Energy Management Systems	\$0	\$276,711	\$265,139	\$733,336	\$0	\$14,649	\$1,289,835
Heating Efficiency	\$0	\$0	\$0	\$0	\$0	\$0	\$0
LED Street Lights	\$0	\$31,000	\$0	\$0	\$0	\$0	\$31,000
Lighting Efficiency	\$18,025	\$2,681,800	\$831,215	\$8,574,308	\$0	\$56,020	\$12,161,368
Lighting - Small Business	\$0	\$1,996,730	\$185,824	\$1,388,226	\$0	\$55,000	\$3,625,780
Motor & Drive Efficiency	\$7,062	\$835,915	\$276,687	\$1,851,665	\$0	\$44,164	\$3,015,493
New Construction	\$5,712	\$3,224,691	\$373,010	\$7,430,381	\$0	\$588,327	\$11,622,121
Process Efficiency	\$0	\$343,212	\$29,051	\$3,190,825	\$0	\$27,000	\$3,590,088
Recommissioning	\$0	\$241,918	\$96,240	\$640,856	\$0	\$0	\$979,014
Self Direct	\$0	\$105,047	\$31,697	\$762,253	\$0	\$0	\$898,997
Business Program Total	\$68,955	\$14,371,219	\$2,794,544	\$28,871,432	\$0	\$916,640	\$47,022,790
Residential Program							
Energy Efficient Showerhead	\$0	\$29,629	\$10,993	\$14,633	\$0	\$200	\$55,455
Energy Feedback Residential	\$16,193	\$3,117,298	\$44,144	\$0	\$0	\$35,144	\$3,212,779
ENERGY STAR New Homes	\$0	\$190,390	\$26,750	\$492,606	\$0	\$103,970	\$813,716
Evaporative Cooling	\$0	\$666,995	\$577,376	\$1,703,700	\$0	\$45,000	\$2,993,071
High Efficiency Air Conditioning	\$0	\$323,389	\$203,902	\$2,048,115	\$0	\$40,000	\$2,615,406
Home Energy Squad	\$0	\$80,831	\$87,542	\$21,487	\$151,296	\$5,000	\$346,156
Home Lighting & Recycling	\$15,000	\$1,115,107	\$1,010,000	\$9,891,010	\$0	\$22,000	\$12,053,117
Home Performance with ENERGY STAR	\$0	\$173,976	\$1,800	\$156,255	\$0	\$30,000	\$362,031
Insulation & Air Sealing	\$0	\$27,413	\$0	\$47,135	\$0	\$10,000	\$84,548
Refrigerator & Freezer Recycling	\$700	\$596,052	\$299,879	\$375,000	\$0	\$11,000	\$1,282,631
Residential Heating	\$0	\$37,842	\$24,393	\$250,000	\$0	\$9,480	\$321,715
School Education Kits	\$0	\$718,555	\$0	\$729,875	\$0	\$0	\$1,448,430
Water Heating	\$0	\$5,548	\$1,926	\$24,750	\$0	\$5,000	\$37,224
Residential Program Total	\$31,893	\$7,083,025	\$2,288,705	\$15,754,567	\$151,296	\$316,794	\$25,626,280
Low-Income Program							
Energy Savings Kit	\$0	\$86,085	\$86,885	\$114,361	\$0	\$2,500	\$289,831
Multifamily Weatherization	\$0	\$83,005	\$53,978	\$664,630	\$0	\$15,351	\$816,964
Non-Profit	\$0	\$108,402	\$45,000	\$337,040	\$0	\$27,825	\$518,267
Single-Family Weatherization	\$0	\$214,748	\$60,000	\$1,073,985	\$0	\$53,699	\$1,402,432
Low-Income Program Total	\$0	\$492,240	\$245,863	\$2,190,015	\$0	\$99,375	\$3,027,493

Table 3b (Cont.)

2015	Program Planning & Design	Administration & Program Delivery	Advertising/Promotion/Customer Ed	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Indirect Products & Services							
Education/Market Transformation							
Business Education	\$0	\$12,095	\$140,362	\$0	\$0	\$0	\$152,457
Business Energy Analysis	\$30,000	\$814,043	\$142,106	\$0	\$0	\$0	\$986,149
Consumer Education	\$0	\$498,957	\$583,717	\$0	\$0	\$0	\$1,082,674
Energy Efficiency Financing	\$3,600	\$5,599	\$50,801	\$0	\$0	\$0	\$60,000
Home Energy Audit	\$0	\$268,257	\$60,694	\$211,600	\$0	\$39,992	\$580,543
Education/Market Transformation	\$33,600	\$1,598,951	\$977,680	\$211,600	\$0	\$39,992	\$2,861,823
Planning and Research							
DSM Planning & Administration	\$0	\$482,174	\$0	\$0	\$0	\$0	\$482,174
Program Evaluations	\$0	\$0	\$0	\$0	\$0	\$297,496	\$297,496
Market Research	\$0	\$306,705	\$3,305	\$0	\$0	\$18,036	\$328,046
Measurement & Verification	\$0	\$15,140	\$0	\$0	\$0	\$0	\$15,140
Product Development	\$472,193	\$737,745	\$0	\$0	\$0	\$644	\$1,210,582
Energy Feedback Pilot - Business	\$10,718	\$108,672	\$0	\$0	\$0	\$29,773	\$149,163
Multifamily Buildings Pilot - EE	\$10,944	\$59,293	\$7,776	\$59,991	\$0	\$8,640	\$146,644
Smart Thermostat Pilot - EE	\$8,550	\$44,438	\$9,750	\$131,250	\$0	\$159,375	\$353,363
Building Optimization DR Pilot	\$7,250	\$60,494	\$6,960	\$0	\$0	\$0	\$74,704
Product Development Total	\$509,655	\$1,010,642	\$24,486	\$191,241	\$0	\$198,432	\$1,934,456
Planning and Research Total	\$509,655	\$1,814,661	\$27,791	\$191,241	\$0	\$513,964	\$3,057,312
Indirect Products & Services Total	\$543,255	\$3,413,612	\$1,005,471	\$402,841	\$0	\$553,956	\$5,919,135
EE PORTFOLIO TOTAL	\$644,103	\$25,360,096	\$6,334,583	\$47,218,855	\$151,296	\$1,886,765	\$81,595,698
Demand Response Program							
Saver's Switch	\$0	\$3,363,759	\$1,774,696	\$7,527,560	\$0	\$135,000	\$12,801,015
Smart Thermostat Pilot - DR	\$7,600	\$111,250	\$5,000	\$62,500	\$0	\$187,500	\$373,850
Small Business Smart Thermostat Pilot	\$22,500	\$195,750	\$0	\$23,250	\$82,726	\$50,000	\$374,226
Building Optimization DR Pilot	\$17,747	\$148,107	\$17,040	\$0	\$0	\$0	\$182,894
DR PORTFOLIO TOTAL	\$47,847	\$3,818,866	\$1,796,736	\$7,613,310	\$82,726	\$372,500	\$13,731,985
PORTFOLIO TOTAL	\$691,950	\$29,178,962	\$8,131,319	\$54,832,165	\$234,022	\$2,259,265	\$95,327,683

Table 3c: Public Service's 2016 Electric DSM Budgets and Targets

2016	Electric Budget	Net Generator kW	Net Generator kWh	Electric MTRC Test Ratio
Business Program				
Commercial Refrigeration Efficiency	\$1,882,895	901	9,797,162	1.50
Compressed Air Efficiency	\$794,746	513	3,268,876	1.50
Computer Efficiency	\$886,254	1,166	8,691,702	1.57
Cooling	\$3,310,810	2,875	9,597,040	1.49
Custom Efficiency	\$1,522,696	762	6,777,536	1.35
Data Center Efficiency	\$1,289,422	863	8,310,341	1.90
Energy Feedback Business	\$183,100	144	4,352,945	2.85
Energy Management Systems	\$1,314,635	233	8,770,020	1.51
Heating Efficiency	\$0	0	0	
LED Street Lights	\$43,000	0	11,500,207	1.45
Lighting Efficiency	\$11,926,086	12,425	80,618,858	1.78
Lighting - Small Business	\$3,625,780	3,128	20,754,224	1.75
Motor & Drive Efficiency	\$2,796,843	1,473	9,766,456	1.63
New Construction	\$9,234,537	9,429	34,681,037	1.47
Process Efficiency	\$3,104,922	2,184	27,450,217	2.14
Recommissioning	\$979,014	350	6,449,641	1.36
Self Direct	\$1,280,124	1,296	8,515,333	1.61
Business Program Total	\$44,174,864	37,743	259,301,596	1.67
Residential Program				
Energy Efficient Showerhead	\$56,946	54	706,159	7.95
Energy Feedback Residential	\$3,062,404	12,032	22,912,843	2.12
ENERGY STAR New Homes	\$859,822	1,058	3,036,877	1.47
Evaporative Cooling	\$2,993,071	5,641	5,078,655	5.97
High Efficiency Air Conditioning	\$2,688,656	2,353	2,120,925	0.81
Home Energy Squad	\$452,303	275	701,109	1.65
Home Lighting & Recycling	\$11,395,617	13,455	90,793,678	2.13
Home Performance with ENERGY STAR	\$362,031	288	594,532	1.08
Insulation & Air Sealing	\$84,548	150	179,911	1.00
Refrigerator & Freezer Recycling	\$1,281,931	408	3,571,262	1.42
Residential Heating	\$321,715	242	2,557,160	1.43
School Education Kits	\$1,479,212	454	4,106,097	1.52
Water Heating	\$37,224	18	89,082	0.74
Residential Program Total	\$25,075,480	36,428	136,448,291	2.32
Low-Income Program				
Energy Savings Kit	\$289,831	112	1,008,759	2.08
Multifamily Weatherization	\$816,964	252	1,917,554	1.15
Non-Profit	\$518,267	216	1,838,130	1.67
Single-Family Weatherization	\$1,358,190	223	2,379,324	1.02
Low-Income Program Total	\$2,983,251	803	7,143,767	1.26

Table 3c: (Cont.)

2016	Electric Budget	Net Generator kW	Net Generator kWh	Electric MTRC Test Ratio
Indirect Products & Services				
Education/Market Transformation				
Business Education	\$152,457			
Business Energy Analysis	\$986,149			
Consumer Education	\$1,082,674			
Energy Efficiency Financing	\$60,000			
Home Energy Audit	\$580,542			
Education/Market Transformation	\$2,861,822			
Planning and Research				
DSM Planning & Administration	\$519,364			
Program Evaluations	\$427,266			
Market Research	\$1,060,924			
Measurement & Verification	\$15,340			
Product Development	\$1,360,582			
Multifamily Buildings Pilot - EE	\$193,655	206	560,772	1.61
Smart Thermostat Pilot - EE	\$204,563	602	1,023,251	1.11
Building Optimization DR Pilot	\$59,904	321	2,607,231	2.02
Product Development Total	\$1,818,704	1,129	4,191,254	0.83
Planning and Research Total	\$3,841,598	1,129	4,191,254	0.50
Indirect Products & Services Total	\$6,703,420	1,129	4,191,254	0.34
EE PORTFOLIO TOTAL	\$78,937,015	76,103	407,084,908	1.76
Demand Response Program				
Saver's Switch	\$13,166,015	13,390	174,412	1.93
Smart Thermostat Pilot - DR	\$0	0	0	
Small Business Smart Thermostat Pilot	\$187,750	0	0	
Building Optimization DR Pilot	\$146,661	0	0	
DR PORTFOLIO TOTAL	\$13,500,426	13,390	174,412	1.88
PORTFOLIO TOTAL	\$92,437,441	89,493	407,259,321	1.77

Table 3d: Public Service's 2016 Electric DSM Costs by Category

2016	Program Planning & Design	Administration & Program Delivery	Advertising/Promotion/Customer Ed	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Business Program							
Commercial Refrigeration Efficiency	\$0	\$1,037,926	\$150,608	\$670,361	\$0	\$24,000	\$1,882,895
Compressed Air Efficiency	\$12,000	\$191,715	\$113,456	\$453,575	\$0	\$24,000	\$794,746
Computer Efficiency	\$0	\$848,604	\$4,000	\$26,650	\$0	\$7,000	\$886,254
Cooling	\$15,902	\$1,773,522	\$114,804	\$1,444,582	\$0	\$12,000	\$3,310,810
Custom Efficiency	\$10,254	\$614,818	\$156,363	\$699,261	\$0	\$42,000	\$1,522,696
Data Center Efficiency	\$0	\$180,911	\$173,450	\$910,241	\$0	\$24,820	\$1,289,422
Energy Feedback Business	\$10,446	\$172,654	\$0	\$0	\$0	\$0	\$183,100
Energy Management Systems	\$0	\$276,711	\$267,839	\$755,336	\$0	\$14,749	\$1,314,635
Heating Efficiency	\$0	\$0	\$0	\$0	\$0	\$0	\$0
LED Street Lights	\$0	\$43,000	\$0	\$0	\$0	\$0	\$43,000
Lighting Efficiency	\$18,025	\$2,681,300	\$831,215	\$8,339,526	\$0	\$56,020	\$11,926,086
Lighting - Small Business	\$0	\$1,996,730	\$185,824	\$1,388,226	\$0	\$55,000	\$3,625,780
Motor & Drive Efficiency	\$7,062	\$835,915	\$228,687	\$1,681,015	\$0	\$44,164	\$2,796,843
New Construction	\$10,712	\$2,287,991	\$345,010	\$6,019,497	\$0	\$571,327	\$9,234,537
Process Efficiency	\$0	\$356,167	\$31,751	\$2,687,304	\$0	\$29,700	\$3,104,922
Recommissioning	\$0	\$241,918	\$96,240	\$640,856	\$0	\$0	\$979,014
Self Direct	\$0	\$105,047	\$31,697	\$1,143,380	\$0	\$0	\$1,280,124
Business Program Total	\$84,401	\$13,594,929	\$2,730,944	\$26,859,810	\$0	\$904,780	\$44,174,864
Residential Program							
Energy Efficient Showerhead	\$0	\$30,251	\$11,284	\$15,211	\$0	\$200	\$56,946
Energy Feedback Residential	\$16,193	\$2,968,355	\$43,428	\$0	\$0	\$34,428	\$3,062,404
ENERGY STAR New Homes	\$0	\$190,877	\$26,750	\$597,624	\$0	\$44,571	\$859,822
Evaporative Cooling	\$0	\$666,995	\$577,376	\$1,703,700	\$0	\$45,000	\$2,993,071
High Efficiency Air Conditioning	\$0	\$327,889	\$203,902	\$2,116,865	\$0	\$40,000	\$2,688,656
Home Energy Squad	\$0	\$97,977	\$116,722	\$30,408	\$202,196	\$5,000	\$452,303
Home Lighting & Recycling	\$15,000	\$1,115,107	\$1,000,000	\$9,233,510	\$0	\$32,000	\$11,395,617
Home Performance with ENERGY STAR	\$0	\$173,976	\$1,800	\$156,255	\$0	\$30,000	\$362,031
Insulation & Air Sealing	\$0	\$27,413	\$0	\$47,135	\$0	\$10,000	\$84,548
Refrigerator & Freezer Recycling	\$0	\$596,052	\$299,879	\$375,000	\$0	\$11,000	\$1,281,931
Residential Heating	\$0	\$37,842	\$24,393	\$250,000	\$0	\$9,480	\$321,715
School Education Kits	\$0	\$739,365	\$0	\$739,847	\$0	\$0	\$1,479,212
Water Heating	\$0	\$5,548	\$1,926	\$24,750	\$0	\$5,000	\$37,224
Residential Program Total	\$31,193	\$6,977,647	\$2,307,460	\$15,290,305	\$202,196	\$266,679	\$25,075,480
Low-Income Program							
Energy Savings Kit	\$0	\$86,085	\$86,885	\$114,361	\$0	\$2,500	\$289,831
Multifamily Weatherization	\$0	\$83,005	\$53,978	\$664,630	\$0	\$15,351	\$816,964
Non-Profit	\$0	\$108,402	\$45,000	\$337,040	\$0	\$27,825	\$518,267
Single-Family Weatherization	\$0	\$140,077	\$60,000	\$1,102,965	\$0	\$55,148	\$1,358,190
Low-Income Program Total	\$0	\$417,569	\$245,863	\$2,218,995	\$0	\$100,824	\$2,983,251

Table 3d: (Cont.)

2016	Program Planning & Design	Administration & Program Delivery	Advertising/Promotion/Customer Ed	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Indirect Products & Services							
Education/Market Transformation							
Business Education	\$0	\$12,095	\$140,362	\$0	\$0	\$0	\$152,457
Business Energy Analysis	\$30,000	\$814,043	\$142,106	\$0	\$0	\$0	\$986,149
Consumer Education	\$0	\$498,957	\$583,717	\$0	\$0	\$0	\$1,082,674
Energy Efficiency Financing	\$3,600	\$5,599	\$50,801	\$0	\$0	\$0	\$60,000
Home Energy Audit	\$0	\$268,256	\$60,694	\$211,600	\$0	\$39,992	\$580,542
Education/Market Transformation	\$33,600	\$1,598,950	\$977,680	\$211,600	\$0	\$39,992	\$2,861,822
Planning and Research							
DSM Planning & Administration	\$0	\$519,364	\$0	\$0	\$0	\$0	\$519,364
Program Evaluations	\$0	\$0	\$0	\$0	\$0	\$427,266	\$427,266
Market Research	\$0	\$993,205	\$3,305	\$0	\$0	\$64,414	\$1,060,924
Measurement & Verification	\$0	\$15,340	\$0	\$0	\$0	\$0	\$15,340
Product Development	\$472,193	\$737,745	\$0	\$150,000	\$0	\$644	\$1,360,582
Multifamily Buildings Pilot - EE	\$10,944	\$59,293	\$0	\$103,258	\$0	\$20,160	\$193,655
Smart Thermostat Pilot - EE	\$14,250	\$104,063	\$0	\$48,750	\$0	\$37,500	\$204,563
Building Optimization DR Pilot	\$7,250	\$45,404	\$0	\$0	\$0	\$7,250	\$59,904
Product Development Total	\$504,637	\$946,505	\$0	\$302,008	\$0	\$65,554	\$1,818,704
Planning and Research Total	\$504,637	\$2,474,414	\$3,305	\$302,008	\$0	\$557,234	\$3,841,598
Indirect Products & Services Total	\$538,237	\$4,073,364	\$980,985	\$513,608	\$0	\$597,226	\$6,703,420
EE PORTFOLIO TOTAL	\$653,831	\$25,063,509	\$6,265,252	\$44,882,718	\$202,196	\$1,869,509	\$78,937,015
Demand Response Program							
Saver's Switch	\$0	\$3,363,759	\$1,774,696	\$7,927,560	\$0	\$100,000	\$13,166,015
Smart Thermostat Pilot - DR	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Small Business Smart Thermostat Pilot	\$22,500	\$92,000	\$0	\$23,250	\$0	\$50,000	\$187,750
Building Optimization DR Pilot	\$17,750	\$111,161	\$0	\$0	\$0	\$17,750	\$146,661
DR PORTFOLIO TOTAL	\$40,250	\$3,566,920	\$1,774,696	\$7,950,810	\$0	\$167,750	\$13,500,426
PORTFOLIO TOTAL	\$694,081	\$28,630,429	\$8,039,948	\$52,833,528	\$202,196	\$2,037,259	\$92,437,441

Executive Summary: Natural Gas DSM Tables

The following tables summarize the forecasted impacts of the Company's proposed natural gas DSM portfolio for 2015 and 2016, including anticipated expenditures, energy savings, costs by budget category, and Modified Total Resource Cost (MTRC) test ratios.

Table 4a: Public Service's 2015 Gas DSM Budgets and Targets

2015	Gas Budget	Net Annual Dth Savings	Annual Dth/\$M	Gas MTRC Test Net Benefits	Gas MTRC Test Ratio
Business Program					
Commercial Refrigeration Efficiency	\$22,472	2,234	99,418	\$265,871	10.82
Compressed Air Efficiency					
Computer Efficiency					
Cooling					
Custom Efficiency	\$75,044	4,775	63,625	\$105,689	1.41
Data Center Efficiency					
Energy Management Systems	\$50,549	3,045	60,232	\$133,750	1.94
Heating Efficiency	\$369,899	17,193	46,480	\$326,316	1.39
LED Street Lights					
Lighting Efficiency					
Lighting - Small Business	\$6,329	2,175	343,587	\$278,401	30.37
Motor & Drive Efficiency					
New Construction	\$1,459,429	154,310	105,733	\$2,133,311	1.24
Process Efficiency					
Recommissioning	\$29,587	3,351	113,246	\$31,595	1.38
Self Direct					
Business Program Total	\$2,013,309	187,082	92,923	\$3,274,933	1.32
Residential Program					
Energy Efficient Showerhead	\$641,217	43,555	67,926	\$5,107,200	6.88
Energy Feedback Residential	\$451,659	50,080	110,881	\$252,451	1.56
ENERGY STAR New Homes	\$2,598,852	121,307	46,677	\$2,678,342	1.36
Evaporative Cooling					
High Efficiency Air Conditioning					
Home Energy Squad	\$288,604	5,448	18,877	\$55,266	1.16
Home Lighting & Recycling					
Home Performance with ENERGY STAR	\$415,724	16,176	38,911	-\$492,333	0.72
Insulation & Air Sealing	\$289,297	16,102	55,659	-\$274,020	0.83
Refrigerator & Freezer Recycling					
Residential Heating	\$725,665	41,771	57,562	\$596,054	1.23
School Education Kits	\$358,222	31,687	88,457	\$3,813,603	8.25
Water Heating	\$109,006	2,807	25,747	-\$270,265	0.44
Residential Program Total	\$5,878,245	328,933	55,958	\$11,466,297	1.72
Low-Income Program					
Energy Savings Kit	\$116,186	8,623	74,217	1,085,233	7.78
Multifamily Weatherization	\$686,120	10,442	15,218	-193,411	0.86
Non-Profit	\$309,044	2,429	7,860	-173,982	0.69
Single-Family Weatherization	\$2,287,908	34,670	15,154	643,122	1.16
Low-Income Program Total	\$3,399,258	56,164	16,522	1,360,962	1.22

Table 4a: (Cont.)

2015	Gas Budget	Net Annual Dth Savings	Annual Dth/\$M	Gas MTRC Test Net Benefits	Gas MTRC Test Ratio
Indirect Products & Services					
Education/Market Transformation					
Business Education	\$43,920	0	0		
Business Energy Analysis	\$98,563	0	0		
Consumer Education	\$250,557	0	0		
Energy Efficiency Financing	\$60,000	0	0		
Home Energy Audit	\$596,304	0	0		
Education/Market Transformation	\$1,049,344	0	0		
Planning and Research					
DSM Planning & Administration	\$110,037	0	0		
Program Evaluations	\$11,730	0	0		
Market Research	\$154,582	0	0		
Measurement & Verification	\$2,200	0	0		
Product Development	\$214,640	0	0		
Energy Feedback Pilot - Business	\$101,337	11,993	118,350	\$67,284	1.66
Multifamily Buildings Pilot - EE	\$78,384	2,653	33,847	\$138,275	2.05
Smart Thermostat Pilot - EE	\$117,788	0	0		
Product Development Total	\$512,149	14,646	28,598	-83,120	0.85
Planning and Research Total	\$790,698	14,646	18,523	-361,669	0.57
Indirect Products & Services Total	\$1,840,042	14,646	7,960	-\$1,162,613	0.39
EE PORTFOLIO TOTAL	\$13,130,855	586,825	44,691	\$14,939,579	1.43

Table 4b: Public Service's 2015 Gas DSM Costs by Category

2015	Program Planning & Design	Administration & Program Delivery	Advertising/Promotion/Customer Ed	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Business Program							
Commercial Refrigeration Efficiency	\$0	\$16,183	\$1,200	\$4,589	\$0	\$500	\$22,472
Compressed Air Efficiency							
Computer Efficiency							
Cooling							
Custom Efficiency	\$0	\$54,736	\$0	\$20,308	\$0	\$0	\$75,044
Data Center Efficiency							
Energy Management Systems	\$0	\$20,058	\$1,000	\$27,766	\$0	\$1,725	\$50,549
Heating Efficiency	\$0	\$96,008	\$0	\$246,681	\$0	\$27,210	\$369,899
LED Street Lights							
Lighting Efficiency							
Lighting - Small Business	\$0	\$3,180	\$0	\$3,149	\$0	\$0	\$6,329
Motor & Drive Efficiency							
New Construction	\$10,000	\$743,847	\$200	\$625,382	\$0	\$80,000	\$1,459,429
Process Efficiency							
Recommissioning	\$0	\$9,932	\$3,000	\$16,655	\$0	\$0	\$29,587
Self Direct							
Business Program Total	\$10,000	\$943,944	\$5,400	\$944,530	\$0	\$109,435	\$2,013,309
Residential Program							
Energy Efficient Showerhead	\$0	\$342,974	\$67,792	\$229,251	\$0	\$1,200	\$641,217
Energy Feedback Residential	\$3,858	\$437,089	\$5,856	\$0	\$0	\$4,856	\$451,659
ENERGY STAR New Homes	\$0	\$533,207	\$78,250	1,761,844	\$0	\$225,552	\$2,598,852
Evaporative Cooling							
High Efficiency Air Conditioning							
Home Energy Squad	\$0	\$50,750	\$81,181	\$62,513	\$89,160	\$5,000	\$288,604
Home Lighting & Recycling							
Home Performance with ENERGY STAR	\$0	\$85,159	\$153	\$300,412	\$0	\$30,000	\$415,724
Insulation & Air Sealing	\$0	\$43,503	\$0	\$225,794	\$0	\$20,000	\$289,297
Refrigerator & Freezer Recycling							
Residential Heating	\$0	\$87,248	\$56,917	\$564,000	\$0	\$17,500	\$725,665
School Education Kits	\$0	\$190,662	\$0	\$167,560	\$0	\$0	\$358,222
Water Heating	\$0	\$20,241	\$11,765	\$67,000	\$0	\$10,000	\$109,006
Residential Program Total	\$3,858	\$1,790,833	\$301,914	\$3,378,373	\$89,160	\$314,108	\$5,878,245
Low-Income Program							
Energy Savings Kit	\$0	\$44,347	\$25,377	\$43,962	\$0	\$2,500	\$116,186
Multifamily Weatherization	\$0	\$66,381	\$32,393	\$574,281	\$0	\$13,065	\$686,120
Non-Profit	\$0	\$74,204	\$15,000	\$202,782	\$0	\$17,058	\$309,044
Single-Family Weatherization	\$0	\$253,690	\$120,000	\$1,824,615	\$0	\$89,603	\$2,287,908
Low-Income Program Total	\$0	\$438,622	\$192,770	\$2,645,640	\$0	\$122,226	\$3,399,258

Table 4b: (Cont.)

2015	Program Planning & Design	Administration & Program Delivery	Advertising/Promotion/Customer Ed	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Indirect Products & Services							
Education/Market Transformation							
Business Education	\$0	\$1,196	\$42,724	\$0	\$0	\$0	\$43,920
Business Energy Analysis	\$12,000	\$74,563	\$12,000	\$0	\$0	\$0	\$98,563
Consumer Education	\$0	\$104,669	\$145,888	\$0	\$0	\$0	\$250,557
Energy Efficiency Financing	\$3,600	\$3,749	\$52,651	\$0	\$0	\$0	\$60,000
Home Energy Audit	\$0	\$257,204	\$50,708	\$248,400	\$0	\$39,992	\$596,304
Education/Market Transformation	\$15,600	\$441,381	\$303,971	\$248,400	\$0	\$39,992	\$1,049,344
Planning and Research							
DSM Planning & Administration	\$0	\$110,037	\$0	\$0	\$0	\$0	\$110,037
Program Evaluations	\$0	\$0	\$0	\$0	\$0	\$11,730	\$11,730
Market Research	\$0	\$144,686	\$4,743	\$0	\$0	\$5,153	\$154,582
Measurement & Verification	\$0	\$2,200	\$0	\$0	\$0	\$0	\$2,200
Product Development	\$108,270	\$105,726	\$0	\$0	\$0	\$644	\$214,640
Energy Feedback Pilot - Business	\$7,282	\$73,828	\$0	\$0	\$0	\$20,227	\$101,337
Multifamily Buildings Pilot - EE	\$8,056	\$43,646	\$5,724	\$14,598	\$0	\$6,360	\$78,384
Smart Thermostat Pilot - EE	\$2,850	\$14,813	\$3,250	\$43,750	\$0	\$53,125	\$117,788
Product Development Total	\$126,458	\$238,013	\$8,974	\$58,348	\$0	\$80,356	\$512,149
Planning and Research Total	\$126,458	\$494,936	\$13,717	\$58,348	\$0	\$97,239	\$790,698
Indirect Products & Services Total	\$142,058	\$936,317	\$317,688	\$306,748	\$0	\$137,231	\$1,840,042
EE PORTFOLIO TOTAL	\$155,916	\$4,109,716	\$817,772	\$7,275,292	\$89,160	\$683,000	\$13,130,855

Table 4c: Public Service's 2016 Gas DSM Budgets and Targets

2016	Gas Budget	Net Annual Dth Savings	Annual Dth/\$M	Gas MTRC Test Net Benefits	Gas MTRC Test Ratio
Business Program					
Commercial Refrigeration Efficiency	\$23,231	2,458	105,787	\$297,348	11.51
Compressed Air Efficiency					
Computer Efficiency					
Cooling					
Custom Efficiency	\$75,044	4,775	63,625	\$115,858	1.45
Data Center Efficiency					
Energy Feedback Business	\$132,400	18,400	138,973	\$129,683	1.98
Energy Management Systems	\$52,443	3,075	58,638	\$127,540	1.82
Heating Efficiency	\$369,899	17,193	46,480	\$355,936	1.43
LED Street Lights					
Lighting Efficiency					
Lighting - Small Business	\$6,329	2,175	343,587	\$281,449	30.69
Motor & Drive Efficiency					
New Construction	\$1,117,607	136,535	122,167	\$2,727,793	1.37
Process Efficiency					
Recommissioning	\$29,587	3,351	113,246	\$35,112	1.42
Self Direct					
Business Program Total	\$1,806,540	187,961	104,045	4,070,718	1.46
Residential Program					
Energy Efficient Showerhead	\$664,569	43,555	65,539	\$5,167,958	6.74
Energy Feedback Residential	\$502,034	73,660	146,722	\$547,149	2.09
ENERGY STAR New Homes	\$2,753,619	126,899	46,084	\$3,041,768	1.39
Evaporative Cooling					
High Efficiency Air Conditioning					
Home Energy Squad	\$380,546	7,476	19,645	\$98,066	1.21
Home Lighting & Recycling					
Home Performance with ENERGY STAR	\$415,724	16,109	38,748	-\$465,314	0.73
Insulation & Air Sealing	\$289,297	16,102	55,659	-\$240,649	0.85
Refrigerator & Freezer Recycling					
Residential Heating	\$725,665	35,935	49,520	\$300,264	1.12
School Education Kits	\$368,852	31,687	85,908	\$3,861,920	8.13
Water Heating	\$109,006	1,766	16,199	-\$260,248	0.38
Residential Program Total	\$6,209,311	353,188	56,880	\$12,050,914	1.73
Low-Income Program					
Energy Savings Kit	\$121,186	8,623	71,155	1,098,930	7.65
Multifamily Weatherization	\$686,120	10,442	15,218	-173,843	0.87
Non-Profit	\$309,044	2,429	7,860	-168,289	0.70
Single-Family Weatherization	\$2,268,610	35,754	15,760	834,215	1.20
Low-Income Program Total	\$3,384,960	57,247	16,912	\$1,591,014	1.25

Table 4c: (Cont.)

2016	Gas Budget	Net Annual Dth Savings	Annual Dth/\$M	Gas MTRC Test Net Benefits	Gas MTRC Test Ratio
Indirect Products & Services					
Education/Market Transformation					
Business Education	\$43,920	0	0		
Business Energy Analysis	\$98,563	0	0		
Consumer Education	\$250,557	0	0		
Energy Efficiency Financing	\$60,000	0	0		
Home Energy Audit	\$596,304	0	0		
Education/Market Transformation	\$1,049,344	0	0		
Planning and Research					
DSM Planning & Administration	\$110,826	0	0		
Program Evaluations	\$320,148	0	0		
Market Research	\$381,001	0	0		
Measurement & Verification	\$2,250	0	0		
Product Development	\$254,640	0	0		
Multifamily Buildings Pilot - EE	\$132,698	8,428	63,515	\$259,945	1.62
Smart Thermostat Pilot - EE	\$68,188	8,215	120,480	-\$3,368	0.99
Product Development Total	\$455,526	16,644	36,537	-\$90,463	0.92
Planning and Research Total	\$1,269,751	16,644	13,108	-\$904,687	0.54
Indirect Products & Services Total	\$2,319,095	16,644	7,177	-\$1,705,631	0.44
EE PORTFOLIO TOTAL	\$13,719,907	615,040	44,828	\$16,007,015	1.46

Table 4d: Public Service's 2016 Gas DSM Costs by Category

2016	Program Planning & Design	Administration & Program Delivery	Advertising/Promotion/Customer Ed	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Business Program							
Commercial Refrigeration Efficiency	\$0	\$16,183	\$1,500	\$5,048	\$0	\$500	\$23,231
Compressed Air Efficiency							
Computer Efficiency							
Cooling							
Custom Efficiency	\$0	\$54,736	\$0	\$20,308	\$0	\$0	\$75,044
Data Center Efficiency							
Energy Feedback Business	\$7,554	\$124,846	\$0	\$0	\$0	\$0	\$132,400
Energy Management Systems	\$0	\$21,058	\$600	\$29,560	\$0	\$1,225	\$52,443
Heating Efficiency	\$0	\$96,008	\$0	\$246,681	\$0	\$27,210	\$369,899
LED Street Lights							
Lighting Efficiency							
Lighting - Small Business	\$0	\$3,180	\$0	\$3,149	\$0	\$0	\$6,329
Motor & Drive Efficiency							
New Construction	\$0	\$482,797	\$200	\$554,610	\$0	\$80,000	\$1,117,607
Process Efficiency							
Recommissioning	\$0	\$9,932	\$3,000	\$16,655	\$0	\$0	\$29,587
Self Direct							
Business Program Total	\$7,554	\$808,740	\$5,300	\$876,011	\$0	\$108,935	\$1,806,540
Residential Program							
Energy Efficient Showerhead	\$0	\$352,709	\$72,359	\$238,301	\$0	\$1,200	\$664,560
Energy Feedback Residential	\$3,858	\$486,032	\$6,572	\$0	\$0	\$5,572	\$502,034
ENERGY STAR New Homes	\$0	\$534,669	\$78,250	\$1,842,288	\$0	\$298,412	\$2,753,619
Evaporative Cooling							
High Efficiency Air Conditioning							
Home Energy Squad	\$0	\$67,667	\$107,391	\$81,592	\$118,896	\$5,000	\$380,546
Home Lighting & Recycling							
Home Performance with ENERGY STAR	\$0	\$85,159	\$153	\$300,412	\$0	\$30,000	\$415,724
Insulation & Air Sealing	\$0	\$43,503	\$0	\$225,794	\$0	\$20,000	\$289,297
Refrigerator & Freezer Recycling							
Residential Heating	\$0	\$87,248	\$56,917	\$564,000	\$0	\$17,500	\$725,665
School Education Kits	\$0	\$195,864	\$0	\$172,988	\$0	\$0	\$368,852
Water Heating	\$0	\$20,241	\$11,765	\$67,000	\$0	\$10,000	\$109,006
Residential Program Total	\$3,858	\$1,873,092	\$333,407	\$3,492,375	\$118,896	\$387,684	\$6,209,311
Low-Income Program							
Energy Savings Kit	\$0	\$44,347	\$30,377	\$43,962	\$0	\$2,500	\$121,186
Multifamily Weatherization	\$0	\$66,381	\$32,393	\$574,281	\$0	\$13,065	\$686,120
Non-Profit	\$0	\$74,204	\$15,000	\$202,782	\$0	\$17,058	\$309,044
Single-Family Weatherization	\$0	\$176,503	\$120,000	\$1,879,840	\$0	\$92,267	\$2,268,610
Low-Income Program Total	\$0	\$361,435	\$197,770	\$2,700,865	\$0	\$124,890	\$3,384,960

Table 4d: (Cont.)

2016	Program Planning & Design	Administration & Program Delivery	Advertising/Promotion/Customer Ed	Participant Rebates and Incentives	Equipment & Installation	Measurement and Verification	Total
Indirect Products & Services							
Education/Market Transformation							
Business Education	\$0	\$1,196	\$42,724	\$0	\$0	\$0	\$43,920
Business Energy Analysis	\$12,000	\$74,563	\$12,000	\$0	\$0	\$0	\$98,563
Consumer Education	\$0	\$104,669	\$145,888	\$0	\$0	\$0	\$250,557
Energy Efficiency Financing	\$3,600	\$3,749	\$52,651	\$0	\$0	\$0	\$60,000
Home Energy Audit	\$0	\$257,204	\$50,708	\$248,400	\$0	\$39,992	\$596,304
Education/Market Transformation	\$15,600	\$441,381	\$303,971	\$248,400	\$0	\$39,992	\$1,049,344
Planning and Research							
DSM Planning & Administration	\$0	\$110,826	\$0	\$0	\$0	\$0	\$110,826
Program Evaluations	\$0	\$0	\$0	\$0	\$0	\$320,148	\$320,148
Market Research	\$0	\$340,186	\$4,743	\$0	\$0	\$36,072	\$381,001
Measurement & Verification	\$0	\$2,250	\$0	\$0	\$0	\$0	\$2,250
Product Development	\$108,270	\$105,726	\$0	\$40,000	\$0	\$644	\$254,640
Multifamily Buildings Pilot - EE	\$8,056	\$43,646	\$0	\$66,156	\$0	\$14,840	\$132,698
Smart Thermostat Pilot - EE	\$4,750	\$34,688	\$0	\$16,250	\$0	\$12,500	\$68,188
Product Development Total	\$121,076	\$184,060	\$0	\$122,406	\$0	\$27,984	\$455,526
Planning and Research Total	\$121,076	\$637,322	\$4,743	\$122,406	\$0	\$384,203	\$1,269,751
Indirect Products & Services Total	\$136,676	\$1,078,703	\$308,714	\$370,806	\$0	\$424,195	\$2,319,095
EE PORTFOLIO TOTAL	\$148,088	\$4,121,970	\$845,191	\$7,440,057	\$118,896	\$1,045,704	\$13,719,907

DSM Participation

Decision No. C14-0731 in 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.*”²² Furthermore, the Commission clarified in Decision No. C14-0997 that “*we 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.*”²³

Tracking Participants / Non-Participants

To most effectively comply with the 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 PSCo customers (eligible for DSM).²⁴ Going forward, the Company will begin to identify the number of customers participating in each DSM product in a given year within the DSM Annual 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 programs 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 program 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 will be provided beginning with the 2014 DSM Annual Status Report.

²² Paragraph 115, pg. 39.

²³ Paragraph 24, pg. 8.

²⁴ PSCo gas transport customer classes are not eligible to participate in DSM.

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 in a given year.²⁵ Customers may have multiple premises,²⁶ multiple projects, and/or participate in multiple DSM 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-participant²⁷ 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 5b and 5c).
- Where mid/upstream products’ do not track participation at the customer level, counts will be an estimate within both the DSM Plans and the Annual DSM 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:

Cooling – Midstream: The participating 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.

Computer Efficiency: Program participation for the upstream component of the program is derived through monthly sales reporting from the third-party implementer. This data is manually entered into Salesforce and is also tracked separately. Based on the total quantity of units sold, it is estimated that participants buy an average of ten computers. Therefore, participation is assumed to be 10% of total units sold.

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

²⁵ Within the Detailed Technical Assumptions table at the end of [Appendix G: Technical Reference Manual](#) of this Plan, the Company identifies “units,” which differ from “participants.” Units are the total number of equipment installed by measure.

²⁶ 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.

²⁷ A non-participant is a PSCo customer who is eligible to participate in DSM, but has not chosen to do so. This type of data point is able to be tracked based on total PSCo customers and/or PSCo customers by class (business or residential).

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), in order to identify the total number of unique customers that receive a showerhead.

ENERGY STAR New Homes: Upstream participation is based on the number of unique new home builders participating in the product each year and is tracked by the third-party implementer. Downstream participation is based on the number of homes completed in the product by that smaller number of builders. In other words, each home is purchased and occupied by a unique customer and no customer is assumed to own more than one participating home during the product year. Therefore, participation estimates included herein will reflect the number of homes.

Home Lighting & Recycling: This product is wide-reaching with a significant amount of bulbs sold and distributed across both the Residential and Business populations. Because the product achieves the vast majority of participation through retail outlets that do not track information on the customers purchasing the bulbs in the product, some estimation of the breadth of participation—based on average bulbs per customer, total installed bulbs, and the product saturation rate—has been performed.

Multifamily Weatherization and Multifamily Buildings Pilot: Participants are considered to be 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.

Building Optimization DR Pilot: Pilot participants will be required to sign an application form. Each participant's information will then be manually recorded on a tracking spreadsheet which will be used to record relevant data during the course of the pilot. As pilot participation is capped at ten participants this manual tracking system is manageable and appropriate.

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 products), but these instances cannot be tracked.

Small Business Smart Thermostat Pilot: Pilot participants will be required to sign an application form. Each participant's information will then be manually recorded on a tracking spreadsheet which will be used to record relevant data during the course of the pilot. As pilot participation is capped at 100 participants this manual tracking system is manageable and appropriate.

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 programs are described below:

Individually-Tracked Products: To estimate the amount of duplicate participation expected to occur in the 2015 and 2016 program years, the ratio of the sum of unique participation within each product observed in the 2013 program year over the unique participation within the Business or Residential segment is calculated. For instance, for the Business class of customers in the 2013 program year, individually-tracked products had a sum of 4,012 unique accounts within products, but these represented only 3,419 unique accounts within the Business class. This results in a factor of 14.78% to account for duplicate participation across the individually tracked products.

Non-Individually-Tracked Products: For several products, it is not feasible to track the individual participation. Home Lighting & Recycling and Computer Efficiency include upstream portions that represent very large participation that do not provide an opportunity to identify the individual participants. For 2015 and 2016, behavioral products for both the Business and Residential classes will be expanded, 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 2015, the Home Lighting & Recycling product is expected to reach 30% of the Residential class population, and the Residential Behavioral product is expected to reach 50% of the Residential class, the duplicate participation is estimated at 15% ($30\% * 50\%$) of the Residential class. The total fraction of the Residential class population participating in either of these programs is estimated by summing the total fraction of the two products at 80% ($30\% + 50\%$) and then subtracting the duplicate participation fraction (15%) to get a fraction of 65% of the Residential class population participating in at least one of these products.

DSM Participation Tables

The following tables included in this Plan present the Company's best estimates for participation and non-participation in DSM programs in 2015 and 2016, based on the methodology for estimating participation described above.

- 5a: 2015/2016 Electric Participant & Non-Participant Estimates, Percentage
- 5b: 2015/2016 Electric Participation Estimates, Average Rebate and Savings by DSM Product
- 5c: 2015/2016 Natural Gas Participation Estimates

Table 5a: 2015/2016 Electric Participant & Non-Participant Estimates, Percentage

	Total Unique DSM Participants (Estimate) ²⁸		Total PSCo Customers (Estimate)		PSCo Customers Participating in DSM		PSCo Customers Not Participating in DSM	
	Count	%	Count	%	Count	%	Count	%
2015 Total	770,810	100.00%	1,227,669	100.00%	770,810	62.79%	456,859	37.21%
Business	17,627	2.29%	93,802	7.64%	17,627	18.79%	76,175	81.21%
Residential	753,174	97.71%	1,133,867	92.36%	753,174	66.43%	380,693	33.57%
<hr/>								
2016 Total	736,715	100.00%	1,227,669	100.00%	736,715	60.01%	490,954	39.99%
Business	24,066	3.27%	93,802	7.64%	24,066	25.66%	69,736	74.34%
Residential	712,612	96.73%	1,133,867	92.36%	712,612	62.85%	421,255	37.15%

²⁸ Estimated participation by DSM product is shown in Table 5b below. Total estimated participation is the sum of DSM product participation estimates less the anticipated number of duplicates (participation in multiple products).

Table 5b: 2015/2016 Electric Participation Estimates, Average Rebate and Savings by DSM Product

Product	2015 Estimated Participants	Average Rebate Per Customer	Average kWh Savings Per Customer	2016 Estimated Participants	Average Rebate Per Customer	Average kWh Savings Per Customer
Business Program						
Business Energy Feedback	8,394	\$ -	288	16,474	\$ -	472
Commercial Refrigeration Efficiency	584	\$ 1,043.53	14,258	642	\$ 1,044.18	14,267
Compressed Air Efficiency	50	\$ 8,615.62	59,342	50	\$ 9,071.51	61,121
Computer Efficiency	4,774	\$ 5.58	1,791	4,533	\$ 5.88	1,793
Cooling Efficiency	400	\$ 3,808.34	23,004	400	\$ 3,611.46	22,431
Custom Efficiency	60	\$ 13,319.25	120,692	60	\$ 11,654.35	105,605
Data Center Efficiency	15	\$ 60,682.74	517,956	15	\$ 60,682.74	517,956
Energy Management Systems	40	\$ 18,333.40	191,309	40	\$ 18,883.40	204,977
Heating Efficiency	N/A	N/A	N/A	N/A	N/A	N/A
LED Street Lights – Co. Owned	N/A	N/A	N/A	N/A	N/A	N/A
Lighting Efficiency	1,682	\$ 5,097.69	45,535	1,593	\$ 5,235.11	47,314
Lighting - Small Business	543	\$ 2,556.58	35,733	558	\$ 2,487.86	34,773
Motor & Drive Efficiency	188	\$ 9,849.28	55,203	169	\$ 9,946.83	54,028
New Construction	149	\$ 49,868.33	272,209	138	\$ 43,619.55	234,951
Process Efficiency	15	\$ 212,721.67	2,199,704	15	\$ 179,153.60	1,710,881
Recommissioning	40	\$ 16,021.40	150,744	40	\$ 16,021.40	150,744
Self-Directed Custom Efficiency	4	\$ 190,563.34	1,326,831	6	\$ 190,563.34	1,326,831
Residential Program						
Energy Feedback - Residential	558,023	\$ -	71*	549,127	\$ -	39*
ENERGY STAR New Homes	2,810	\$ 175.30	902	2,936	\$ 203.55	1,034
Evaporative Cooling Rebate	4,434	\$ 384.24	1,057	4,434	\$ 384.24	1,057
Heating System Rebate	2,500	\$ 100.00	944	2,500	\$ 100.00	944
High Efficiency Air Conditioning	2,851	\$ 718.38	667	2,939	\$ 720.27	666
Home Energy Squad	1,200	\$ 17.91	402	1,600	\$ 19.01	396
Home Lighting & Recycling (Residential)	373,633	\$ 24.88	200	292,435	\$ 29.68	234
Home Lighting & Recycling (Business)	1,772	\$ 334.91	9,492	1,584	\$ 349.75	9,762
Home Performance w/ENERGY STAR	515	\$ 303.41	1,066	515	\$ 303.41	1,066
Insulation Rebate	580	\$ 81.27	286	580	\$ 81.27	286
Refrigerator Recycling	7,500	\$ 50.00	493	7,500	\$ 50.00	440
School Education Kits	38,500	\$ 18.96	98	38,500	\$ 19.22	98
Energy Efficiency Showerhead	2,650	\$ 5.52	246	2,650	\$ 5.74	246
Water Heater Rebate	55	\$ 450.00	1,868	55	\$ 450.00	1,495
Low-Income Program						
Energy Savings Kit	8807	\$ 12.99	106	8807	\$ 12.99	106
Multifamily Weatherization	2656	\$ 250.24	666	2656	\$ 250.24	666
Non-Profit Energy Efficiency	32	\$ 10,532.49	53,024	32	\$ 10,532.49	53,024
Single-Family Weatherization	2552	\$ 420.84	850	2552	\$ 432.20	861
Indirect Program						
Business Energy Analysis	300	\$ -	0	300	\$ -	0
Consumer Education - Business	1385	\$ -	0	1385	\$ -	0
Consumer Education - Residential	34,000	\$ -	0	34,000	\$ -	0
Energy Efficiency Financing	300	\$ -	0	300	\$ -	0
Residential Home Energy Audit	2,500	\$ 84.64	0	2,500	\$ -	0
Multifamily Buildings Pilot	751	\$ 79.88	591	254	\$ 406.53	2,038
Smart Thermostat Pilot EE	0	N/A	N/A	4,800	\$ 10.16	197
Building Optimization EE Pilot	0	N/A	N/A	10	\$ -	0
Demand Response Program						
Building Optimization DR Pilot	10	\$ -	0	0	N/A	N/A
Saver's Switch	11,429	N/A	N/A	11,429	N/A	N/A
Sm Bizz Smart Thermostat Pilot	100	\$ 625.00	0	0	N/A	N/A
Smart Thermostat Pilot DR	1,000	\$ 23.25	8	0	N/A	N/A

*Energy Feedback products' savings are based on annual kWh savings rather than 1st-year savings which are divided by three.

Table 5c: 2015/2016 Natural Gas Participation Estimates

Product	2015 Natural Gas DSM Participation	2016 Natural Gas DSM Participation
Business Program		
Business Energy Feedback (2016)	8394	16474
Commercial Refrigeration Efficiency	100	110
Custom Efficiency	10	10
Energy Management Systems	13	13
Heating Efficiency	95	95
Lighting - Small Business	176	176
New Construction	137	100
Recommissioning	20	20
Residential Program		
Energy Efficiency Showerhead	41,516	41,516
Energy Feedback Residential	452,193	452,846
ENERGY STAR New Homes	4,027	4,208
Home Energy Squad	1,200	1,600
Home Performance w/ENERGY STAR	515	515
Insulation & Air Sealing	1000	1000
Residential Heating	4700	4700
School Education Kits	38,500	38,500
Water Heating	946	946
Low-Income Program		
Energy Savings Kit	9846	9846
Multifamily Weatherization	2656	2656
Non-Profit	32	32
Single-Family Weatherization	2181	2181
Indirect Program		
Business Education	593	593
Business Energy Analysis	100	100
Consumer Education	34,000	34,000
Energy Efficiency Financing	300	300
Home Energy Audit	2600	2600
Multifamily Buildings Pilot	751	254
Smart Thermostat Pilot (EE)	0	4800

Business Program

A. Description

The Business Program offers prescriptive and custom DSM products to commercial and industrial customers in the Colorado service territory.²⁹ Public Service has a total of 223,485 gas and electric commercial and industrial customer premises in Colorado.³⁰ A breakdown of business premises by type is shown in the table below.

Table 6: Business Premise Counts by Type³¹

	Natural Gas Only	Electric Only	Both Gas & Electric	Total
Commercial	35,133	113,964	70,877	219,974
Industrial	3,049	368	94	3,511
Total	38,182	114,332	70,971	223,485

Public Service divides business customers into two sub-segments for marketing purposes: (1) large customers and (2) small- and medium-sized customers. Large customers are typically single or aggregated electric customers with demand usage of over 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 with Public Service 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 2014. Public Service is proposing to continue offering 16 electric and seven natural gas DSM products in 2015 and 17 electric and eight natural gas DSM products in 2016. Six of the seven 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. Public Service's Business Program continues to offer 12 of the same products³² that were first launched in 2009 to continue to target those specific market segments with energy

²⁹ The majority of PSCo'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 Demand-Side Management Cost Adjustment (DSMCA) and ineligible to participate in the Company's energy efficiency products.

³⁰ Premise counts as of September 2014.

³¹ Natural gas transportation-only customer are excluded.

³² Compressed Air Efficiency, Cooling Efficiency, Custom Efficiency, Data Center Efficiency, Energy Management Systems, Lighting Efficiency, Motor & Drive Efficiency, New Construction, Process Efficiency, Recommissioning, Self Direct, and Lighting – Small Business.

savings opportunities and become larger contributors to the DSM portfolio energy savings. The business product rankings are shown in Table 7 below.

Table 7: Business Product Rankings

2015/2016	Rank
Lighting Efficiency	3
Computer Efficiency	6
Small Business -- Lighting	8
Motor & Drive Efficiency	9
Cooling	10
Commercial Refrigeration Efficiency	11
Process Efficiency	13
Data Center Efficiency	15
New Construction	16
Energy Management Systems	18
Custom Efficiency	21
Recommissioning	22
Compressed Air Efficiency	23
Self Direct	24
Heating Efficiency	26
LED Street Lights	33

The following are the newest products and measures being launched for the Colorado market: Energy Feedback Business (2016), energy management information systems (EMIS) measure within EMS, LED Street Lights product, and a Process Efficiency measure for small/mid-sized customers. These products and measures were developed based on a need identified by stakeholders or an established gap found in reviewing utility best practices.

B. Targets, Participants & Budgets

Targets and Participants

The Business Program is anticipated to contribute to a significant portion (nearly two-thirds) of Public Service's estimated energy savings achievements in 2015 of 261.0 GWh and 187,082 Dth will account for 64% of the Company's total electric energy savings target and 31% of the total natural gas savings target. Similarly, planned achievements of 260.5 GWh and 187,961 Dth in 2016 will account for 64% of the Company's total electric energy savings target and 30% of the total natural gas target. Each of the product targets were reviewed by the Company's energy efficiency operations manager for reasonability and appropriateness based on technical potential. The bulk of the Company's electric business energy savings will come from eight products in the Business Program: Commercial Refrigeration, Computer Efficiency, Cooling Efficiency, Lighting Efficiency, Lighting – Small Business, Motor and Drive Efficiency, New Construction, and Process Efficiency products.

The product's energy savings and participation, and corresponding budgets, are shown in Tables 8a through 8d below.

Table 8a: 2015 Electric Business Program Budgets and Targets

2015	Electric Budget	Net Generator kW	Net Generator kWh	Electric MTRC Test Ratio
Business Program				
Commercial Refrigeration Efficiency	\$1,755,953	819	8,906,511	1.43
Compressed Air Efficiency	\$773,251	496	3,173,698	1.48
Computer Efficiency	\$916,554	1,228	9,147,862	1.50
Cooling	\$3,454,564	3,076	9,842,168	1.46
Custom Efficiency	\$1,622,590	871	7,745,756	1.34
Data Center Efficiency	\$1,286,182	863	8,310,341	1.85
Energy Management Systems	\$1,289,835	210	8,185,221	1.54
Heating Efficiency	\$0	0	0	
LED Street Lights	\$31,000	0	1,000,960	1.33
Lighting Efficiency	\$12,161,368	12,570	81,922,710	1.71
Lighting - Small Business	\$3,625,780	3,128	20,754,224	1.69
Motor & Drive Efficiency	\$3,015,493	1,701	11,100,875	1.65
New Construction	\$11,622,121	11,441	43,383,388	1.39
Process Efficiency	\$3,590,088		35,293,136	2.12
Recommissioning	\$979,014	350	6,449,641	1.30
Self Direct	\$898,997	864	5,676,889	1.54
Business Program Total	\$47,022,790	40,424	260,893,380	1.62

Table 8b: 2016 Electric Business Program Budgets and Targets

2016	Electric Budget	Net Generator kW	Net Generator kWh	Electric MTRC Test Ratio
Business Program				
Commercial Refrigeration Efficiency	\$1,882,895	901	9,797,162	1.50
Compressed Air Efficiency	\$794,746	513	3,268,876	1.50
Computer Efficiency	\$886,254	1,166	8,691,702	1.57
Cooling	\$3,310,810	2,875	9,597,040	1.49
Custom Efficiency	\$1,522,696	762	6,777,536	1.35
Data Center Efficiency	\$1,289,422	863	8,310,341	1.90
Energy Feedback Business	\$183,100	144	4,352,945	2.85
Energy Management Systems	\$1,314,635	233	8,770,020	1.51
Heating Efficiency	\$0	0	0	
LED Street Lights	\$43,000	0	11,500,207	1.45
Lighting Efficiency	\$11,926,086	12,425	80,618,858	1.78
Lighting - Small Business	\$3,625,780	3,128	20,754,224	1.75
Motor & Drive Efficiency	\$2,796,843	1,473	9,766,456	1.63
New Construction	\$9,234,537	9,429	34,681,037	1.47
Process Efficiency	\$3,104,922	2,184	27,450,217	2.14
Recommissioning	\$979,014	350	6,449,641	1.36
Self Direct	\$1,280,124	1,296	8,515,333	1.61
Business Program Total	\$44,174,864	37,743	259,301,596	1.67

Table 8c: 2015 Natural Gas Business Program Budgets and Targets

2015	Gas Budget	Net Annual Dth Savings	Annual Dth/\$M	Gas MTRC Test Net Benefits	Gas MTRC Test Ratio
Business Program					
Commercial Refrigeration Efficiency	\$22,472	2,234	99,418	\$265,871	10.82
Compressed Air Efficiency					
Computer Efficiency					
Cooling					
Custom Efficiency	\$75,044	4,775	63,625	\$105,689	1.41
Data Center Efficiency					
Energy Management Systems	\$50,549	3,045	60,232	\$133,750	1.94
Heating Efficiency	\$369,899	17,193	46,480	\$326,316	1.39
LED Street Lights					
Lighting Efficiency					
Lighting - Small Business	\$6,329	2,175	343,587	\$278,401	30.37
Motor & Drive Efficiency					
New Construction	\$1,459,429	154,310	105,733	\$2,133,311	1.24
Process Efficiency					
Recommissioning	\$29,587	3,351	113,246	\$31,595	1.38
Self Direct					
Business Program Total	\$2,013,309	187,082	92,923	\$3,274,933	1.32

Table 8d: 2016 Natural Gas Business Program Budgets and Targets

2016	Gas Budget	Net Annual Dth Savings	Annual Dth/\$M	Gas MTRC Test Net Benefits	Gas MTRC Test Ratio
Business Program					
Commercial Refrigeration Efficiency	\$23,231	2,458	105,787	\$297,348	11.51
Compressed Air Efficiency					
Computer Efficiency					
Cooling					
Custom Efficiency	\$75,044	4,775	63,625	\$115,858	1.45
Data Center Efficiency					
Energy Feedback Business	\$132,400	18,400	138,973	\$129,683	1.98
Energy Management Systems	\$52,443	3,075	58,638	\$127,540	1.82
Heating Efficiency	\$369,899	17,193	46,480	\$355,936	1.43
LED Street Lights					
Lighting Efficiency					
Lighting - Small Business	\$6,329	2,175	343,587	\$281,449	30.69
Motor & Drive Efficiency					
New Construction	\$1,117,607	136,535	122,167	\$2,727,793	1.37
Process Efficiency					
Recommissioning	\$29,587	3,351	113,246	\$35,112	1.42
Self Direct					
Business Program Total	\$1,806,540	187,961	104,045	\$4,070,718	1.46

Budgets

Achievement targets 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 longer-term 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 is continuing to closely manage natural gas DSM expenditures due to concerns about reduced cost-effectiveness of many gas DSM products given low gas commodity prices, the lack of significant system benefits from gas DSM, 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 Public Service to identify who is participating in our DSM 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 products, market segments utilized, and equipment types our customers use. By analyzing specific end-use data, Public Service 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 Public Service's Account Managers and marketing team work individually and collaboratively

to drive participation in the Business Program. While coordination of DSM participation by the largest business customers typically requires regular personal communications and site visits, Public Service 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 a topic on 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 on conservation, climate change, and the environment increases leading to an affinity for energy-saving 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.

Strategy

Public Service follows the “AIDA” (awareness, interest, desire, action) process for encouraging customers to participate in DSM 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 products by providing more information about the offerings, including payback examples and case studies, through a variety of customer touch-points.
3. Instill the desire for participation in DSM 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, Public Service uses several overarching key messages including:

- Energy efficiency reduces operating costs and improves the bottom line.
- Public Service 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 environment impacts.

Public Service 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, Public Service 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 how to 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, computer and electrics, 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 environment 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, offering specific examples of concrete ways to do more. These examples show customers and trade partners the direct, personal impacts of their efforts, 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, environmental) 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 Public Service 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 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.
- *Installation date:* Rebates are provided for qualifying equipment installed within a 12-month period.
- *Payback requirements:* The payback policy for custom conservation products:
 - a. Rebates may be paid on projects with payback of at least 1 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 electrical energy and demand usage to an off-peak period, without 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 that are less than a one year payback, they will not receive a rebate, but Public Service will claim the study-driven savings regardless. The Company believes that our 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 Public Service's DSM products and would like to provide feedback into the design, planning, and implementation of the products.

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's) planning and research efforts to promote energy efficiency technologies.

In 2014, the Company launched the *Partners in Energy* program to support communities in developing and implementing comprehensive energy action plans. In 2015 and 2016 the Company will continue to work with local community partners through this initiative, to reach out to businesses to support them in reducing their energy consumption by participating in the Company's DSM products. This innovative approach will give local businesses greater access to DSM resources through non-traditional channels. This approach 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 decide it prudent to offer bonus rebates to customers and/or trade partners to boost participation if implementation lags and budget allows..

Indirect products, such as Business Energy Analysis and Business Education support participation in business DSM 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 2015 or 2016 are also noted that section.

➤ Commercial Refrigeration Efficiency

A. Description

The Commercial Refrigeration Efficiency product offers refrigeration maintenance and upgrades to commercial customers with significant refrigeration loads, notably restaurants, and grocery, convenience, and liquor stores. Refrigeration systems in these targeted facility types typically account for over 50% of the facility's energy use and run 24 hours per day year-round.

This product consists of five major components:

1. *Free Onsite Energy Assessment* – Each customer will be offered a free on-site facility energy assessment and walk-through to identify and explain key energy efficiency opportunities. The assessment will be performed by a third-party implementer. A copy of the assessment report will be provided to the customer, and will include a prioritization of identified opportunities.
2. *Direct Install for Immediate Savings* – While onsite for the energy assessment, the third-party implementer will perform free installation of the following energy savings measures, where applicable:
 - a. Screw-in LEDs for walk-in coolers/freezers;
 - b. Pre-rinse sprayers for restaurant and commercial kitchens, and aerators in public restrooms and kitchen sinks; and
 - c. Coil brush give-away and demonstration of appropriate use on refrigeration coils.
3. *Full Coil Cleaning* – As part of the onsite visit, the third-party implementer will perform a free coil-cleaning service, including materials and training for self-contained equipment. Cleaning condenser coils in self-contained units is estimated to save an average of 6% of the equipment's annual energy consumption, depending on the system and its condition. Since coil cleaning should be performed annually, we will provide customers with a coil cleaning brush, an instructional "How-To" sheet, and an onsite tutorial, to equip them with the tools and knowledge to complete this task on a regular basis using in-house staff. We will claim energy savings for the cleaning performed by the third-party implementer.
4. *Rebated Refrigeration Measures* – These measures are the core of the Refrigeration Efficiency product offering. In order to qualify for the rebate, the equipment must be professionally installed. These core measures include:
 - Enclosed Reach-in Cases: The Company will rebate reach-in cases with doors when the customer replaces existing open multi-deck cases with equivalent storage (cubic feet or linear feet).

- Night Curtains: Night curtains may be rebated when they are installed on open refrigerated cases to reduce heat transfer and mixing of air inside and outside the case during times of low store traffic. The rebate will be available for permanent, low emissivity (reflective) night curtain products only.
- Walk-in Electronically Commutated Motors (ECM): PSCo will rebate the replacement of evaporator fan motors with new, more efficient motors, (typically ECM) in walk-in coolers and freezers where none previously existed.
- LED Case Lighting: Rebates will be available for the installation of LED case lighting, including horizontal and vertical solutions, to replace existing mixed populations of older lighting technologies.
- Anti-Sweat Heater Controls: PSCo will rebate efficient anti-sweat heater controls installed on commercial cooler and freezer doors to prevent the door from fogging or having condensation buildup on the glass.
- Floating Head Pressure Controls: Rebates will be available for floating head pressure controls. The floating head pressure control will control the compressor pressure based on outside temperature.
- Evaporator Fan Motor Controls: The Company will rebate fan controls that limit the fan runtime to 100% baseline speed for 5,875 hours per year and 70% of baseline speed for 2,520 hours per year.

5. *Turn-Key Services* – The customer will be provided with proactive project management, by the third-party implementer, to assist with the implementation of prescriptive projects, including coordination between the customer, Public Service, and the installation contractors/trade allies to complete the improvements and submit rebate applications.

B. Targets, Participants & Budgets

Targets and Participants

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

Budgets

Public Service plans to work with a third-party implementer to provide this product. The forecasted expenditures in 2015-2016 for this product are based on projected participation levels, promotion, and administration expenses. The majority of the product costs are for administration, vendor marketing/training, and customer rebates.

C. Application Process

The Company plans to promote the Commercial Refrigeration Efficiency product through the outreach efforts of a third-party implementer. Secondary outreach is likely to occur

through the Company's Account Managers, Xcel Energy Business Solution Center's (BSC's) Energy Efficiency Specialists, contracted trade allies, and/or other marketing efforts such as mailings, newsletters, and the Company website.

The Commercial Refrigeration Efficiency product's application process will include:

1. *Customer Intake:* The Company will work with the third-party implementer to establish and follow a set protocol for receiving and qualifying customers who are interested in this product. Interested customers will be contacted to schedule an installation/assessment time.
2. *Identify Opportunities:* After completion of direct installation measures, the third-party implementer will use the assessment results to work with the customer and PSCo to identify deeper prescriptive savings opportunities.
3. *Turn-Key Support:* The third-party provider will offer proactive project management to assist with implementation of the prescriptive rebate projects, including coordination between the customer, PSCo, and the installation contractors/trade allies to complete projects and submit rebate applications.

D. Marketing Objectives & Strategies

The Commercial Refrigeration Efficiency marketing strategy is built upon the Company's and the third-party implementer's experience working in the Colorado market. The strategy incorporates best practices learned from similar refrigeration programs offered across the United States, and is integrated within the Company's larger marketing efforts. The Company and third-party implementer will develop targeted marketing collateral that may include sell-sheets, direct mail, e-mail communications, case studies, and leave-behinds.

The third-party implementer will use education and training to market the product while building trade ally and customer knowledge about energy efficiency technologies and encouraging better energy decisions.

Marketing Channels: The third-party implementer will use several marketing channels for the Commercial Refrigeration Efficiency Product, including:

Program Field Staff: Field staff will be the on-the-ground marketing team, conducting targeted outreach to relevant customer groups and industry associations in addition to working with customers.

Account Management and BSC Staff: The third-party implementer will build relationships with Public Service's Account Managers and BSC staff to drive customer participation. The product will also be promoted to applicable Lighting – Small Business participants to offer them more comprehensive savings opportunities.

Trade Partners: The third-party implementer will engage trade partners as early as possible through training to increase their ability to reach customers at an appropriate time so that the product can influence a buying decision.

Direct Marketing: PSCo will work with the third-party implementer to incorporate marketing materials into product training sessions, direct mailings to target customer segments (grocers, restaurants, convenience and liquor stores), and distribute at targeted locations.

Industry Associations: Public Service will work with the third-party implementer to develop relationships and marketing strategies with food service and sales associations to target the major players within the commercial refrigeration customer segment.

E. Product-Specific Policies

Commercial Refrigeration Efficiency has the following product-specific policies:

- All rebated equipment must be new and meet all product rules and requirements. The rebate application must be submitted within 12 months of the invoice date.
- Rebates assume a one-for-one replacement of retrofit fixtures that will result in energy savings.
- The product is available to retail business customers with electricity and natural gas service, or electricity service only. Gas only customers are not eligible for this product.

F. Stakeholder Involvement

There are relatively few trade allies who specialize in refrigeration, but Public Service will target this network, and use other marketing outreach as described in Section D above, to ensure that all organizations have the opportunity to participate.

G. Rebates & Incentives

Customers may apply for prescriptive and custom rebates for qualifying equipment. Third-party implementer project management services and direct installations will be performed at no additional cost to the customer.

➤ Compressed Air Efficiency

A. Description

The Colorado 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 Variable Frequency Drive (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 reductions.

Rebates are available for any size of compressed air equipment through the product's custom component. For equipment over 50 horsepower, customers are advised to complete a system study prior to submitting for a custom efficiency rebate. Examples of equipment replacement that may qualify for the custom rebate include:

- Replacing an oversized 50 horsepower compressor with a 40 horsepower compressor;
- After completing a compressed air study, replace an existing 150 horsepower air compressor with two 75 horsepower compressors and controls;
- After completing a compressed air study, replace an existing 150 horsepower air compressor with a 150 horsepower VFD compressor; and

The Compressed Air Efficiency product is available to all electric commercial and industrial customers within the Company's service area. The primary targets are mid-sized business customers that have some or all of the following characteristics:

- Demand of 100+ kW, and/or
- Operate within energy-intensive industries (e.g., food processing, mining, etc).

In addition, there is a secondary target of small business customers that may have some or all of the following characteristics:

- Limited internal resources to purchase, install and finance projects, and/or
- Limited technical expertise, and/or
- Focus on short-term paybacks.

Members of the trade are also targeted, including equipment manufacturers and installers, as well as design engineers and electricians.

B. Targets, Participants & Budgets

Targets and Participants

Participation and savings targets were established in light of recent product trends and experience, including performance in 2013 and early 2014. Trade feedback, an evaluation of potential customers within the Colorado service territory, and results from the product's 2014 comprehensive evaluation also informed target-setting.

Budgets

Historical were analyzed to project the product budget for 2015-2016. Other external variables such as promotions, trainings and staffing influenced deviations from historical trends. The budget is largely driven by rebates and internal labor, as well as consulting fees:

- *Rebates* – The budget for rebates is established by estimating participation for the product and applying the rebate amounts per kW and kWh
- *Internal labor* – Compressed Air Efficiency is a labor-intensive product. It is one of the few products in Colorado that has prescriptive, study-based, and custom components. The study and custom components require Xcel Energy staff to conduct detailed analysis for preapproval of each potential project. Labor is typically 25% to 30% of the product cost.
- *Consulting* – A consultant provides measurement and verification (M&V) services, as needed.

C. Application Process

The customer can learn about the Compressed Air product through various channels including the account manager, compressed air vendor, 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 vendor 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 a detailed 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 within six weeks, as indicated on the application.
- The replacement of compressors must be for a new variable speed drive compressor(s) with horsepower that is less than or equal to that of the replaced load/no-load compressor(s). If the retrofit is not a reduction in horsepower or

involves additional compressor types, customers may apply for preapproval through the Custom Compressed Air process.

- The replacement or installment of a new cycling dryer must be 75 CFM or greater and must not be used as backup. Non-cycle or refrigerating dryers are not eligible. The replacement or installment of a new mist eliminator filter must be 125 CFM or greater and must not be used as backup. The rated pressure drop of all mist eliminators must be .75 psig or less over the lifetime. The installment of only new dew point controls (purge controls) must be for systems that are 95 CFM or greater and cannot be used as backup. Dryers must have dew point sensor at discharge to monitor demand and only desiccant heatless dryers are eligible. Anything that meets the requirements listed above would go through the Custom Compressed Air process.

Compressed Air Studies

In order to begin the study process the customer will first obtain a study estimate from a participating compressed air vendor/contractor. A list of eligible participating providers and trade partners is available on the Company's website, here: <http://www.xcelenergy.com/staticfiles/xe/Marketing/Files/CO-Bus-Compressed-Air-Participating-Providers.pdf>. The customer submits the Compressed Air Efficiency study application and the proposed cost of the study to a Company Account Representative. To receive preapproval, the study application must propose to include the following components:

- An ultrasonic leak survey to locate and tag air leaks, and estimate the cost of inefficiencies due to system leaks and misuses;
- An efficiency report with system recommendations and estimate of energy cost savings due to each recommendation;
- Characterization of major compressed air system components including:
 - Compressor number, type, capacity, pressure rating, and age
 - Compressor motor size, efficiency, and age
 - Type, capacity, and age of dryers and other conditioning equipment
 - Type of automatic compressor controls, if any
 - Description of major compressed air end uses
 - Location and layout of piping and major system components
 - Inspection of compressed air system components and identification of problem areas.
- Identification of system loading of major compressed air users including size, frequency, and duration of use;
- Flow and/or electric metering results;
- Summary of the results of the leak and unregulated demand inspection, including the location and approximate size of each leak;
- Summary of the execution steps and cost estimate to repair the leaks, unregulated end-uses and inefficient compressed air applications;
- Recommendations for improvements to customer's maintenance procedures; and
- Recommendations for follow-up actions to improve operation and efficiency, including the installation of new equipment.

To receive the study rebate, the customer must deliver the completed study report, within the allotted preapproval timeframe, and must repair at least 50% of the air loss due to leaks and/or waste as identified by the study. When the report is complete and the customer has repaired the leaks, the customer will inform their Account Representative. The customer and Account Representative review the list of identified leaks and note the repair status of each leak. The customer and Account Representative 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.

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.

D. Marketing Objectives & Strategies

Account managers and compressed air vendors are the primary marketing conduits for this product and market the product through their direct relationships with customers. In addition, the following strategies will help meet product targets in 2015-2016.

Targeting Industrial Customers. Industrial customers make up a sizeable, untapped 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. Very few trade partners operate in Colorado, but they 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 vendors is high due to the limited market size. Therefore, the Company trains each trade partner individually. Throughout 2015 and 2016, training with trade partners will continue. The trainings provide a forum to review the vendor's work, make recommendations for a better end-product, solicit feedback on the effectiveness of the Compressed Air product, and maintain a healthy relationship with each vendor.

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 in soft and hard copy format for customers, trade partners, and the Company's internal staff. 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 vendor 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 Study Providers 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 vendor. The Company does not endorse any particular provider 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 and custom projects require pre-approval before purchase and installation. This process helps minimize free ridership and it ensures 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 50 horsepower 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

Customers, trade partners, and other stakeholders are currently engaged at the specific project level. Feedback is garnered individually from each participant and once a trend develops (positive or negative), the company makes a change to the product design. If it is a small change, it is then discussed internally and possibly with a few key trade partners and, if deemed acceptable, implemented. A larger change would possibly involve review by the product's external technical resources or other third-party.

G. Rebates & Incentives

The Compressed Air Efficiency product helps customers lower operating costs by offering rebates on compressed air studies and by providing rebates on compressed air equipment. Rebates apply to new and leased equipment, but not to used equipment. All rebates are subject to Product-Specific Policies (Section E above) and Business Program Policies.

Study rebate levels are described in Appendix H: Technical Reference Manual and are described in the study funding application as well as on the Company's website.

Prescriptive rebates for compressed air equipment are available for no loss air drains, cycling dryers, mist eliminators, dew point controls, and select variable speed drive compressors. Prescriptive rebate levels are shown in the Appendix H: Technical Reference Manual, on the rebate application, and on the Company's website.

In 2015-2016, the product provides custom rebates for all other compressed air energy saving projects of up to \$600 per kW saved. The rebate level is a continuation of the 2014 rebate level.

➤ Computer Efficiency

A. Description

The Computer Efficiency product offers upstream measures and downstream prescriptive measures—both are available to electric business customers in Xcel Energy’s Colorado service territory.

Upstream measures offer incentives to manufacturers that design, install, and deliver desktop personal computers (PCs) with high-efficiency power supplies.

1. High Efficient Power Supply

Manufacturers that sign a participation agreement and turn in a claim form to the Company’s third-party implementer can receive incentives to cover part of the incremental cost for installing high efficient power supplies. Manufacturers typically use this incentive to promote their efficient PCs to increase the number of products offered with high-efficiency power supplies. Units are shipped to qualified zip codes (as confirmed by the manufacturer).

The third-party administrator delivers the incentive to manufacturers and provides a report and invoice to Xcel Energy for reimbursement.

Downstream measures offer incentives to business customers who implement a Virtual Desktop Infrastructure (VDI) strategy (“Desktop PC Virtualization”) or install PC Power Management Software.

2. Desktop PC Virtualization

This downstream measure provides rebates to business customers who implement a VDI strategy. This strategy involves installing a VDI device (also known as “thin clients,” “zero clients” or “ultra-thin clients”) instead of the traditional desktop PC. The VDI device has a lower operating wattage and uses less energy than traditional desktop computers. The VDI device communicates with a server to enable access to software applications and for the user to store data on the server rather than on their local hard drive.

This measure is administered by Public Service and follows the methodology of other prescriptive measures. Customers can apply for a rebate of \$60 per VDI installed. Rebate amounts are based on 52% of the incremental cost to the customer for the implementation of the VDI system.

3. PC Power Management

This downstream measure provides rebates to business customers who install power management software that remotely controls a computer’s power management strategy from data centers or other central locations. The software,

that manages the computer's power management settings, is locked and the computer user cannot override the power management settings.

The prescriptive rebate is only for applications on desktop PCs and excludes installations on laptops, tablets and other hardware. In addition, it is limited to computers used during a typical single shift workweek. The computers being controlled by the power management software must be located in PSCo's electric service territory to qualify for the rebate.

B. Targets, Participants & Budgets

Targets and Participants

The Company has developed separate energy savings and participation targets for each of the upstream and downstream components of the product:

High Efficient Power Supply: Demand kW and energy kWh impact goals were determined from equipment wattages levels based on information from the third-party implementer and ENERGY STAR®. Participant levels for the upstream manufacturer incentives were determined by product experience in the Company's Minnesota service territory and performance in the Colorado since the program's inception.

Desktop PC Virtualization: The number of participants per year was estimated based on market potential determined in conjunction with the third-party implementer.

PC Power Management: The number of participants per year was estimated based on market potential determined in conjunction with the third-party implementer.

Budgets

Rebates, program administration, labor, and promotions drive most of the budget. The third-party implementer charges an administrative fee per each unit shipped (upstream measures only). The estimated promotional budget includes contribution to a general energy efficiency advertising campaign. The estimated M&V budget anticipates costs for both third-party customer on-site visits as well as third-party customer follow up communications detailed in the M&V section of this Plan.

C. Application Process

Manufacturers learn of the upstream incentives and the benefits through marketing undertaken by the third-party implementer. Manufacturers must submit a rebate claim form to the third-party implementer within twelve months of unit delivery to receive a rebate.

End-use customers learn about the prescriptive rebates for Desktop Virtualization and PC Power Management through marketing by Public Service. Customers apply for rebates

through an application process managed by the Company. Applications for the products are available on Xcel Energy's website, here:

http://www.xcelenergy.com/Save_Money_&_Energy/Rebates/Computer_Efficiency_-_CO. The application process for the prescriptive products is similar to the Company's other prescriptive products. Customers may apply for rebates by completing the application and providing a detailed invoice and specification sheet for the newly installed equipment. Customers submit a rebate application within twelve months of equipment purchase and installation to their Account Manager or to the Business Solutions Center (BSC). Rebate checks will be mailed to the customer as indicated on the application within six to eight weeks.

D. Marketing Objectives & Strategies

The primary marketing efforts for the manufacturer incentives will revolve around the third-party implementer connecting with computer manufacturers to continue increasing program participation with additional manufactures. Public Service will educate business customers on the benefits of purchasing high-efficiency computing products through our newsletters, BSC representatives, customer events, and website.

Desktop Virtualization and PC Power Management product challenges include customer awareness, incremental customer costs, and educating trade partners on the technology and rebate structure. Public Service will promote the technology to the trade through: newsletters, BSC representatives, trade relations managers, and our trade partner website.

E. Product-Specific Policies

For the end-use customer rebates, all equipment rebated through the measure must be new and meet all measure rules and requirements.

F. Stakeholder Involvement

Public Service consulted with equipment vendors for guidance when designing the Computer Efficiency product for Colorado. These vendors provided insight into the types of products to rebate and the incremental capital and total equipment costs to be expected. Public Service will also rely on trade partners to help promote the product to customers.

G. Rebates & Incentives

Rebates and incentives were developed for each product component:

High Efficient Power Supply: Incentives are paid directly to PC manufacturers for installing high-efficiency desktop power supplies. The rebate levels offset the

incremental cost to the computer manufacturers. This results in a lower purchase price for the customer and balances the cost-effectiveness of the product.

The incentive structure for PCs includes:

- \$5 incentive for ENERGY STAR 5.0 / 80 Plus Bronze desktop power supplies
- \$10 incentive for ENERGY STAR 5.0 / 80 Plus Silver desktop power supplies
- \$15 incentive for ENERGY STAR 5.0 / 80 Plus Gold desktop power supplies
- \$20 incentive for ENERGY STAR 5.0 / 80 Plus Platinum desktop power supplies

Desktop PC Virtualization: Business customers are paid \$60 per desktop PC removed from their system and replaced with a “thin-client” or “zero-client” device. The rebate is 52% of the average incremental cost, providing a payback to the customer of less than 2 years.

PC Power Management: Business customers are paid \$5 per PC controlled remotely by power management software, and the rebate is 34% of the average incremental cost.

➤ Cooling

A. Description

The Cooling product encourages Public Service business customers to consider high efficiency options when choosing to replace existing cooling equipment. Cooling is typically the second or third largest user of electricity for business customers.

The Cooling product offers a broad range of prescriptive rebates for high efficiency equipment options. Some cooling solutions require individual “custom” evaluations to determine the savings and rebate potential; those projects follow the guidelines of the Company’s [Custom Efficiency](#) product.

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. Public Service reviewed and adopted best practices for DSM product development and product structure from across the country. The Company also adopted the guidelines of the International Energy Conservation Code (IECC) 2009 for equipment definitions, standard formulas, and minimum recommended efficiencies. These sources, along with Public Service’s historical experience, allowed the Company to develop influential prescriptive rebates that encourage the most efficient choice of equipment in the majority of equipment categories.

Midstream measures are a newly emerging offering under this product designed to deliver incentives to market actors who sell qualifying high efficiency HVAC equipment. The logic that underscores this approach is that a small number of midstream market actors are in a position to impact hundreds of thousands of customers and influence their choice of equipment by increasing the stocking and promotion of high efficiency HVAC equipment. Distributors currently have limited stock of high efficiency HVAC equipment. This condition limits the current program’s effectiveness with replace-on-burn-out projects. The midstream model cost-effectively leverages existing market structure and relationships. The product also provides a web-based paperless rebate application system to facilitate program participant sales and invoice tracking, which further reduces administrative costs as compared with paper application processing. The feature will increase the number of participants and dramatically increase the level of participation. The Midstream product is designed to adapt to market changes, and will continue working with relevant industry players to continually enhance the program to include new midstream incentives for “beyond-code efficient” equipment.

B. Targets, Participants & Budgets

Targets and Participants

Cooling targets are based on the achievements of past years, estimates of market penetration, and a review of potential cooling technology improvements in the area of efficiency.

Participation was derived from prior years' (2013 and 2014) performance. Additional factors included feedback from trade partners, product participation trends, average project size, and historical participation.

The Midstream product will include a variety of non-incentive program services intended to support customers and contractors in achieving greater energy efficiency from HVAC upgrades. Such services include:

- Education, training, and sales tools for contractors on high efficiency cooling components, controls, and features on packaged HVAC units. The training will include sales, marketing, cost-effectiveness (ROI), and financing of these features.
- Improved comfort and indoor air quality for customers.

Budgets

Historical cost and participation information was analyzed to project budgets. External resources and discussions with local stakeholders were used to ascertain 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 average project rebate cost from the detailed technical assumptions and multiplying by anticipated participation.
- *Administration:* Determined by estimating the number of full-time employees needed to manage the product and execute the marketing strategy and rebate process, including Account Management and Business Solutions Center (BSC) support.
- *Promotions:* The estimated promotional budget anticipates several customer and trade partner communications events during the year and a contribution to the general conservation advertising campaign.

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

- *Incentives:* Midstream incentives to HVAC 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 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 budgets are minimal. M&V costs are similar to the traditional components of the Cooling product.

C. Application Process

Prescriptive Measures:

Applications for the product are available from trade allies and on Xcel Energy's website, here:

http://www.xcelenergy.com/Save_Money_&_Energy/Rebates/Cooling_Efficiency_-_CO

Customers may apply for rebates by completing the prescriptive Cooling application and providing a detailed purchase invoice for the newly installed equipment. The equipment must be new and meet all the qualifications detailed on the application. After the customer has installed the equipment, the application and invoice must be submitted to Public Service within twelve months of the invoice date. Applications may be mailed to Public Service or submitted directly to participants Account Manager or the BSC. Once the paperwork is received and processed, rebate checks will be mailed to the customer, or alternate recipient, as indicated on the application, within six to eight weeks.

Midstream Incentive:

A critical component of the midstream measure is its use of a web-based paperless application. A paperless system is critical for ease of participation and for reducing the cost per kWh saved. Incentives will be paid on a bi-weekly basis. The distributor must submit the following information into an online application, in order to receive the incentive:

Qualifying Equipment Information:

1. Manufacturer
2. Model
3. Number of units installed
4. Unit Serial numbers

Installation Site Information:

1. Business name and address where the equipment is to be installed
2. Contact information (customer, or contractor, or installer)

Sales Information:

1. Invoice number and date

Custom Cooling:

Customers with projects that save cooling energy, but do not have a corresponding prescriptive rebate, can submit custom cooling projects for evaluation under Custom Efficiency, with preapproval.

The sales cycle for cooling projects is typically influenced by the size and complexity of equipment. It may take two years to study, purchase, and install a new, large system, while smaller rooftop units (RTUs) can take only two weeks to replace. For this reason, the Cooling product makes every effort to remind customers to evaluate high efficiency options when they are faced with a purchasing decision.

D. Marketing Objectives & Strategies

The Cooling product creates a base level of knowledge in the marketplace through newsletters and direct mail to customers and trade allies. These tactics make customers aware of the key benefits of energy efficiency and its applicability to cooling systems, and gives the trade a platform from which to educate customers on high efficiency solutions for their particular 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 Trade Relations Manager. The Cooling product also benefits from opportunities identified for participants via the Company's Business Energy Analysis and Recommissioning products.

Marketing communications will revolve around the benefits of energy efficiency through paybacks, lifecycle costs, and environmental benefits. Newer cooling 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), 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.

To reach its energy savings target, Cooling needs to continue to penetrate the centrifugal chiller market. These systems provide the largest per project savings for the lowest transactional costs, making them the most cost-effective opportunities. The product has been successful in penetrating this market through strong relationships between Public Service account managers and customers and increasingly strong relationships with the trade. Custom cooling strategies, such as cooling controls have been identified as an area of growth. Future strategies will involve more online tools to help customers evaluate the benefits of high efficiency equipment. Rebate and payback calculators, as well as lifecycle costing tools, have recently been developed for vendors and customers to improve their decision making process when purchasing equipment. Online submission of rebate applications will also be a priority.

In 2014, new prescriptive measures, such as anti-sweat heater controls and ECM fan motors were added. The Company also intends to explore other potential prescriptive rebates to add to the portfolio.

Why target distributors?

1. Distributors control equipment stocking and sales.
2. Influence contractors' purchase decisions which influence customer purchases.
3. Minimize downstream markups and lost opportunities.
4. Fewer market actors enable lower implementation costs.
5. Meets customer's demand for immediate replacement.
6. Distributors influence majority of equipment sales.
7. Most qualified sales staff with financial, technical, and sales skills.

E. Product-Specific Policies

The Cooling product does not rebate back-up equipment because deemed energy savings will not be realized. In addition, portable equipment is not eligible for a rebate.

For the midstream approach:

Qualifying 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 manufacture representative may serve as its own distributor and sell directly to the end-use customer. In this case, the manufacturer/distributor can qualify.

Qualifying Customers: Must be commercial electric customers in PSCo's service territory.

Qualifying Equipment: Qualifying equipment must be new and permanently installed at the end-use customer. Currently qualifying equipment includes RTUs, split systems (including fan coil units) consisting of one evaporator and one condenser, condensing units, packaged terminal air conditioners/heat pumps, water source heat pumps (PTACs/PTHPs), and air-cooled chillers. Downstream rebates will not be available for these equipment types.

F. Stakeholder Involvement

Because cooling systems can be very complex, trade partner support is imperative to achieving the product's energy savings and participation targets. The Company has engaged trade allies in product design and improvement through the creation of a Cooling Council. This group meets twice per year to discuss new technologies, product issues, and general market topics. The Cooling Council members are representatives from all

levels of the cooling equipment distribution chain. Members include manufacturer's representatives, mechanical engineering firms, and equipment contractors.

A successful market transformation program—the midstream approach—rests on the coordination of efforts across many stakeholders. The most successful market transformation programs have involved multiple organizations, providing overlapping market interventions.

G. Rebates & Incentives

Most of the components of the product provide prescriptive rebates based on the size of the unit in tons combined with an efficiency bonus to encourage customers to exceed minimum qualifying efficiencies.

Generally, Public Service has set the minimum qualifying efficiency at a point that nominally exceeds the IECC 2009 minimum efficiency requirements to encourage customers to purchase the most efficient equipment, while ensuring that manufacturers have equipment that meets the criteria of the product.

The proposed rebate level averages 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 is increasing with the stricter code requirements in the market.

The midstream approach provides distributor incentives based on the size of the unit in tons, combined with an efficiency bonus to encourage distributors to exceed minimum qualifying efficiencies.

➤ Custom Efficiency

A. Description

The Custom Efficiency product offers custom electric and gas rebates to all business customers who install qualifying energy efficiency measures not covered under traditional prescriptive products.

The product also provides study funding up to 75% of the study cost, not to exceed \$25,000 to help customers identify project savings.

Many types of energy saving measures may not be eligible for a prescriptive rebate, but could be eligible for a custom rebate, including, but not limited to, the following:

Equipment	Application
Compressed Air	New equipment, reduction in horsepower (hp) of compressors, storage, vacuum pumps, and variable speed drive compressors, reduction of compressor run time
Controls	CO ₂ based ventilation, compressed air and refrigeration controls
Cooling	Heat recovery, process cooling and controls
Lighting	Lumen output changes, exterior lighting, LED and daylighting, retrofits (not one-to-one)
Miscellaneous	Energy efficient windows (film, argon, Low E), humidification, insulation, printing presses, welders, and elevator modernization (DC to AC motor conversion)
Motors & Drives	Motors > 200 hp. Drives > 200 hp and any motor type outside the prescriptive program parameters.
Refrigeration	Ammonia compressors, freezer doors, and evaporative condensers
Process changes	<ul style="list-style-type: none"> • 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.

B. Targets, Participants & Budgets

Targets and Participants

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

The participation target was derived from historical performance over the last three years, in particular from the 2014 average project size and mix of custom technologies.

Budgets

Historical cost and participation information is tracked and analyzed to project future budgets. For the Custom Efficiency product, administration, advertising, 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.
- *Advertising:* The budget supports general marketing of DSM business program resources for customers.
- *Rebates:* The budget for rebates is established by estimating participation for the product and multiplying by the rebate per kW amount in the technical assumption models.

C. Application Process

The application process for Custom is more involved than the prescriptive products. Each project must meet specific eligibility requirements. This process can be broken into distinct steps: Application Submission, Project Analysis, Project Acceptance or Rejection, and Project Completion:

Application Submission:

Account Managers and/or the BSC work with a customer and their vendor to identify a project with energy efficiency opportunities and start the application process. In addition to the two-page application which must be signed by the customer, an electronic “workbook” must be filled out with a detailed description of the project.

Project Analysis:

Engineers review the project information and enter pertinent data into a Total Resource Cost (TRC) 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 Rejection:

Once the engineers have completed the analysis, a preapproval or rejection letter is sent to the customer. The letter provides critical information regarding the project, including: project 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 rejected, a rejection 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. The customer and Account Manager sign the verification section of the application and submit it along with copies of invoices and other required information as stipulated in the preapproval letter. If the final documentation matches the preapproved project information, the project is approved and 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, changes in final project cost, or the purchasing of similar, but not identical, equipment to what was analyzed during the preapproval analysis. 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 targets in 2015 and 2016:

- *Target Industrial Customers.* Colorado's industrial base is relatively small, but these few customers offer tremendous 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 Energy Efficiency Specialists.* The BSC provides direct support to the 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 website³³ and in hard copy format for customers, trade allies, and internal Public Service staff. 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.

³³ http://xcelenergy.com/Save_Money_&_Energy/Business/Customized_Solutions/Custom_Efficiency_CO

- Trade Ally Website³⁴ – This resource was designed specifically for the Company's trade allies. It includes all of the collateral 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.

Target Market

As with the other business rebate products, the bulk of savings is anticipated to come from the large commercial and industrial segment. The Custom Efficiency product has an even greater reliance on this segment as most projects are from customers involved in manufacturing and processing. Approximately 80% of these customers are concentrated within the Denver metro area, which will enable us to provide concentrated marketing campaigns. Account Managers manage the largest accounts, but the Company will also continue to target mid-market customers outside of the Denver metro area with on-site workshops.

E. Product-Specific Policies

All custom projects require pre-approval before order, purchase, and installation; a TRC ratio of equal to or greater than 1.0; and a simple payback criterion of over one-year and less than the estimated life of the product. Rebates are capped at 60 percent of the incremental project cost. This process is in place to help ensure free-ridership is kept to a minimum and that rebates are awarded to projects that are technically and financially sound.

F. Stakeholder Involvement

Customers, trade allies, and other stakeholders are engaged at the specific 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, but not to used or portable equipment. To determine eligibility for a rebate, all projects are analyzed as described in the application process. Rebates are calculated based on the demand savings of the project. Additional information on this process is described in the technical assumptions section. For 2015

³⁴http://xcelenergy.com/Energy_Partners/Trade_Partners/Commercial_Programs/Custom_Efficiency_for_Trade_Partners - CO

and 2016, Public Service is maintaining an incentive level of \$400 per kW for electric savings projects and \$4 per Dth for gas savings projects.

➤ Data Center Efficiency

A. Description

The Data Center Efficiency product helps customers address energy conservation opportunities in both new and existing data centers. This specialized product was designed in response to the significant energy savings potential of these customers, and their projected growth in energy use in data centers over the next several years.

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

- High Efficiency Servers
- Server Virtualization/Consolidation
- Airflow Improvements
- Electrical Equipment
- High-Efficiency Cooling
- Humidification
- Power Systems
- High-Efficiency Lighting

Any size data center may participate, the product encourages a holistic approach to energy efficiency within the data center when feasible for the customer.

For existing facilities, the product provides funding toward an onsite evaluation and analysis, and rebates based on the energy savings resulting from implementing opportunities recommended in the study. Additionally, individual projects will be analyzed and rebated using a custom model. New Construction design assistance is available for data center customers as well; if the facility participates, the contractor will partner with a study provider for analysis of the data center portion of the project.

Public Service selects third parties to perform data center studies and analysis. Study paths leverage third-party experts, who have been provided training on Company tools, to conduct the analysis. The Company maintains a list of qualified contractors whose studies may be rebated by Public Service. Data Center projects that do not require a study, or have completed a study in the past, will be evaluated through the custom model and evaluated for rebate opportunities.

Prescriptive equipment rebates from products across the Company's DSM portfolio are available to data center customers.

B. Targets, Participants & Budgets

Targets and Participants

Electric savings and participation targets were determined by looking at historic participation and identified projects since the 2009 product launch through mid-year 2014. A logical division of data center square footage size was applied based on actual participation, and the estimated savings of the individual measures were calculated and totaled.

Budgets

Budgets were developed commensurate with the savings goals, based on historical ratios. The largest cost in the budget is for implementation and study rebates, which represent more than 60% of the overall product budget.

C. Application Process

Customers learn about the product through a variety of channels, including: the Xcel Energy website, Account Managers, Business Solutions Center (BSC) representatives, and trade partners or study providers. In addition, the Company will recruit data center experts to help promote the product to customers. Product applications are available through all of these channels. Customers may submit an application through their account manager or a trade partner, or send it via mail or email to Public Service.

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 will follow the New Construction product's Energy Design Assistance guidelines for facilities.

Preapproval is required to receive rebates for studies and custom measures. Prescriptive measures do not require preapproval and will be rebated for implemented projects.

D. Marketing Objectives & Strategies

The marketing strategy for Data Center Efficiency includes 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, 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 and the BSC focus on recruiting data center customers to participate. 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.

Data Center Efficiency customers typically require a great deal of effort to influence into participating in DSM. Many are reluctant to make any changes to their mission-critical operations, and upgrades require agreement across many customer functions.

Tactics include collateral materials, newsletter articles, direct mail campaigns, advertising, presentations, and event marketing outreach.

E. Product-Specific Policies

Customers may perform a study by selecting a pre-qualified provider or other vendor of their choice. New providers 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. Preapproved projects must be cost-effective. If at least two years has passed since a project was approved, the technical 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 preapproved, will need to be submitted to Public Service within three months of issuance of the preapproval letter.

F. Stakeholder Involvement

As part of the product design effort prior to the 2009 product launch, Public Service conducted focus groups with data center facility managers and one-on-one interviews with information technology executives in order to better understand their needs and interest in energy efficiency. Some of the recommendations resulting from the focus groups which were considered by Public Service in the product design include:

- Create an analysis product that is specific to data centers and utilizes experts in data center design and operation.
- Assess products so they are more dynamic and better reflect the nature of the data center.
- Develop materials to help data centers select energy efficient equipment; and to develop a case study on how a carefully managed, energy efficient data center may be more reliable than a standard data center. Connect reliability to energy efficiency.
- Provide a quick "hit list" of things that data center operators should be aware of to aid in conservation of energy.
- Design the product to increase the awareness around information technology strategies that have an impact on energy conservation in a facility.

The Company continues to develop collateral and education materials to support the product as the conversation around data center efficiency matures. As participant feedback is received, suggestions will be evaluated for feasibility of incorporating changes.

Xcel Energy has been an active participant in the Consortium for Energy Efficiency (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 data center efficiency product development.

Xcel Energy is also a member of AFCOM (<http://www.afcom.com/>), the leading association of data center and facilities management professionals.

G. Rebates & Incentives

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

Prescriptive rebates will be applied where applicable, and all other energy efficiency upgrades will be handled through a custom analysis. Individual custom projects will be rebated at up to \$400 per kW saved. Additional promotional incentives may be considered, depending on the expected impact on market penetration and product cost-effectiveness.

³⁵ <http://www.cee1.org/content/committee-work>

➤ Energy Feedback – Business (2016)

A. Description

Business customer behavior-based energy conservation is a large and untapped source of energy savings for both utilities and their customers. The Energy Feedback – Business product is based on the same system and practices as the Energy-Feedback – Residential product, but targeted at small business customers. This product will launch in 2016, following an anticipated successful completion of the Energy-Feedback – Business pilot, which started in 2014 and will run into and be evaluated in 2015. The product provides a targeted direct mailing called the Business Energy Report to small business customers (<250 kW average annual usage) providing specific information and recommendations in order to motivate and to teach customers how to reduce their energy consumption. Customers receive new information with each Business Energy Report. Savings are quantified by comparing the energy consumption of the Treatment Group participants to a non-participating Control Group. The third-party implementer will provide an analysis of the impact of the product each year.

The product's main offering is the personalized Business Energy Report. The personalized Business Energy Report includes:

- Customers' energy use compared to the average of 50 similar businesses in similar-sized buildings with the same heating fuel type;
- Targeted efficiency recommendations based on an analysis of the businesses' energy usage, demographics, and characteristics; and
- Advice on how report recipients can easily implement efficiency measures based on their individual circumstances.

The group of randomly assigned customers receiving the reports is referred to as the Treatment Group. The group of randomly assigned customers who do not receive reports is referred to as the Control Group. Public Service will subtract the energy saved through other direct impact products in the DSM portfolio, by this product's participants, from the results to prevent double counting energy savings.

B. Targets, Participants & Budgets

Targets and Participants

Approximately 10,000 participants from Public Service's small business customer segment (customers with < 250 kW average annual usage) are currently receiving printed energy feedback reports as part of the pilot which started in 2014. An additional 10,000 participants will be randomly selected to also receive printed energy feedback reports starting with the program launch in January 2016.

Based on previous research this currently active product, which started as a pilot in June 2014, is forecasted to measure reductions of up to 2.0% for electricity use and up to 1.9%

for natural gas consumption in 2016. These savings can make a significant contribution toward Public Service's goals for energy savings in the business sector.

Budgets

The budget includes the cost for preparing and mailing the Business Energy Reports and an ongoing regression analysis of the Treatment Groups and the Control Groups to determine the electricity and natural gas savings. Administrative costs for data extraction and product administration are based on actual costs from the pilot in 2014. The main budget driver is the third-party administration which includes implementation, data analytics, and marketing costs.

C. Application Process

Participation occurs through random selection of 20,000 participants, called the Treatment Group, and a statistically significant and homogeneous non-contact Control Group. Prior to randomization, the third-party implementer analyzes the customer data pool to ensure adequate quantities of similar customer demographics, usage data and other characteristics exist for comparison, and then treatment and control group customers are randomly selected from within that pool. Customers are informed of their Treatment Group selection at the beginning of the treatment and are offered the opportunity to withdraw from the Treatment Group at any time. The Control Group is never contacted or influenced by any contact with the product

Business Energy Reports

Business Energy Feedback Reports comprise carefully crafted components designed to work together to drive efficiency gains and maximize engagement. The reports provide customers with contextualized energy use, data-driven insights, and targeted action steps which are intended to motivate customers to take actions which lead to a sustainable drop in electricity and natural gas use. In order to develop targeted messages the third-party implementer analyzes a vast array of data streams to derive insights about customer segments and individual customers. This data may include historical meter and usage-pattern data, past DSM product participation information, and third-party publicly available data such as building demographics (e.g. square footage, building age, NAICS code), weather, geography, and more.

Reports will be delivered in a varying cadence (e.g. monthly, a bi-monthly, quarterly) as appropriate. The third-party implementer will compile the usage data that has been provided by Public Service and will generate the appropriate analysis to create personalized reports for all eligible customers in the Treatment Group. After the personalized Xcel Energy Business Energy Reports have been created, they will be printed and mailed in Xcel Energy-branded envelopes to customers.

Following the receipt of the Business Energy Feedback Report, customers may choose to phone our Business Solutions Center and talk to Energy Efficiency Specialists about questions regarding their energy usage or to inquire about participation in other products. Public Service representatives are trained to handle these inquiries and have access to a

special customer service system that specifically provides support for this energy feedback product. For customers who can benefit, their enrollment in other products or participation in rebates will be handled through the usual Xcel Energy channels.

Customers in the Treatment Group have the option to log on to the My Account-My Energy portal and view their monthly report (including past reports), adjust their profiles, view energy data and analysis, or opt-out of the product Treatment Group at any time.

D. Marketing Objectives & Strategies

The objectives of marketing for the program will be to get as many customers as possible to not only read the reports, but complete energy efficiency actions that lower their energy usage. The specific strategies to do this will be engaging, easy to comprehend print reports, attention-getting emails and a Web portal experience that keeps customers coming back by delivering useful information and helpful suggestions that fit the customers' business needs and level of energy expertise. These strategies will be recommended by the third-party implementer using segmented data analytics to derive the most likely messages and strategies to drive ongoing energy savings.

Public Service will track direct-impact program participation and will subtract the energy saved by Treatment Group participations from the Energy-Feedback – Business results to prevent double counting of energy savings toward goals.

E. Product-Specific Policies

Customer confidentiality and data privacy practices will be stringently applied in accordance with Xcel Energy's Privacy Policy, available on the Company's website, here:

<https://www.xcelenergy.com/staticfiles/xe/Admin/Xcel%20Online%20Privacy%20Policy.pdf>. Customer assistance will be provided to participants and non-participants in the same manner.

F. Stakeholder Involvement

Public Service is offering energy behavior-based products as a result of recommendations and support from the Colorado DSM Roundtable.

G. Rebates & Incentives

Rebates are not offered as part of this product.

➤ Energy Management Systems

A. Description

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

An energy management system is a system of controls and sensors that are centrally operated, typically via a computer software package. Through automatic programming, such systems may control the heating, cooling, ventilation, and lighting in a facility. Systems covered in the product include new energy management systems in an existing building, replacing a non-functional energy management system, replacing an obsolete energy management system, or adding functionality to a current system.

The duplication of existing systems does not qualify for a rebate under the EMS product. Potential measures that pair well with the EMS product are shown in the table below.

EMS Components

Scheduling <ul style="list-style-type: none"> • Holiday scheduling • Zonal scheduling • Override control and tenant billing • Night setup/setback • Optimum start • Optimum stop • Morning warm-up/cool-down 	Resets <ul style="list-style-type: none"> • Supply air/discharge air temperature • Hot deck and cold deck reset • Entering condenser water temperature • Chilled water supply temperature and pressure • VAV fan duct pressure and flow 	Miscellaneous <ul style="list-style-type: none"> • Simultaneous heating/cooling control • Zone-based HVAC control • Chiller staging • Boiler control • Building space pressure • Variable speed drive control • Heat recovery
Ventilation Control <ul style="list-style-type: none"> • Carbon dioxide sensing • Occupancy sensing with central programming • Supply air volume/OSA damper compensation routines • Exhaust fans 	Lockouts <ul style="list-style-type: none"> • Boiler system • Chiller system • Direct expansion compressor cooling • Resistance heat 	Lighting <ul style="list-style-type: none"> • Lighting sweep • Occupancy sensors • Daylight dimming • Zonal lighting control
Air-Side Economizers <ul style="list-style-type: none"> • Night ventilation purge 	Energy Monitoring <ul style="list-style-type: none"> • Whole building or end-use • KWh or demand 	Demand Control <ul style="list-style-type: none"> • Demand limiting or load shedding, when in conjunction with other energy savings controls. • Duty cycling

Energy Information Systems (EIS) Measures

Beginning in 2015, Xcel Energy is adding a group of energy information system (EIS) measures to the EMS product. These new measures will expand the EMS product, which currently focuses on automated controls systems, to add visualization and analysis of real-time energy data from across a customer's facility via an EIS. This will enable customers to expand the energy savings from an EMS to include identification and implementation of low cost recommissioning measures as well as behavioral and operational energy savings measures. Using experts in the field of strategic energy management, Xcel Energy will help customers put the appropriate data collection systems in place to accurately describe the energy performance of their facilities and associated energy systems. Information from the data collection systems will be sent to a Web-based visualization and analytics tool (EIS) of the customer's choice, where both the customer and Xcel Energy staff will be able to interpret usage patterns, identify opportunities for energy savings, and ultimately verify that energy savings were achieved as a result of implementing those opportunities.

EIS will offer the following services to commercial and industrial customers and help with their investment in three areas:

- 1. Strategic energy management consulting*

Before the customer selects an EIS solution provider, Xcel Energy will work with the customer to identify the metering and communications needs, existing sources of data, and opportunities to improve data collection through new metering or data-logging equipment for the site. At this time, Xcel Energy and the customer will establish a common understanding of goals for the metering solution as well as the definition for how efficiency of each building and system is characterized.

- 2. Web-based real-time data visualization and analytics software*

Xcel Energy will help the customer select an EIS tool provider that best meets their specific needs. Xcel Energy will pre-qualify EIS providers to ensure solutions will enable accurate and reliable M&V for the program.

- 3. Energy efficiency opportunity identification*

Once the EIS is operational it will take a period of time to sufficiently capture the data required to inform the identification of energy-efficiency opportunities. At this time, Xcel Energy will quantify the expected value of the opportunities in terms of energy savings potential and incentive eligibility.

EIS services will create three types of new savings measures within the EMS product. While these measures are expected to be the predominant measure types identified through and attributed to the EIS, we anticipate that the EIS will identify additional capital improvement opportunities that will be captured in other DSM products as well.

Measure Type	Description
New system or process automation opportunities	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.
Low cost / no cost recommissioning opportunities	Measures that address failure or underperformance of installed systems and equipment that can be fixed by making small adjustments, typically not requiring new equipment.
Behavioral or operation opportunities	Measures that require manual intervention to achieve energy savings that may not be feasible through system automation.

Measurement and Verification of EIS Energy Savings

To ensure persistence of savings, Xcel Energy 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 EIS measure types.

The existing Energy Management Systems measure will remain available to customers in its current form.

B. Targets, Participants & Budgets

Targets and Participants

For 2015-2016, energy savings and participation targets were established considering recent product trends, average project size, and the product's historical performance. We also considered trade partner and industry expert feedback.

Budgets

Historical costs and anticipated participation levels guided budget development. The product's budget is driven by rebate, consulting and labor costs:

- *Rebates* – The budget for rebates is estimated using historical data and analyzing anticipated payouts per kW, kWh, and Dth.
- *Third-party provider* – Initial project analysis is conducted by a third party implementer, whose work is reviewed by the Company's in-house engineering staff. With the addition of the EIS measures, the provider may also perform the strategic energy management consulting role to help identify energy-efficiency opportunities for customers. The provider also performs measurement and verification (M&V) duties.
- *Internal labor* – EMS is a labor-intensive product due to the preapproval process and analysis component of the product. Labor is usually less than one-fifth of the total cost of the product.

C. Application Process

The application process for the EMS product is similar to the Custom Efficiency product or end-use study where each project is individually analyzed and preapproved prior to installation. Applications must be signed by the customer but can be submitted by other participants including: building owners, contractors, engineering firms, energy services companies and equipment vendors. The general application steps and requirements are as follows:

1. Application Submission

Typically, the Company's account representative works with a customer and their vendor to identify a project with energy efficiency opportunities and starts the application process. The application form is available from Account Managers as well as on Xcel Energy's website at: <http://www.xcelenergy.com/Save Money & Energy/Rebates/Energy Management Systems - CO>. The scope of work provided by the vendor to the participating customer must be included with the application form submitted to the Company. A well-defined scope of work must include enough detail to allow the Company's internal engineers to analyze the savings opportunities. Details should include at minimum:

- *General Building Information* – Total building square footage as well as square footage to be controlled, year built, building use type, and annual electric and natural gas use.
- *Type of Equipment In Use* – Includes lighting fans/air handling, cooling and heating, and each piece of equipment's specifications and operating conditions.
- *Process* – Existing and new connected kW and operating hours; existing and new gas BTUh and full load hours.
- *Controls* – Existing and new temperature setbacks and resets, outside air optimization, DDC conversions, variable air volume boxes.

In 2015, the Company will launch a Custom Workbook application for EMS, using Microsoft Excel.

2. Application Review

Upon receipt of a completed application (along with a scope of work) the application is reviewed for completeness and the project is entered and tracked by the Company's DSM management system

3. Project Analysis

The Company's outside consultant completes an initial analysis of the project application. The consultant reviews the project information and enters pertinent data into a spreadsheet model to determine the projected energy savings, benefit-cost ratio and payback. The model enables consistency in analysis from one project to another. For the EMS measures, all calculations are based on approved ASHRAE methods or other similar industry standards. For the EIS measures, calculations will involve a combination of methods, including established engineering literature and statistical modeling utilizing multi-variable regression analysis.

Based on the modeled results, the consultant will suggest preapproving or rejecting the project and provide the results to the Company's internal engineering staff for review. Should an error be discovered, documentation will be sent back to the consultant for re-analysis.

4. Project Acceptance or Rejection

Once the project analysis is approved, a preapproval letter is sent to the customer. The preapproval letter provides critical information regarding the project, including potential project rebate amount, the project description and costs, and any conditions that must be met to receive the rebate (e.g., measurement and verification). Should a project be rejected, a rejection letter is sent informing the customer of why their project is not eligible. A copy of the preapproval or rejection letter is also sent to the Account Manager. All project documents, including the application, specification sheets, proposals and the analysis model are held by the Company.

5. Completion

The final step in the process is verification that the project was implemented. The customer fills out the verification section of the application and provides invoices for the completed project. Customers may submit American Institute of Architects project continuation sheets in lieu of invoices. The Company checks the completed documents for any variances from the project proposal, including cost variances of 10% or more. Projects with variances are re-analyzed for rebate and impact adjustments.

D. Marketing Objectives & Strategies

Marketing of EMS product is primarily conducted by Account Managers, leveraging their direct relationships with customers. In addition, the following strategies will help meet product goals in 2015-2016:

Collateral

Customers and trade partners can access material electronically on Xcel Energy's website at:

http://www.xcelenergy.com/Save_Money_&_Energy/Rebates/Energy_Management_Systems_-_CO.

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, and a summary of procedures.
- *Product Application and Worksheet* – The document that customers fill out to start the process of participation. The customer or vendor is asked to fill out several sections including information on the business location, Account Manager, applicable rates, project description, and technical information related to proposed and existing equipment, equipment supplier and project verification upon completion. The worksheet aspect is used to gather all of the necessary information about the project and the building. Filling out the worksheet completely enables a smooth analysis process.

Vendor Communications

The company will continue to communicate via email and site visits to all energy management system vendors. Each contact reminds vendors that the product exists and how they can take advantage of it with their customers. Communications may also include links to tools that will help with project analysis.

Other efforts to further strengthen relationships include:

- Energy Exchange – a quarterly email newsletter that goes out to all vendors who have registered to be part of our trade ally network.
- Product Training – Our site visits with trade partners usually include a program review and/or product training for vendor employees.

Target Market

All commercial and industrial customers within the company's service area are eligible to participate. For the initial EIS measure offering, the Company expects that its largest, most engaged and progressive customers will participate. As EIS matures and case studies are created, more customers are expected to take interest.

The bulk of energy management systems are installed in commercial facilities (office buildings, schools, etc). The product focus is on managed accounts and larger unmanaged accounts. Approximately 80% of these customers are concentrated within the Denver metro area, thus marketing campaigns are focused in this area. Additional information on target markets includes:

Primary Market: The primary target is a large business customer with any of the following characteristics:

- Demand of 500+ kW;
- Have facilities built before the 1990s;
- Have interest in newer building automation technologies; or
- Own facilities with large cooling or refrigeration needs.

Secondary Market: The secondary target is a small business customer with any of these characteristics:

- Demand of 100 kW to 500 kW;
- Have limited internal resources to purchase, install and finance projects; or
- Have limited technical expertise.

The product is also marketed to trade partners, which primarily consist of:

- Manufacturers of equipment,
- Electrical contractors,
- Mechanical contractors,
- Design engineers, and
- Architects.

E. Product-Specific Policies

Much like the Custom Efficiency product, EMS projects require:

- preapproval before any equipment is purchased or installed, or any contracts are signed or binding commitments are made
- a TRC ratio equal to or greater than one, and
- a payback between one and 15 years based on the analysis.

Information pertaining to minimum requirements is included on the application.

F. Stakeholder Involvement

Customers, trade partners, and other stakeholders are currently engaged at the project level. Feedback is garnered individually from each participant. The Company works with these stakeholders to identify product trends that may require changes to product design. If it is a small change, it is then discussed internally and possibly with a few key trade partners and, if deemed acceptable, implemented (a 60-Day Notice is initiated, if required). Significant changes may involve additional review by external technical consultants or other third parties.

G. Rebates & Incentives

EMS offers electricity rebates of up to \$600 per kW and gas rebates of up to \$4 per Dth saved. Rebate amounts are based on the project performance and cost-effectiveness.

➤ Heating Efficiency

A. Description

Public Service's Heating Efficiency product provides rebates for business customers who purchase high efficiency natural gas or dual-fuel commercial equipment for space heating, water heating or process heating loads less than 30 percent. Available rebates are designed to promote the installation of high-efficiency equipment that improves combustion and seasonal efficiency above standard levels. While this product is only available for Public Service's retail natural gas business customers, those who choose to switch from a third-party natural gas provider can also be eligible. This product is not available for *Gas Transport Only* customers. The product has several components which include: hot water boiler systems, furnaces, water heaters, boiler auxiliary equipment improvements, pipe insulation, boiler tune-ups and other unique (custom) heating systems. The details for each product measure are described below.

1. Hot Water Boiler Systems

Public Service rebates hot water boilers that exceed the minimum efficiency levels established by 2012 International Energy Conservation Code (IECC) standards. IECC requires a minimum efficiency of 82% on 2,500 MBTUH and larger and requires a minimum efficiency of 80% on hot water boilers less than 2,500 MTUH. Rebates are eligible for the installation of a new condensing boiler where either no previous boiler existed, or the current boiler is no longer functional and cover two scenarios:

- Plan A-1 – Boilers equal to or above 85% efficiency, and
- Plan A-2 – Boilers equal to or above 92% efficiency.

2. Furnaces

Furnaces must have a minimum efficiency of 92% Annual Fuel Utilization Efficiency (AFUE), which aligns with ENERGY STAR® guidelines. Furnaces of 94% AFUE or higher receive a larger rebate.

3. Water Heater Systems

Public Service rebates commercial water heating systems that exceed the minimum efficiency levels established by the 2012 IECC standards. These can be either:

- Tankless or storage systems greater than 150 MBTUH and more than 92% efficiency.

4. Boiler Auxiliary Equipment Improvements

The performance of a boiler system can be enhanced with controls and system efficiency improvements. Boiler auxiliary equipment rebates are based on the incremental cost of efficient equipment and are calculated based on a percentage of the project cost (i.e. how much it costs to perform that portion of the project, not the entire project cost). Rebates for tune-ups are available on the same boiler every two years. The following will be rebated:

a) Boiler Tune-Ups

Must include the following activities in order to qualify:

- Measurement of combustion efficiency using an electronic flue gas analyzer at steady state conditions
 - Test results of the electronic flue gas analyzer must be included with the application
- Adjustment of air flow and reduction of excessive stack temperatures
- Adjustment of burner and gas input, manual or motorized draft control
- Cleaning of burners, combustion chamber and heat exchanger surface, when weather or operating schedule permits
- Cleaning and inspecting the burner nozzles
- Checking for proper venting
- Completing visual inspection of system piping and insulation
- Checking safety controls
- Checking adequacy of combustion air intake

b) Boiler Efficiency Retrofits

- Modular burner controls (addition of controls to existing equipment)
- 5:1 turndown ratio or greater
- Outdoor air reset controls
- Stack dampers
- Steam trap replacement/parts

c) Pipe Insulation

- Insulation rebates are for boiler or water heater pipes and are based on the pipe's diameter, R-value of the insulation, and the linear feet of insulation.

5. Custom Boilers

Equipment installations performed outside of the prescriptive scope may be eligible for rebates available through the Custom Efficiency product. All projects require preapproval prior to purchase and installation and must conform to all Custom Efficiency product guidelines. More Custom Efficiency rebates and guideline information can be found at:

http://www.xcelenergy.com/Save_Money_&_Energy/Business/Customized_Solutions/Custome... These projects require individual evaluation to determine how much energy will be saved and to ensure cost-effectiveness. Projects that typically fall under the custom category include, but are not limited to:

- Large boiler systems (greater than 10 million BTUH)

- Carwash boilers
- Pool boilers
- Boiler control systems
- Process loads

B. Targets, Participants & Budgets

Targets and Participants

Pipeline and market potential are used to determine participation and energy savings targets. Participation increased rapidly through the first few years of the product being available in Colorado, but due to low natural gas prices, pipeline momentum has slowed in recent years. To increase participation in the product, the Company will review potential new prescriptive measures identified through Custom Efficiency, as technology improves and markets change.

Budgets

For the Heating Efficiency product, rebates are the largest expense with promotions and labor also being factors. The following summarizes the budget drivers:

- *Rebates* – calculated using average rebate cost per Dth.
- *Promotions* – important to build awareness and provide education on the benefits of high efficiency heating systems.
- *Labor* – determined by estimating the number of full-time employees needed to manage the product and execute the marketing strategy and rebate process.

C. Application Process

Rebate applications are available on the Xcel Energy website, here: [http://www.xcelenergy.com/Save Money & Energy/Rebates/Heating Efficiency - CO](http://www.xcelenergy.com/Save_Money_&_Energy/Rebates/Heating_Efficiency - CO).

Hard copies are also available via Account Managers, Trade Relations Manager, and trade allies. Participants in the product may submit their application through their Account Manager or the Business Solutions Center (BSC). Customers must apply for rebates within 12 months of equipment purchase and start-up. Participants are required to complete an application, and provide manufacturer equipment specifications and an invoice, as proof of purchase.

The following equipment information must be included on the application when applying for a boiler rebate:

- Plan selection (A-1 or A-2),
- use (space heat and/or domestic water heat or both),
- status (new or existing)
- manufacturer and model number,
- process load percentage,
- efficiency,
- size (MMBTUH), and

- quantity.

Information required for other equipment may include:

- r-value,
- fluid temperature,
- pipe location (inside/outside) linear feet,
- pipe diameter,
- cost, and
- serial number.

Preapproval is not required before the customer buys or installs equipment for prescriptive measures, but will be required for custom projects in accordance with the Custom Efficiency product policies.

D. Marketing Objectives & Strategies

The objective of the Heating Efficiency product is to provide education and incentives that motivate customers to purchase high efficient heating equipment and run their existing heating systems at optimum efficiency. Boiler systems are typically installed in mid- to large-sized facilities, while furnaces tend to be in smaller buildings. The product marketing strategy supports identification of and targeted messaging to these different facilities for efficiency improvement.

The Heating Efficiency product follows the marketing strategy of other prescriptive products, leveraging the BSC to improve the level of knowledge on heating efficiency in the marketplace. The Company also provides a newsletter and direct communication campaigns to customers and trade allies, and participates in trade shows and other events. These tactics make customers aware of the key benefits of energy efficiency and its applicability to heating systems. The Company provides fact sheets and rebate applications to customers directly, and via trade allies, to encourage them to consider leveraging Heating Efficiency rebates as they make equipment purchase decisions. An online case study helps customers, identifying the energy and non-energy benefits of upgrading to high efficiency equipment and auxiliary equipment. In addition, Public Service's Account Managers and BSC will educate customers on energy efficiency potential—including how to evaluate the value of the rebate, and how to complete the application process. Trade allies can get similar assistance from the Company's Trade Relations Manager. The Heating Efficiency product may also follow-up on customer opportunities identified following participation in the Business Energy Analysis product—communications will center on the benefits of energy efficiency through reduced paybacks and lifecycle costs, and greater environmental benefits.

E. Product-Specific Policies

Gas Transport Only customers cannot participate in rebates for the Heating Efficiency product.

F. Stakeholder Involvement

Public Service routinely consults with several of the major equipment suppliers and contractors for guidance when refining the Heating Efficiency product for Colorado. These stakeholders provided insight into the types of products to rebate, the incremental and total equipment costs to be expected, and how the application process can be improved. The Company also works closely with state and local governments to promote energy efficiency; and holds semi-annual Heating Advisory Board meetings to engage with contractors and seek feedback and input on product updates and other considerations in delivering this product.

G. Rebates & Incentives

Rebate levels have been designed to encourage customers to install high efficiency equipment. Auxiliary equipment rebates are available to encourage customers to further improve the standard choices that could be made. Pipe insulation and boiler tune-ups are lower cost options for customers who wish to enhance the overall performance and efficiency of their system.

There are two levels of hot water boiler equipment rebates. The Plan A-1 boiler measure rebates systems greater than 85% efficiency and is the lowest efficiency hot water boiler rebate offered. Plan A-2 covers boilers greater than 92% efficiency. This is for Public Service customers who have installed a new boiler where either no previous boiler existed, want to replace the existing boiler that is no longer functional, or desire to upgrade the existing functioning boiler.

Hot Water Boilers*		
Minimum Requirements	Plan A-1 - 85% min efficiency	Plan A-2 - 92% min efficiency - Modulating Burner - Outdoor Air Reset
Rebate	\$750/MMBTUH	\$3,500/MMBTUH

*Conditions: (1) Equipment must use natural gas fuel as the primary fuel but can have dual fuel capability for backup. (2) Efficiency is based on either thermal efficiency (natural gas fuel) or efficiency determined from a combustion analyzer test (boiler systems with optional controls). (3) MBH or MMBTUH is based on boiler input capacity.

Rebates for furnaces must meet minimum efficiency requirements that align with ENERGY STAR guidelines and are rated in Annual Fuel Utilization Efficiency (AFUE). Customers may receive rebates of \$80 per unit for systems with minimum 92% AFUE, or \$120 per unit for systems with minimum 94% AFUE.

Commercial water heater equipment rebate levels are set at \$200/100,000 BTUH per unit (Greater than 150 MBTUH). Rebates apply to tankless, or units with storage. They must be at least 92% efficient to qualify.

Pipe insulation rebate levels are based on the size of the pipe being insulated and the R-value of the insulation. Larger diameter pipes with thicker insulation will be eligible for the highest rebates. Rebates are issued per linear foot of insulation installed, as detailed in the table below.

Pipe Insulation		
Pipe Diameter	R-Value	Rebate per linear foot per inch of pipe diameter
0.5" – 2"	3.5	\$3.00
0.5" – 6"	5.0	\$4.00
2.5" – 12"	7.0	\$5.00

Retrofit Controls, Heat Recovery and System Improvements

- i. Boiler Tune-Ups:
 - \$250/MMBTUH (only available on the same boiler every two years)
- ii. Boiler Efficiency Retrofits:
 - Modular Burner Control, 5:1 Turndown Ratio or Greater: \$750/MMBTUH; \$2,000 max
 - Outdoor Air Reset Controls: \$250/MMBTUH
 - Stack Dampers: \$250/MMBTUH
 - Steam Trap Replacement/Parts: 25% up to \$250/trap; max \$10,000/facility

The following equipment information must be included on the application when applying for rebates on system improvements:

- boiler use for use (space heat and/or domestic water heat or both),
- process load percentage,
- boiler size (MMBTUH),
- quantity, and
- cost.

➤ LED Street Lights

A. Description

The Company's LED Street Lights product captures energy savings for local municipalities on the Street Lighting Service (Schedule SL) rate by retrofitting legacy Company-owned street light fixtures with LED fixtures.

The Company owns approximately 95,000 cobrahead-style street lights across its Colorado service territory with nearly three-fourths of those lights being concentrated within a small number of larger municipalities. Retrofit of the current fixtures (100 Watt, 150 Watt, 250 Watt, and 400 Watt bulbs) with more efficient LED fixtures will result in significant energy savings. Cobrahead retrofits offered through this voluntary product will be provided at no up-front charge to SL Rate PSCo customers wishing to transition to LED technology, for retrofits.

B. Targets, Participants & Budgets

Targets and Participants

The Company is forecasting retrofits of 28% of Company-owned cobrahead street light fixtures by the end of 2016. The replacement schedule is tied to an energy savings target of 1 GWh in 2015 and 12 GWh in 2016.

Budgets

Equipment and labor costs make up nearly 100% of the product's capital expense, although *none of these costs* are being requested for recovery via the DSMCA. Rather, they will be recovered through the Schedule SL rate. The primary costs included in the DSM Plan for are for personnel time to track and report the energy savings from LED street lights for purposes for tracking and reporting participation and energy savings.

C. Application Process

The Company will develop a retrofit schedule for each year that is responsive to customer demand, yet based on a prioritized, lowest-cost fulfillment strategy. Because the product and companion rate will be voluntary, customers will submit indications of interest as opposed to being required to undergo the retrofit.

D. Marketing Objectives & Strategies

LED Street Lighting will primarily be promoted to communities through Company Account Managers.

The website will offer information on LED street lighting technologies, discuss reasons to upgrade to more efficient lighting, how customers and municipalities can participate, and contacts for more information. The Company will conduct mutually agreeable co-marketing with municipal entities that were Settling Parties to Proceeding No. 14A-1057EG.

E. Product-Specific Policies

Voluntary product participation is available for only PSCo customers on the Schedule SL rate. The upgraded street lighting infrastructure will remain under PSCo 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 has consulted with local municipalities regarding this product prior to this Plan filing, in October 2014,³⁶ and will continue to collaborate with customers in engaging their participation in this DSM product.

G. Rebates & Incentives

No rebate will be offered for this product. SL ratepayers will benefit from the ability to transition to the new technology at no up-front charge and from lower energy consumption.

H. Evaluation, Measurement, & Verification

Sufficient verification is performed in assigning the SL rate. Further, there is no variance in the hours of operation that would require any measurement. Thus, no additional M&V will be performed.

³⁶ Decision No. C14-0731 (Proceeding No. 13A-0686EG), paragraph 89 on page 31 states the following regarding LED Street Lights, "Before the program is introduced to the Commission, we encourage and expect Public Service to consult with affected municipalities. We expect to see plans for continued communications with the municipalities during and after the implementation of the program."

➤ 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 or new buildings. Rebates are offered to encourage customers to purchase energy efficient lighting by lowering the upfront premium costs associated with this equipment. The product is primarily marketed through Account Managers, trade partners, manufacturers' representatives, distributors, and contractors.

The product's main offerings include the following:

- Prescriptive rebates for qualifying measures³⁷ that save energy, such as:
 - Replacement of high intensity discharge (HID) fixtures with new fluorescent fixtures;
 - Light emitting diode (LED) and compact fluorescent lamps (CFLs) and fixtures that replace inefficient systems, including incandescent and HID.
 - Niche LED measures, including refrigerated case lighting, as well as exterior wall pack, canopy and soffit lighting.
- Custom rebates for energy saving lighting projects that do not fall within the requirements of the prescriptive rebates.
- Study funding is available for customers who have facilities that are under- or mis-lit. Studies will identify and quantify lighting solutions that include energy saving opportunities.
- The Company will be deploying midstream LED lamp incentives for local distributors, called Business LED Instant Rebate.

Prescriptive Lighting Rebates

The product offers rebates for qualifying lighting equipment that is more efficient than existing equipment in retrofit situations or more efficient than standard equipment in new construction applications. Lighting measures most 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

Energy saving lighting measures that do not fit into a prescriptive rebate category can be evaluated through the Custom Efficiency analysis, provided the customer obtains pre-approval before proceeding with the project. While this option provides rebates for projects that may not otherwise be rebated, there are a number of barriers to participation, which limit the number of projects received and/or rebated—such as purchasing equipment before obtaining preapproval, or not having the capability or time to gather and provide all information needed to analyze the energy savings potential of the project.

³⁷ [http://www.xcelenergy.com/Save Money & Energy/Rebates/Lighting Efficiency - CO](http://www.xcelenergy.com/Save_Money_&_Energy/Rebates/Lighting_Efficiency - CO)

Lighting Redesign Studies

Funding for lighting redesign studies is available to customers who have facilities where the lighting is not meeting the needs of the site employees and users. This may include situations where the lighting system was installed prior to the prevalence of computers, when more lighting was needed to work on tasks, but is now causing eye strain or glare on computer screens. It may also be appropriate when the use of a facility changes and the current lighting system is no longer sufficient for the application.

Studies must be performed by an individual who holds one of the following credentials: Lighting Certified professional, Certified Lighting Efficiency Professional, or someone who is a member of the International Association of Lighting Designers. Customers may also elect to work with an individual who does not hold one of these designations; in that situation, the individual must provide sufficient documentation to demonstrate his or her lighting design qualifications to Xcel Energy. Implementation rebates are available to customers who proceed with recommendations from the study and install energy efficient lighting equipment.

B. Targets, Participants & Budgets

Targets and Participants

The product's participation and energy savings targets 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. With increasing DSM goals in 2015 and 2016, additional budget dollars have been allocated for product expansion and increased marketing and promotional efforts.

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 2013 and 2014 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 and technical assistance with complex lighting projects.
- *Advertising and Promotion* – A promotional budget was developed based on historical expenditures on marketing activities. Promotions 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.
- *Customer Service* – This budget will be applied to consulting and analytical services for lighting projects that are analyzed through the Custom Efficiency product.

C. Application Process

Customers may hear of 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 the Business Solutions Center (BSC) is available for all business customers, particularly small- and mid-sized business customers, who need information on lighting rebate products.

Lighting Efficiency Retrofit and New Construction Applications

The application process for the prescriptive retrofit and new construction products is similar to our 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 for retrofit situations must be a one-for-one replacement that will result in energy savings. If the retrofit is not a one-for-one replacement but still results in energy savings, customers may apply for preapproval through the [Custom Efficiency](#) product. 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 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 application within six to eight weeks.

Custom Efficiency Lighting and Lighting Redesign

Applications for energy saving lighting projects that do not fit into the prescriptive paths may be reviewed using the Custom Efficiency product preapproval application and the accompanying Lighting Evaluation Worksheet. Project analysis and preapproval of Custom Efficiency lighting projects is required prior to equipment purchase and installation.

Under the Lighting Redesign path, rebates for pre-project studies require preapproval. After the study is completed by a licensed lighting professional, the Lighting Redesign Study Rebate Application form may be submitted to the Company with a copy of the study proposal. If the recommended energy saving measures are carried out, the customer (with assistance from the lighting professional and the Company) may apply for a Lighting Redesign implementation rebate, which is a function of dollars per kW saved.

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, Energy Efficiency Specialists 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.

Account Managers and the BSC market the Lighting Efficiency product to customers—especially mid- to large-sized commercial and industrial customers, where the majority of the product's savings are realized—with their day-to-day interactions.

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 and BSC scripted calls, or via mass communications 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 held in first quarter of each year, for both customers and trade allies;
- The Lighting Advisory Board, described in section *F. Stakeholder Involvement* below;
- *Energy Exchange*, a quarterly email that is sent to the trade discussing energy efficiency lighting applications, case studies, product changes, and other pertinent topics; and
- Trade website,³⁸ including applications, specific brochures and informational pieces directed toward the trade, and updates on product offerings.

³⁸http://www.xcelenergy.com/Energy_Partners/Trade_Partners/Commercial_Programs/Lighting_Efficiency_for_Trade_Partners_-_CO

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 Lighting – Small Business third-party implementer.

In addition, several printed marketing pieces are available on the Company's website³⁹ for 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.
- *Lighting Efficiency Product Summary* – This brochure is available on the Company's website and is used by Account Managers, BSC, and trade to describe the product, discuss reasons to upgrade to more efficient lighting, and identify potential lighting projects.
- *Resource Documents* – The Lighting Efficiency webpage links to several documents on energy efficient lighting technologies, written by outside organizations such as E-Source, that further identify lighting efficiency sources and opportunities.
- *Managing Costs by Segment Documents* – Documents identifying specific energy savings ideas for key segments, such as grocery stores, office buildings, schools and universities.

Marketing Messages Driven by Future Regulatory Requirements

In the coming years, Lighting Efficiency energy savings potential will be affected by necessary compliance with several new Federal and State legislative rules (example: Department of Energy Rulemaking on fluorescent lighting technology). An imperative marketing strategy is to keep Account Managers, Energy Efficiency Specialists, trade partners and customers aware of the requirements and timing deadlines for these pending energy efficiency standards. These new rules will also influence Lighting Efficiency product development, such as expansion of LED lighting applications, and the phasing out of obsolete technology.

E. Product-Specific Policies

Lighting Efficiency has a number of product-specific policies:

- All rebated equipment must be new, meet all product rules and requirements, and the application must be submitted within 12 months of the invoice date.
- 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.

³⁹ [http://www.xcelenergy.com/Save Money & Energy/Rebates/Lighting Efficiency - CO](http://www.xcelenergy.com/Save_Money_&_Energy/Rebates/Lighting_Efficiency_-_CO)

- Preapproval is required for Custom Efficiency lighting projects prior to the purchase and installation of lighting equipment. The customer has up to 24 months after the preapproval date to implement the lighting project. Custom projects that exceed their planned timeframe, or have significant equipment deviations from the original plan, require reanalysis and approval.
- The parking garage lighting retrofit rebate application is available for prescriptive projects to replace high intensity discharge technologies (high-pressure sodium and metal halide) with more efficient fluorescent options.
- Lighting redesign studies must be submitted no later than three months after the study is completed.

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.

G. Rebates & Incentives

Lighting Efficiency offers rebates through the retrofit and new construction prescriptive components, and/or Custom Efficiency and Lighting Redesign paths.

➤ Lighting – Small Business

A. Description

The Lighting – Small Business product offers free lighting audits, rebates and support for energy efficient lighting upgrades to PSCo's small- and mid-sized business customers with annual peak demand of up to 400 kW. In addition to lighting, the customer will be informed of other energy saving opportunities available for rebates, such as heating, ventilation, cooling, motors, and recommissioning of their existing equipment.

The product aims to overcome specific barriers that often prevent small businesses from investing in energy efficiency measures, such as:

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

To address these issues, the product offers:

- a. Intensive outreach to bring the resources to the customer, rather than relying on the customer to seek them out;
- b. Simple, one-stop services that hold customer time requirements to a minimum;
- c. Computerized lighting audits and reporting systems that generate site-specific feedback and reports;
- d. Objective recommendations backed by the credibility of the Company;
- e. Introductions to participating lighting trade partners;
- f. Substantial rebates to offset the cost of installing energy efficient fixtures and lamps;
- g. Assistance with preparing and submitting the rebate paperwork to the Company
- h. Midstream LED lamp incentives; and
- i. Direct installation of LED lamps and aerators.

To facilitate the above offerings, the Company employs a third-party implementer to provide the following services:

- Free lighting audit when customer agree to participate in the product;
- Identify other energy savings opportunities during the audit and, at a minimum, make customers aware of other rebate opportunities;
- Build and maintain a network of qualified contractors, approved by the Company, to aid the customer in implementation of lighting retrofits;
- Serve as a liaison between the customer and the contractor;
- Maintain engagement with the customer to ensure that recommended measures get implemented and assist the customer, as needed, in hiring a contractor; and
- Review and submit the customers' application for rebate.

Direct Install for Immediate Savings – Beginning in 2015-2016, the Company will offer direct installation options within this product. Customers with an annual peak demand of less than 100 kW will qualify for participation in the direct install component of the product. While onsite for the lighting assessment, the third-party implementer will perform free installation of the following energy savings measures, where applicable:

- a. Select screw-in LED lamps; and
- b. Aerators in public restrooms and kitchen sinks.

B. Targets, Participants & Budgets

Targets and Participants

The goals for this product were derived from historical data, market data, and equipment deemed savings values in Colorado; trade participation and feedback; and lighting industry, economic and market trends.

Budget

The forecasted expenditures in 2015-2016 for this product are based on projected participation levels, promotion, and administration expenses. The majority of the product costs are driven by the third-party costs to implement the program in addition to customer rebates and promotional expenses.

C. Application Process

The Company promotes the Lighting – Small Business product primarily through the outreach efforts of a third-party implementer. Secondary outreach is likely to occur through the Company's Account Managers, contracted trade allies, and/or other marketing efforts such as mailings, newsletters, and the Company website.

The Business Solutions Center (BSC) is also available for all small- and mid-sized business customers, who may inquire about lighting rebates. The BSC may refer new leads to the third-party implementer for follow-up. The third-party implementer is expected to aggressively promote the product to increase participation.

The third-party implementer offers and conducts a free lighting 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 by 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 lighting rebate for projects that do not fit into the prescriptive rebate offerings. Project analysis and preapproval of Custom Efficiency lighting projects is required prior

to equipment purchase and installation; the third-party implementer assists the customer with that process.

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 target customers for this service are small- to mid-sized businesses with up to 400 kW of annual demand. However, all market segments are eligible to participate, and the product is available to all PSCo customers. The key marketing objective is to raise awareness, interest and participation in the product, contributing to achievement of the Company's energy savings goal. The product is marketed primarily through the third-party implementer—they are required to meet the implementation targets for which they are contracted and they will deliver the marketing strategies needed to meet them.

E. Product-Specific Policies

Lighting – Small Business has a number of 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 direct installation of specific measures at the time of the lighting audit (as described above).
- All rebated equipment must be new, meet all product rules and requirements, and the application must be submitted within 12 months of the invoice date.
- Rebates assume a one-for-one replacement of retrofit fixtures that will result in energy savings.
- Once completed paperwork is submitted, rebate payments are usually issued in six to eight weeks.
- Preapproval is required for Custom Efficiency small business lighting projects prior to the purchase and installation of lighting equipment. The customer has up to 24 months after the preapproval date to implement the lighting project. Custom projects that exceed their 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.

Lighting trade partners are an important stakeholder as they will be performing the lighting retrofits as well as promoting the product to customers. The Company expects the third-party implementer to continue to grow the trade partner list of qualified contractors available for lighting retrofits. The 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.

Stakeholders are also involved in the product through the Lighting Advisory Board and 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 product offerings, suggest areas of improvement, and to offer a forum for open discussion of lighting topics. The Board will continue to meet on a regular basis, or as long as needed.

G. Rebates & Incentives

Prescriptive rebates will be paid based on the same technologies identified as qualifying equipment for the Lighting Efficiency product.

Third-party implementer project management services and direct installations will be performed at no additional cost to the customer.

➤ Motor and Drive Efficiency

A. Description

Public Service's Motor and Drive Efficiency product strives to assist customers with awareness and incentives to reduce the barriers associated with equipment purchases. Over time, the product line has adjusted to market and regulatory conditions, and incorporated input from evaluations.

The Company offers prescriptive incentives for:

- Variable Frequency Drives (VFDs), which save energy consumed by motors when the demands on the motor allow for lower and varying speeds.
- Constant Speed Motor Controllers (CSMCs), which provide savings on devices which require constant speeds, like escalators, and under-loaded conveyors.
- Motors which exceed NEMA Premium® efficiencies by more than one percentage point.⁴⁰

We also offer custom rebates for motors or motor-related equipment that fall outside the prescriptive criteria for equipment that allows customers to operate efficiently, and provides multiple benefits like longer equipment life span, and reduced maintenance costs.

In 2015, the product will no longer prescriptively rebate motors that only meet NEMA Premium® efficiencies, as they are now the standard for new AC induction motors.⁴¹

B. Targets, Participants & Budgets

Targets and Participants

The individual product energy savings and participation targets are based on 2013 and 2014 (to-date) performance, inputs from the 2010 Motor & Drive comprehensive evaluation,⁴² and empirical research from primary and secondary research sources, including:

- The Motor Decisions MatterSM (MDM) workgroup of the Consortium for Energy Efficiency (CEE),⁴³
- Other utility programs, and
- Interactions with trade partners.

⁴⁰ NEMA Premium Motors, <http://www.nema.org/Policy/Energy/Efficiency/Pages/NEMA-Premium-Motors.aspx>.

⁴¹ U.S. Department of Energy, Building Technologies Office, Appliance & Equipment Standards, Small Electric Motors, http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/40.

⁴² 2010 Motor & Drive Comprehensive Evaluation, <http://www.xcelenergy.com/staticfiles/xe/Regulatory/Regulatory%20PDFs/2010ColoradoMotorandDriveProgramEvaluation.pdf>.

⁴³ Motor Decisions Matter, <http://www.motorsmatter.org/>.

Budgets

The product budget was derived from rebate levels in the implemented quantities that will result in the achievement of established savings targets. Historical actual expenses also influenced the budget. Some budget reductions were achieved for expenses in certain categories such as labor and advertising.

C. Application Process

Customer awareness occurs through various marketing channels: the Xcel Energy website, direct and email promotions, and Public Service's internal sales team, end-use equipment trade allies, and occasional advertising or direct mail. Rebate applications are available to download via the Internet, from our sales team, or from our participating trade partners.

Prescriptive Rebate Applications

The rebate application process for prescriptive motors and drives is similar to other DSM prescriptive product rebates. Customers may apply for a rebate up to 12 months after the equipment has been purchased and installed. The equipment must be new and meet all qualifications detailed on the rebate application form. Once the paperwork is completed and submitted, the application package is reviewed for accuracy and entered into the Company's customer relationship management system. Rebate checks are mailed to customers with qualifying applications within six to eight weeks.

Custom Rebate Applications

For motors, drives, or related equipment that does not fit into the prescriptive offer, the customer may apply for a custom motors rebate using the application and information worksheet available within the [Custom Efficiency](#) product. Project analysis, engineering analysis and preapproval of custom projects is required prior to equipment purchase and installation. Customers with successful projects receive their rebate within eight weeks.

D. Marketing Objectives & Strategies

The overall marketing objective is to drive qualifying energy savings by raising awareness, interest, and participation in the product.

The product is primarily promoted through Company account representatives and mechanical and electrical contractors, and via traditional marketing vehicles such as advertising, mailings, website content, email, and other sales promotions.

Account representatives include:

- *Account Managers*, who work directly on projects with large commercial and industrial customers, where the majority of savings are realized; and

- *Energy Efficiency Specialists at the Business Solutions Center (BSC)* responding to inbound calls and initiating outbound telemarketing, specializing in marketing to small- and medium-sized businesses.

Significant market targets include (HVAC systems within) office buildings, schools, and retail establishments. Manufacturing sites are also potential participants, but represent fewer customers in the PSCo service territory, and are primarily served by the Process Efficiency product.

As outreach to mechanical and electrical contractors, the Company's channel and program managers actively engage in:

- Presentations at industry events and trade shows, such as the Company's Energy Efficiency Expo held in first quarter, for both customers and trade allies;
- Sponsorship and presence at industry events such as the conference of the Electrical Apparatus and Service Association.
- In-person training and "lunch-and-learns" at the contractors' offices.
- The *Energy Exchange*, a quarterly email that is sent to trade partners to share information on energy efficiency projects, case studies, product changes, and other pertinent topics.
- Collaborative efforts with organizations such as MDM, which is a national public-awareness campaign; sponsors include a consortium of motor manufacturers, motor service centers, trade associations, electric utilities, and government agencies.

E. Product-Specific Policies

All rebated equipment must be new, meet all product rules and requirements, and the rebate application must be submitted within 12 months of the purchase date. Additional product-component policies include:

- For prescriptive rebates, VFDs must automatically control the speed of existing or new motors, and controlled motors must also be qualifying equipment.
- For HVAC in new construction, VFD rebates are available for a limited subset of horsepower levels. Custom projects require either preapproval or other acceptable project planning documentation, prior to purchase. The customer has up to 24 months after preapproval to implement the project. Custom projects that exceed their timeframe, or have significant equipment deviations from the original plan, require reanalysis and approval.

F. Stakeholder Involvement

Public Service's Motor and Drive Efficiency product has been successful because of external support from trade allies and other stakeholders who understand the product and assist in driving customer education, and awareness. Customers benefit from hearing a consistent message from a variety of sources. Product inputs come from customers, sales

representatives, the quarterly DSM Roundtable Meetings, workgroups, primary and secondary research, and through discussions with other utilities. Comments are considered and implemented if and when appropriate.

G. Rebates & Incentives

Rebates are paid directly to customers unless the customer reassigns the rebate to their vendor as an alternate rebate recipient.⁴⁴ The product offers rebates based on the information shown in the following table:

Description	Horsepower (hp)	Rebate Amount
Enhanced efficiency motors (Exceeding NEMA Premium® efficiencies by a threshold percentage).	1 hp – 200 hp	Tiered rebate offer depending on the horsepower, and on whether the motor is an efficiency upgrade or if it is for new or restored capacity.
VFDs controlling motors used on fans and pumps	1 hp – 200 hp	Tiered rebate offer depending on the controlled horsepower.
Constant Speed Motor Controllers	5 hp to 3,000 hp	Tiered rebate offer depending on the controlled horsepower.
Custom for larger and non-prescriptive motors, drives, or related measures	Outside the prescriptive parameters	Individual project rebates determined under the Custom Efficiency product guidelines.

⁴⁴ See *Alternative Rebate Recipient* section of the rebate application form:
<http://www.xcelenergy.com/staticfiles/xe/Marketing/Managed%20Documents/CO-Bus-Motors-Motor-Rebate-Application.pdf>.

➤ 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. Since the Company services building owners of different areas and size, the New Construction product offers two core components:

1. Energy Design Assistance (EDA)
2. Energy Efficient Buildings (EEB)

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

1. Energy Design Assistance

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 the *Best Practices Benchmarking for Energy Efficiency Programs*,⁴⁵ 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 two months of building occupancy. Verification ensures that the

⁴⁵ 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.

measures were installed as proposed, and provides an added degree of confidence in the project's calculated energy savings.

EDA offers two 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:

- Square footage: Greater than 20,000 square feet (new construction, major renovation or addition)
- Design phase: Schematic design or early design development
- Energy Savings: 15% peak demand savings and 15% natural gas savings minimum goals are required to be accepted into the basic track.

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®).⁴⁶ 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 20,000 square feet (new construction, major renovation or addition)
- Design phase: Pre-design or early schematic design
- Energy Savings: 30% peak demand savings and 15% natural gas savings minimum goals are required to be accepted into the enhanced track.

Public Service administers EDA using third-party implementers to help identify product candidates, facilitate meetings with the design teams (including the owner), and complete energy modeling activities. Energy modelers are chosen based on a set of qualification criteria to become a qualified third-party implementer providing EDA services. Qualification opportunities are open once each year, or as Public Service deems appropriate. Third-party implementers are paid on a pay-for-performance basis.

From 2007-2013, EDA has achieved approximately 107 GWh in savings. Acceptance into the Colorado market is strong given the improvements in the economy since 2013. All segment types can participate in EDA; however, many of the projects fall in the sectors of office, schools, retail, multifamily and healthcare.

The EDA baseline continues to rise as Colorado counties continue to adopt more stringent building codes. These changes only impact new projects starting in 2015 under the New Construction product.

⁴⁶ USGBC, LEED, <http://www.usgbc.org/leed>.

2. Energy Efficient Buildings

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-blown energy modeling of the EDA offering. Projects must be a minimum of 5,000 square feet. Projects are also generally less than 50,000 square feet and have past the schematic design stage of new construction. However, any size project above 5,000 square feet may qualify.

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, and custom opportunities. Customers will receive a rebate tailored to their building after the project has been constructed and onsite verification completed. From 20010-2013, EEB has achieved approximately 8.4 GWh in savings

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 the customer with the EEB process.

B. Targets, Participants & Budgets

Targets and Participants

The EDA energy savings targets 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 American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) 90.1-2007⁴⁷ standard, or the local jurisdiction's code, whichever is more stringent. Since the sales cycle for EDA is typically two to four years—from project initiation and design to the completion and occupancy of a physical building—the projects expected to finish in 2015 have already been identified by the Company and third-party implementers.

Participation was estimated using actual historical product data.

Budgets

Once targets were established, the budget was developed based on historical cost and participation information. Average project modeling drives the budget, construction incentives, measurement and verification (M&V), and promotional expenses. 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 \$260 per kW saved for the Basic track and \$300 to \$400 per kW saved for the Enhanced track. Modeling costs are then split between the year

⁴⁷ More information: http://www.energycodes.gov/sites/default/files/becu/90.1-2007_BECU.pdf.

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.

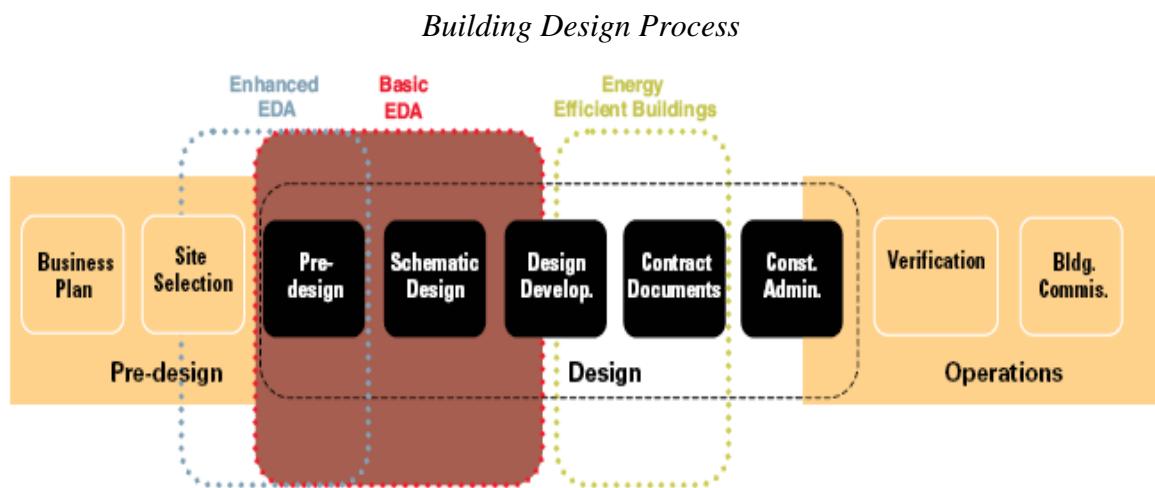
- *Incentives:* Incentives are determined by establishing a dollar value per participant at the appropriate rebate level.
- *M&V:* Completed in two steps for the offering and described in the M&V section of this Plan. Cost estimates are based on construction document and site review and are analyzed on a per project basis. Verification costs, on average, range between \$4,000 and \$10,000 per project.
- *Promotions, Advertising and Customer Education:* Promoting the product through specific advertising campaigns, trade shows, and “lunch and learn” 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

The rebate application process differs between EDA and EEB.

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 following diagram.



The average time frame for project completion can range from two to four years depending on project schedules. For example, projects beginning modeling in 2015 will likely be completed in 2017 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 – 2007 standard, 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—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, or bundles, 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 Analysis:* Once the design team completes construction documents (CDs), a third-party implementer reviews the CDs and adjusts the energy

model. 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 meeting is held to review the CD energy analysis 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.

Energy Efficient Buildings

Customers may hear of the EEB offering through several channels, including Account Managers, the Business Solutions Center (BSC), architects and engineers, general contractors, or equipment trade partners. 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 for 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 engagement (interest in energy efficiency options). Once the application is preapproved, the customer will receive an email from Public Service 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.

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

Public Service continues to identify opportunities to improve the product through multiple methods. An evaluation of the product was completed in 2009 and the recommendations were reviewed and adopted within the 2011 DSM Plan. In addition, the minimum savings requirements were increased from 5% to 15% in 2011 for the Basic

track and from 15% to 30% in the Enhanced track; the electric incentive was increased from \$300 to \$400 per kW. In 2012 a kWh incentive of \$0.04 was added, further increasing the product scope. To continue to promote higher efficiency levels in buildings, enable more qualified energy companies to participate in EDA, and to give customers more choices of energy modeling companies, in 2013 Public Service offered additional qualified third-party implementers the opportunity to become EDA providers. EDA also moved to a pay for performance method of payment for third-party implementers to better align with the Public Service's DSM goals, and allowing smaller buildings (20,000-50,000 sq. ft) access to EDA.

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

- Implement energy efficiency
- 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

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

- *Product Feature Sheet:* explains the features and the benefits of the product
- *Case Studies:* provides examples of how various customers benefited from participating in the product
- *Process Flow Chart:* detail information on the product processes
- *White Papers:* explain 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. Several strategies are used, such as:

- *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.
- *E-newsletters:* Another avenue to educate the market on the product and benefits of reviewing new construction projects for energy efficiency opportunities.

E. Product-Specific Policies

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 another fuel consumption, such as the change from an incandescent light to a compact fluorescent bulb reduces the lighting heat output, but increases the heating need for the space. This results in a net decrease in BTU consumption and a decrease in electricity consumption, but a slight increase in gas consumption (assuming a space heated with natural gas). In these situations, Public Service will account for both the decreases (energy savings) and increases in fuel consumption and will 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.

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. If it is a small change that does not require a 60-Day Notice, then it is typically discussed internally, and possibly with a few key trade allies and, if deemed acceptable, implemented. More significant product changes may involve review by external technical consultants or other third-parties, and would be submitted via 60-Day Notice and/or presented at a quarterly DSM Roundtable Meeting.

Xcel Energy 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

The EDA offering covers energy modeling services valued at an average of \$25,000 per project. Public Service also reimburses design team members to offset the incremental cost of their participation from \$4,000 to \$12,000 per project, depending on the square footage of the building.

In addition to energy modeling, Public Service provides financial construction incentives to building owners to improve the cost-effectiveness of the chosen energy efficiency measures. Customer incentives are based on demand and energy savings set at a base rate

of \$400 per kW saved and \$0.04 per kWh saved. In addition, a natural gas savings rebate of \$4 per dekatherm saved is available.

➤ Process Efficiency

A. Description

The Process Efficiency product is a Strategic Energy Management (SEM) offering designed to target energy-intensive processes in customers' facilities. Its holistic approach to energy conservation helps the customer create and implement a sustainable energy management plan that targets a system level approach to energy conservation versus a project level approach. This product is typically delivered in three phases. Each of these phases is defined in a Memorandum of Understanding (MOU) between the Company and the customer that is customized to reflect the needs of the specific customer.

Phase 1: Identification – A high-level analysis is performed to identify opportunities for energy savings in both a customer's business practices and the technical opportunities within their operations. This is completed at no cost to the customer.

Phase 2: Scoping – Support and resources are provided to further define and offer recommendations for energy savings opportunities identified in Phase 1.

Phase 3: Implementation – The Company works with the customer to compose schedule and conservation goals that are integrated into an energy management plan into actual conservation impacts. Projected estimates of the rebates that Xcel Energy will provide to support these efforts are calculated for the customer. Equipment rebates for this product include both prescriptive and custom measures, adhering to applicable policies and rebate levels for those project types.

Expanded Participation Eligibility for Mid-Sized Customers

Historically the product has been offered only to large customers ("large customer offering"), with 20 GWh or more in annual usage, where proposed projects have a minimum of 2 GWh in potential conservation opportunities. However, the Company is expanding the product offering, starting in 2015, to mid-tier industrial customers ("mid-tier customer offering") with minimum annual consumption of 2 GWh. The Company has designed this new offering to cost-effectively target this new market segment.

Successful delivery of this product is resource intensive both internally and externally. Due to the magnitude and complexity of custom projects, significant internal PSCo resources are required for completing project analyses and verifying adherence to all M&V requirements. Additionally, the product's success relies heavily on a more developed relationship with the customer garnered through the Account Management team. Lastly, the Company provides support, in partnership with trade allies, to customize the offering to match customer needs.

External resources are used to deliver services in Phase 1 and Phase 3 of the product. A third-party implementer delivers the Phase 1 session, but given the breadth of

opportunities and the volume of studies, their resources are also augmented by additional service providers. The product emphasizes building on what the customer has in place, so, when possible, vendors with familiarity with specific the customers' operations are utilized. This approach has included leveraging various engineering firms and equipment vendors. The Company requires that the vendor possess the necessary skills and experience and deliver the services at a reasonable price. This is achieved by requiring the vendor to submit costs and a proposal for Phase 2 study funding prior to preapproval, which is the same process followed by other study-based products within the Company's DSM portfolio.

B. Targets, Participants & Budgets

Targets and Participants

Participation levels are based on the number of customers actively participating in the project pipeline. The product has reached a point at which larger customer projects have reached the implementation stage, resulting in relatively high per project and per participant savings.

The Company generally will not see impacts from new customers in their first year of participation, which is the result of the extended sales cycle for the process-related, capital-intensive conservation improvements being targeted for implementation. An 18-24 month period is anticipated leading up to project installation, however, the Company does aim to influence installation of some smaller, energy efficiency projects in the interim.

Budgets

The majority of the budget traditionally has been, and will continue to be, spent on consulting services to provide the assessment and scoping phases of the product. The budgets and goals were developed by reviewing historical performance, the current pipeline for projects, and anticipated market uptake.

Although the product budget was developed based on historical performance, additional factors were considered:

- Rebate dollars have been adjusted to drive additional projects to implementation.
- Customers are reaching a point in the implementation of their energy management plans where a larger percentage will complete system optimizations that will result in qualification for DSM rebate bonuses.

C. Application Process

Due to the hefty customer engagement required for participation in this product, the Company identifies potential participants by cross referencing customers' historic electric usage with general industry energy consumption and conservation potential data—particularly for PSCo customers using more than 10 GWh per year. Beginning in 2015, the energy consumption target will be lowered to accommodate a mid-tier industrial

customer with minimum annual consumption of 2 GWh. Once eligible customers have been identified, Account Managers are relied upon to approach the customer with a description of the product and facilitate an informational meeting, if appropriate, between the customer, the DSM product manager, and any other relevant parties.

If the customer chooses to proceed with participation in the Process Efficiency product, the Account Manager will coordinate the walk-through of the customer facility as described in Phase 1 above. The customer's formal acknowledgement of planned participation in the product begins with the customer signing the MOU at this stage.

The Company views the signing of the MOU to formally establish a date of influence for all projects completed under the umbrella of the product. Conditional preapproval is established for the measures the customer chooses to pursue after signing the MOU.

D. Marketing Objectives & Strategies

This product is marketed primarily to customers through Public Service's internal Account Managers. Beginning in 2015, the Company will begin offering this product to mid-tier industrial customers, lowering the usage threshold for participation. In addition, the Company will continue to offer segment-specific seminars to introduce new energy-efficient technologies to the market and attract customers to participate in the product. The comprehensive nature of the product's process will evaluate energy use throughout a customer's operations instead of focusing on implementation of specific technologies or efficiency upgrades. This holistic approach can lead to the identification of significant conservation opportunities resulting from process or business practice changes.

E. Product-Specific Policies

The "large customer offering" is available to all commercial and industrial customers with a minimum annual consumption of 20 GWh. The "mid-tier customer offering" is limited to industrial customers with minimum annual consumption of 2 GWh. Both options are expected to attract participants primarily within energy-intensive processes.

Conservation opportunities may be grouped into a single or multiple projects within a customer's energy management plan. The plan will identify the expected sequencing and scheduling of the projects.

If a study conducted at a Process Efficiency customer's facility identifies custom projects that do not meet the Custom Product rebate eligibility requirements, energy savings credit will still be claimed by the Company as "study-influenced savings."

The anticipated timeframe from project initiation to completion is expected to be 18-24 months. No energy savings impacts will be recorded until a project is fully installed, operational, and the final rebate (if applicable) is issued. This approach results in significant investment by the Company in the year preceding realized impacts. There

will also be customers who start the sales cycle but withdraw before completing any projects resulting in stranded investments by Public Service. These risks are mitigated through monitoring of corporate commitments during established multi-year energy management plan checkpoints.

The incentive to optimize a system versus implement individual projects may also result in a lag between when individual components are installed and when the rebate is paid. These rebates will not be paid until all projects identified in the MOU are completed.

Bundling of two or more projects to achieve cost-effectiveness, improve payback, or to meet rebate requirements is an option for Process Efficiency participants if the requested bundled projects meet certain requirements:

- projects included in a bundle cannot be completed before they are preapproved as a bundle;
- payback for each project will be individually analyzed and confirmed to be within the lifetime requirements for the measures; and
- the entire project bundle must be cost-effective.

F. Stakeholder Involvement

The Process Efficiency product is being offered in direct response to requests from customers who have significant conservation potential and a willingness to complete energy efficiency projects, but may not have available resources or internal expertise.

The quarterly DSM Roundtable Meetings provide a forum for stakeholder involvement and feedback on this product, and others in the Company's DSM portfolio in Colorado.

G. Rebates & Incentives

Participants will be eligible for both study funding and end-use equipment rebates. The funding for Phase 2 studies will be based on the customer contributing 25% of the cost of the study, up to a maximum of \$7,500 for “large customer offering” and \$2,500 for the “mid-tier customer offering,” to encourage implementation of study recommendations. Projects will be rebated based on the measures installed and the energy and demand savings achieved. Rebates will be valued according to the levels established for end-use equipment within the Company’s other DSM products. Bonus incentives may be given for completion of milestones within the energy management plan, or achievement of energy savings exceeding the level indicated in the MOU.

➤ Recommissioning

A. Description

Building Recommissioning is the process of reviewing existing equipment and systems within a building to ensure that they are working as efficiently as possible and operating as intended. The product covers both recommissioning and retrocommissioning. *Recommissioning* is commissioning a building that has already been commissioned in the past. *Retrocommissioning* is commissioning a building that has never been commissioned. The Recommissioning product is designed to assist electric and/or natural gas business customers in improving the efficiency of their existing building operations by identifying existing functional systems that can be “tuned up” to run as efficiently as possible through low- or no-cost improvements.

Examples of typical recommissioning measures include:

- Calibration/tune-up of energy management system points
- Adjustment of outside air and return air dampers
- Resetting the chilled water and hot water supply temperatures
- Optimum start/stop of air handlers and makeup air units (early shutdown in the evening, late start in the a.m.)
- Resetting of a chiller’s condenser water temperature
- Eliminating simultaneous heating and cooling

Recommissioning consists of two main steps: diagnosis (studies) and implementation. Public Service offers rebates for recommissioning studies and the implementation of recommissioning measures. To facilitate participation from a variety of recommissioning professionals, the customer selects and hires a qualified engineering firm to complete the study and implementation.

The Recommissioning Product has four different paths a customer can choose:

1. *Study and implementation* – Customers receive funding for both the study and implementation from Public Service. Public Service works with the customer from the beginning of the project until the end. The study path has historically been the most popular choice for Public Service’s customers within Recommissioning.
2. *Fast track implementation* – This path is for customers who have either performed a study outside of this product offering, or have identified a few recommissioning measures within their building without doing a full blown study. To qualify, Public Service will review the study and/or recommendations / savings opportunities to determine recommissioning implementation rebates.
3. *Refrigeration recommissioning* – This path is focused on analyzing grocery / convenience store refrigeration systems to determine how they can be tuned up to save energy. Due to the nature of the recommended measures, implementation of the energy savings recommendations occurs as the provider is conducting the analysis.

4. *Building Tune-up* – This path is a less expensive study/implementation option targeted to buildings less than 75,000 square feet. An onsite study is performed, but focuses on a shorter checklist of measures, along with the study vendor completing fixes on-site as appropriate. This option opens the door to owners of smaller buildings to recommissioning activities without having to spend their limited capital on a costly study.

B. Targets, Participants & Budgets

Targets and Participants

To achieve the product targets, Public Service claims energy and demand savings as a customer implements the measures identified in their study. Participants are allowed to pick which measures they want to implement; a typical recommissioning study may suggest anywhere from five to ten measures, with varying cost and paybacks.

Budgets

Once energy savings targets were established, historical cost and participation information was analyzed to project budgets. For the Recommissioning product, most of the budget is driven by the number of studies completed and the number of customers who implement projects in a given year. The following factors were considered in determining the budget: total participants; rebate levels offered; promotional, advertising, and educational opportunities; and labor requirements to achieve the savings and participation targets.

C. Application Process

Customers learn of the product through their Public Service Account Manager, direct marketing efforts, and via recommissioning providers.

If a customer is interested in participating in a study, they should apply for preapproval before they begin the study. To obtain preapproval, the customer will submit an application and a proposal from their recommissioning provider that outlines the scope of the project. After the customer receives preapproval, they can begin the study on their building. When the study is completed, Public Service's internal engineer reviews the study to ensure that it meets our requirements and that the energy savings calculations are reasonable. After Public Service approves the study, the provider will present their final recommendations to the customer and then the customer can receive their study rebate. At this point, the customer will review the study and select individual measures to implement. After they finish implementation, they will receive their rebate check for the individual measures.

The typical sales cycle for a regular recommissioning project (study and implementation) takes one to two years to complete. Once preapproved, the study can typically take three months to complete and receive Public Service approval. Another year or more may be

required for the customer to receive internal approval for their capital expenditures and completion of their project.

If a customer wants to participate in the fast track implementation option (described above), where they receive implementation rebates only (no study funding), they obtain pre-approval for implementation rebates prior to completing the measures. To obtain pre-approval, they need to submit either their study or their project proposal for review. The sales cycle for fast track projects is typically shorter than a regular recommissioning project since they have already completed a study or may only be requesting a proposal from the provider.

To participate in the refrigeration recommissioning option, a customer can receive instant preapproval via the product website by entering relevant information regarding the project. After their investigation/implementation is completed, Public Service's technical staff reviews the project to determine energy savings.

D. Marketing Objectives & Strategies

The marketing strategy is to educate customers and trade allies on what recommissioning entails and the benefits of recommissioning a building. Due to the long sales cycle, it is important to continually build the study pipeline to meet future year's goals. To build the pipeline and to attract customers and recommissioning providers, various marketing tactics such as direct mail, educational seminars, targeted email newsletters, in person meetings, case studies, and the website are utilized. Another tactic is to provide increased study funding and/or implementation funding to customers if participation and/or achievement is lower than anticipated during the 2015 and/or 2016.

The primary market segment for Recommissioning is commercial customers that are 50,000 square feet or larger, such as offices, hospitals, and schools. These customers are good candidates due to the following:

- Office real estate owners are looking for quick paybacks on their buildings and want to cut their operating costs without sacrificing tenant comfort. Recommissioning is an ideal option for these customers as many measures are low/no cost with quick paybacks.
- Hospitals are intense energy users, and their energy systems frequently run as if there is full load, although that often isn't the case. There are many opportunities for low cost savings in hospitals and medical centers.
- Schools are closed down for more periods than most buildings and have more opportunities for optimizing their energy systems.

A comprehensive list of marketing materials has been developed for customers, providers, and Account Managers, including:

- Product feature sheet – explains the features and the benefits of the product
- Study preapproval application

- Study rebate application – used to receive a study rebate after study has been approved
- Fast track preapproval application
- Recommissioning guidebook – information booklet that explains recommissioning, benefits, process, etc.
- Provider list – contains providers who have participated in our product in the past
- Case studies: Hospital, school, office building, hotel, medical and research facility – provides examples of how other customers benefited from participating in recommissioning
- Process flow chart
- Provider tips booklet – helps providers through the process
- Customer website – snapshot of our product and links to many useful resources and marketing materials
- Provider website – contains information on the product and tips that are specific to providers participating in the product. The website also has links to all of the marketing materials for easy access.
- Provider calculation tool - helps providers with basic calculations of recommissioning energy savings

Periodically, specific marketing materials that cover timely information are developed, such as:

- Direct mail pieces – promotional piece that is sent to a specific target market either based on size or segment
- Customer newsletters – reminds customer of product offering, highlights product changes/enhancements
- Customer email – a brief email that is available to Account Managers to send to customers
- Customer seminar – educate customers about Recommissioning and the benefits
- Provider newsletters – highlights product tips, changes, and announcements
- Provider seminar – educate providers on how to participate in the product

Recommissioning providers play a key role in the success of the product since customers rely on providers to identify energy saving opportunities in their building. While provider interest in participating in the product is increasing, the Company will be working to identify additional providers in 2015 / 2016 to help meet future demand. The goal is to make sure that providers understand expectations for the product and provide the necessary tools to help customers through the process. To help providers participate in the product, the Company meets with them one-on-one or in group training sessions to explain the process and requirements and encourage working through the projects collaboratively with Public Service.

E. Product-Specific Policies

Recommissioning has a few policies that are specific to the product which include:

- *Study/analysis driven credit:* If a customer implements measures that are less than a one-year payback or over a 15-year payback, they will not receive a rebate, but Public Service will claim the study/analysis-driven savings. The Company believes that our help identifying and/or analyzing energy efficiency measures provide sufficient influence on the customer's decision to implement those measures.
- *Maintenance:* The Recommissioning product claims energy savings for maintenance identified and implemented through the recommissioning process.
- *Rebate/energy savings validity:* If at least two years has 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. Gas only service customers are not eligible for this product

If it is too burdensome for the customer to gather invoices for a project, we will accept only their signatures as documentation of implementation as long as the customer accepts foregoing any rebate they may have qualified for. There are instances where the customer may not qualify for a rebate due to the payback of the measure; the rebate may be very small; and/or it may be difficult to obtain an invoice as the cost of the measure may be imbedded in an invoice that was for a larger project. When this is the case, the customer may be hesitant to spend the time to gather invoices, but agree to foregoing an implementation rebate because Public Service helped pay for the study. When this happens, Public Service will claim the credit for the measure, but will not issue a rebate to the customer.

F. Stakeholder Involvement

The Company values feedback from customers and providers and makes an effort 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 our active trade allies 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.

G. Rebates & Incentives

The Recommissioning product offers two types of customer rebates: study and implementation.

Study rebate: Public Service will pay up to 75% of the recommissioning study cost, up to \$25,000. Payment of the remaining balance by the customer ensures customer commitment to identifying and implementing measures found within their study.

Implementation rebate: Public Service will pay up to \$400 per peak summer kW or \$0.08 per kWh saved, whichever is higher, and an additional \$4/Dth saved for Public Service natural gas customers, up to 60% of the recommissioning measure costs that are identified in recommissioning studies or preapproved through the fast track implementation option.

➤ Self Direct

A. Description

The Self Direct product provides large commercial and industrial customers in Colorado the opportunity to control all stages of their project's rebate application process. Participating customers will identify, engineer, implement, and commission qualifying energy efficiency projects to receive rebates for implementing those projects. The dollar value of the rebates will be calculated based on the incremental energy savings achieved. Because the Self-Direct product shares many of the features of the Custom Efficiency product, it can be viewed as a traditional custom product targeted towards a unique subset of customers.

A fundamental principle and differentiating factor of the Self-Direct product is that the customer performs all of the work and incurs all the costs for the identification study, design, engineering, measurement & verification (M&V), and reporting work associated with the energy saving projects. Large customers with energy saving evaluation resources may choose to participate in the Self Direct product because they believe that it is beneficial for them to perform more of the administrative and engineering activities, and in doing so, receive a higher rebate over Public Service's other DSM products.

Participation in the Self Direct product will generally follow this sequence:

1. Public Service prequalifies customers who are eligible for participation.
2. Once prequalified, a customer identifies energy savings opportunity(ies), then develops and submits a project proposal.
3. Public Service provides confirmation of application receipt, reviews the application, and requests additional information as necessary.
4. Public Service notifies the customer of preapproval or denial of the application, including the estimated rebate and energy savings from the project, and finalizes a mutually agreed upon M&V plan.
5. Public Service encourages the customer to attend a project planning meeting to discuss final rebate application preparation and project details.

If the customer chooses to implement the preapproved project they must follow the requirements detailed in the M&V plan and conduct all necessary steps in order to verify energy savings. Any data required for pre-installation monitoring detailed in the M&V plan should be submitted to the Company and approved before the customer implements the energy efficiency measures. Upon acceptance of the data the customer can then implement the measures and perform any follow-up monitoring as described in the M&V plan.

Once the project is implemented and operational and all necessary M&V is completed, the customer will submit their project completion report with required details. Public Service will review the report, request any additional data, and calculate the final rebate.

The rebate will be paid by check upon completion of the project and Public Service's approval of the project completion report.

B. Targets, Participants & Budgets

Targets and Participants

Energy savings and participation targets have been 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 for because customers incur the costs associated with M&V for custom projects.

C. Application Process

Customers are most likely to hear about the Self Direct product through their Account Managers or one of the Company's trade partners. Customers must be prequalified for participation before submitting a project application. The customer is responsible for providing the Company with justification for eligibility (prequalification). Justification must include, but is not limited to, a list of the customer's account numbers, locations, and meter numbers to be aggregated.

Once prequalified, the customer will submit a project application for each Self Direct project. The project applications may contain a single measure, or a combination of multiple measures at a single, or multiple customer sites. All energy conservation measures must be at customer locations that receive electric service from the Company.

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. 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 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 customers with new facilities that demonstrate, to the satisfaction of the Company,

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 this 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 be rebated 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 being rebated through the Self Direct product. Customers may enroll their new facilities in either the Self Direct product or the New Construction product, but not both. 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.

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 projects fit 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. Self Direct project applications may contain a single measure, or a combination of multiple measures at a single or multiple locations. All energy efficiency measures must be at customer locations receiving electric service from the Company.
- 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, non-energy 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 demand and energy 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.

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, implement potential changes (via 60-Day Notice, as needed).

G. Rebates & Incentives

Public Service will pay rebates based on the actual savings from a project, up to \$525 per customer kW or \$0.10 per customer kWh. Rebates will be given for either peak demand or energy savings for a project, not both, and will be limited to 50% of the incremental costs of the project. Rebates 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 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. Rebate levels will be adjusted downward so that no project (with rebates included) has a payback less than one year. For rebate calculation purposes, kW saved shall reflect the reduction in the customer's peak demand (kW) as a result of the energy efficiency project. For rebate calculation purposes, kWh saved will be the annual kWh saved as a result of the energy efficiency project(s).

The expected rebate for the project will be communicated to the customer upon preapproval. The final rebate amount will equal the preapproved rebate amount if the actual project costs and energy/demand savings are within 10% of the estimated values and the MTRC test ratio for the completed project meets the criteria stated above. If actual project costs, energy or demand savings differ from the estimated values by more than 10%, the customer should include revised calculations for the requested rebate in the project completion report.

Residential Program

A. Description

Public Service will continue to offer a wide range of product offerings to serve residential customers in 2015 and 2016. The DSM products that make up the Residential Program will be available to over 1.2 million electric and 1.24 million natural gas customers.⁴⁸ 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 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 2015-16. The full list of residential products is provided in the table below, along with product rankings and other market data. Public Service is adding Energy Feedback Residential and Home Energy Squad as new product offerings, as well as adding new energy efficiency measures to the existing products.

⁴⁸ Customers counts as of July 29, 2014.

Table 9: Residential Program Product Rankings

2015/2016	Rank
Home Lighting & Recycling	1
Energy Feedback Residential	2
School Education Kits	4
Efficient Showerheads	5
Evaporative Cooling	7
ENERGY STAR New Homes	14
Refrigerator & Freezer Recycling	17
Residential Heating	19
Home Energy Squad	20
High Efficiency Air Conditioning	27
Insulation & Air Sealing	29
Home Performance with ENERGY STAR	30
Water Heating	32

In developing and refining the portfolio of products, Public Service worked closely with external consultants familiar with residential and low-income 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. Targets, Participants & Budgets

Targets and Participants

The Company's residential DSM products have a large reach to customers and provide a wide portfolio of offerings that will allow all customers to participate. Planned achievements of 136.1 GWh and 338,068 Dth in 2015 will account for 33% of the Company's total electric energy savings target and 57% of the total natural gas target. Planned achievements of 136.7 GWh and 367,044 Dth in 2016 will account for 33% of the Company's total electric energy savings target and 58% of the total natural gas target. Each of the product targets was reviewed by the Company's energy efficiency manager for reasonability and appropriateness based on technical potential. The bulk of the Company's residential energy savings will come from five of the 13 products in the Residential Program—Energy Feedback Residential, Home Lighting & Recycling, Refrigerator & Freezer Recycling, School Education Kits, and Evaporative Cooling products.

Table 10a: 2015 Electric Residential Program Budgets & Targets

2015	Electric Budget	Net Generator kW	Net Generator kWh	Electric MTRC Test Ratio
Residential Program				
Energy Efficient Showerhead	\$55,455	54	706,159	7.98
Energy Feedback Residential	\$3,212,779	12,744	14,381,570	1.78
ENERGY STAR New Homes	\$813,716	869	2,535,469	1.38
Evaporative Cooling	\$2,993,071	5,641	5,078,655	5.89
High Efficiency Air Conditioning	\$2,615,406	2,283	2,058,796	0.80
Home Energy Squad	\$346,156	222	522,927	1.65
Home Lighting & Recycling	\$12,053,117	14,636	98,760,793	2.11
Home Performance with ENERGY STAR	\$362,031	288	594,532	1.05
Insulation & Air Sealing	\$84,548	150	179,911	0.97
Refrigerator & Freezer Recycling	\$1,282,631	458	4,008,195	1.50
Residential Heating	\$321,715	242	2,557,160	1.39
School Education Kits	\$1,448,430	454	4,106,097	1.50
Water Heating	\$37,224	22	111,307	0.82
Residential Program Total	\$25,626,280	38,062	135,601,572	2.28

Table 10b: 2016 Electric Residential Program Budgets and Targets

2016	Electric Budget	Net Generator kW	Net Generator kWh	Electric MTRC Test Ratio
Residential Program				
Energy Efficient Showerhead	\$56,946	54	706,159	7.95
Energy Feedback Residential	\$3,062,404	12,032	22,912,843	2.12
ENERGY STAR New Homes	\$859,822	1,058	3,036,877	1.47
Evaporative Cooling	\$2,993,071	5,641	5,078,655	5.97
High Efficiency Air Conditioning	\$2,688,656	2,353	2,120,925	0.81
Home Energy Squad	\$452,303	275	701,109	1.65
Home Lighting & Recycling	\$11,395,617	13,455	90,793,678	2.13
Home Performance with ENERGY STAR	\$362,031	288	594,532	1.08
Insulation & Air Sealing	\$84,548	150	179,911	1.00
Refrigerator & Freezer Recycling	\$1,281,931	408	3,571,262	1.42
Residential Heating	\$321,715	242	2,557,160	1.43
School Education Kits	\$1,479,212	454	4,106,097	1.52
Water Heating	\$37,224	18	89,082	0.74
Residential Program Total	\$25,075,480	36,428	136,448,291	2.32

Table 10c: 2015 Natural Gas Residential Program Budgets & Targets

2015	Gas Budget	Net Annual Dth Savings	Annual Dth/\$M	Gas MTRC Test Net Benefits	Gas MTRC Test Ratio
Residential Program					
Energy Efficient Showerhead	\$641,217	43,555	67,926	\$5,107,200	6.88
Energy Feedback Residential	\$451,659	50,080	110,881	\$252,451	1.56
ENERGY STAR New Homes	\$2,598,852	121,307	46,677	\$2,678,342	1.36
Evaporative Cooling					
High Efficiency Air Conditioning					
Home Energy Squad	\$288,604	5,448	18,877	\$55,266	1.16
Home Lighting & Recycling					
Home Performance with ENERGY STAR	\$415,724	16,176	38,911	-\$492,333	0.72
Insulation & Air Sealing	\$289,297	16,102	55,659	-\$274,020	0.83
Refrigerator & Freezer Recycling					
Residential Heating	\$725,665	41,771	57,562	\$596,054	1.23
School Education Kits	\$358,222	31,687	88,457	\$3,813,603	8.25
Water Heating	\$109,006	2,807	25,747	-\$270,265	0.44
Residential Program Total	\$5,878,245	328,933	55,958	\$11,466,297	1.72

Table 10d: 2016 Natural Gas Residential Program Budgets and Targets

2016	Gas Budget	Net Annual Dth Savings	Annual Dth/\$M	Gas MTRC Test Net Benefits	Gas MTRC Test Ratio
Residential Program					
Energy Efficient Showerhead	\$664,569	43,555	65,539	\$5,167,958	6.74
Energy Feedback Residential	\$502,034	73,660	146,722	\$547,149	2.09
ENERGY STAR New Homes	\$2,753,619	126,899	46,084	\$3,041,768	1.39
Evaporative Cooling					
High Efficiency Air Conditioning					
Home Energy Squad	\$380,546	7,476	19,645	\$98,066	1.21
Home Lighting & Recycling					
Home Performance with ENERGY STAR	\$415,724	16,109	38,748	-\$465,314	0.73
Insulation & Air Sealing	\$289,297	16,102	55,659	-\$240,649	0.85
Refrigerator & Freezer Recycling					
Residential Heating	\$725,665	35,935	49,520	\$300,264	1.12
School Education Kits	\$368,852	31,687	85,908	\$3,861,920	8.13
Water Heating	\$109,006	1,766	16,199	-\$260,248	0.38
Residential Program Total	\$6,209,311	353,188	56,880	\$12,050,914	1.73

Budgets

Achievement targets 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 longer-term 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: ENERGY STAR New Homes, Home Performance with ENERGY STAR, 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 central air conditioning and heating options. To address this demand, the Company offers products focused on quality installation of new units and replacement of inefficient, existing systems.

Products: Evaporative Cooling, Residential Heating, and High Efficiency Air Conditioning

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

Products: Energy Feedback Residential 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 Water Heating.

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 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.

Strategy

Public Service follows the “AIDA” (awareness, interest, desire, action) process for encouraging customers to participate in DSM 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 products by providing information about the offerings across a variety of customer touch-points.
3. Instill the desire for participation in DSM 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.

Residential Program policies include:

- *Proof of installation:* Nearly all residential DSM 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. Once equipment is installed and operational, rebate applications may generally be submitted within a 12-month period.

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, Colorado Department of Public Health and Environment, Energy Efficiency Business Coalition (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 the DSM products, including: ACEEE, CEE, U.S. Department of Energy, U.S. Environmental Protection Agency, E Source, Southwest Energy Efficiency Project (SWEEP), and Wisconsin Energy Conservation Corporation (WECC).

These organizations continue to provide feedback on the Company's DSM 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* program 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 products. In 2015 and 2016, the Company will continue to support and grow community partnerships through *Partners in Energy*, by configuring our DSM 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 Programs such as Consumer Education, Energy Efficiency Financing, 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 2015 or 2016 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, energy-efficient showerheads and aerators to help reduce their energy and water use costs.

Eligible customers are contacted and offered one of two kit options based on their past participation in the Energy Efficient Showerhead product and/or their home's water-savings needs:

1. **Kit Option One** (for customers that have never participated,⁴⁹ or participated more than 10 years ago):
 - a. Two, 1.5GPM showerheads
 - b. Two, 1.0GPM bath aerators
 - c. One, 1.5GPM kitchen aerator
2. **Kit Option Two** (for customers that participated between 2009 – 2013):
 - a. One, 1.5GPM showerhead
 - b. Two, 1.0GPM bath aerators
 - c. One, 1.5GPM kitchen aerator
3. **Kit Option Three** (for customers that participated in 2014):
 - a. One, 1.5GPM showerhead
 - b. One, 1.0GPM bath aerator

The free energy efficiency kit is mailed to customers who make the active decision to request the energy efficiency measures within the promotional period. In addition to showerheads and aerators, the kits include Teflon tape, and illustrated installation instructions. Participants receive one kit per request.

The Company contracts with a third-party implementer to manage all customer requests and distribute the energy efficient showerheads. The third-party implementer is a recognized distributor of energy efficiency-related products in the United States. Customer participation is tracked and provided to the Company following the kit distribution.

⁴⁹ Previous non-participants can elect to receive measure for one or two bathrooms.

B. Targets, Participants & Budgets

Targets and Participants

PSCo set the 2015 and 2016 product targets 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).

Budgets

The product budget was developed based upon the cost of reaching the proposed energy savings targets – using 2013 product performance as a guide for the cost of the showerheads/aerators, fulfillment charges, postage, and all necessary marketing efforts. New cost-savings will be realized in 2015 and 2016 due to offering additional showerheads and aerators to customers. Since the third-party implementer will manage all day-to-day activities outside of marketing, minimal internal Company labor is allocated to this product.

C. Application Process

Customers are notified of this product through direct mail and/or email, typically distributed in the spring (and occasionally fall) targeting different areas of the service territory in each mailing. Customers have a limited amount of time (approximately 45 to 60 days for direct mail and a few weeks for email) to return the business reply card to the third-party implementer. Once the customer responds to the offer, they will be shipped one free energy-savings kit within six weeks.

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

D. Marketing Objectives & Strategies

An average of 9% of customers who received a direct mail brochure between 2011 and 2013 requested the product. Based on this data, PSCo has developed a marketing plan utilizing direct mail and/or email campaigns and partnerships to 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

Only natural gas and combination gas and electric customers who haven't participated in the equipment lifetime of the showerhead/aerators are eligible to participate. The product's savings goals and anticipated response rates help the Company determine how

many eligible customers receive the offer. If an eligible customer who did not receive the mailing becomes aware of the product and would like a free showerhead and aerators, they will receive one, if budget allows.

The Company is aware of the Colorado Senate Bill 103 and plans to adjust the showerhead baseline in 2017 accordingly.

F. Stakeholder Involvement

In past program years, Public Service has partnered with local cities and counties on their water efficiency initiatives. PSCo plans to continue its support of these types of programs in 2015 and 2016.

G. Rebates & Incentives

The product provides free energy efficient equipment rather than a rebate to the customer—the price for that equipment is classified as the rebate in the product budget.

➤ Energy Feedback – Residential

A. Description

The Energy Feedback – Residential product is based on the successful conclusion of the Energy Feedback pilot, which has run in PSCo since 2011. The product provides targeted communication of energy-use comparisons and information called the Home Energy Report to PSCo's Colorado residential customers, providing specific recommendations and feedback to motivate and to teach customers how to reduce their energy consumption. Customers receive new information with each Home Energy Report that is delivered by mail or email, or a combination of both formats. An online version of this information along with supplemental energy-awareness and savings tools also is available for all PSCo residential customers to support product objectives. Savings are quantified by comparing the energy consumption of the participating group to a non-participating control group. The third-party implementer will provide an analysis of the impact of the product each year.

The product's main offerings include the following two components:

Personalized Home Energy Reports – A targeted direct mailing and/or email that provides specific recommendations and incentives to motivate customers to reduce their energy consumption. The individualized reports provide:

- Customers' energy use compared to the average of 100 neighbors in similar-sized homes with similar characteristics;
- Targeted efficiency recommendations based on an analysis of the household's energy usage, demographics, and home characteristics;
- Advice on how report recipients can easily implement efficiency measures based on their individual circumstances.

The group of randomly assigned customers receiving the reports is referred to as the Treatment Group.

- A portion of customers receive a mailed print version of the report, a portion of customers receive an emailed report, and a portion of customers receive both print and email reports.

The group of randomly assigned customers who do not receive the reports is referred to as the Control Group.

- Energy savings of the Treatment Group is compared against this portion of customers.

My Energy Tools – An online suite of tools that gives customers greater insight into their energy consumption and actions they can take to become more energy efficient. These tools are available to all Xcel Energy residential customers in Colorado, and provide the same information as customers receive in their Home Energy Reports, with a more robust

set of customization options and energy-savings tools that can make future Home Energy Reports even more personalized and useful for customers. The online suite includes:

- Customer-specific electricity and natural gas consumption data;
- An efficiency recommendation database with community ratings and reviews, which provides customer feedback collected and analyzed regionally on which tips work best for customers in Colorado;
- Encouragement to set an energy goal and track ongoing progress toward that goal, and
- A Home Energy Assessment tool with progressive, simple, and straightforward questions that provide immediate value and feedback.

Similar to the Home Energy Reports, Public Service will compare Treatment and Control Groups to determine energy savings from use of My Energy tools. Savings from customers who are part of the Home Energy Report Treatment Group who also use My Energy tools will have all savings measured as part of their Home Energy Report savings calculation. Only savings from customers who are not part of the Home Energy Report Treatment Groups will be counted as attributable to My Energy savings.

Participants will be given the opportunity to opt out of outbound communications at any time.

B. Targets, Participants & Budgets

Targets and Participants

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

Home Energy Report: Participants in the 2014 pilot will remain in the print and email groups for 2015 and 2016, with the exception of 10,000 customers whose treatment will cease as a part of a study to see if energy savings persist over time after treatment stops. New participants will be selected to expand the product in 2015-2016, and after selection will be randomly divided into Treatment and Control Groups. We expect to see ongoing savings averaging approximately 1.4% for electricity use and 0.5% for natural gas consumption from the Home Energy Reports. Through our pilot experience, we have learned that savings ramp up over time as customers receive multiple reports, so while some existing groups are forecasted to save higher amounts, newer groups will save less initially. While the average savings are reported above, they represent a wide range of savings levels among different Treatment Groups. Actual savings will be measured and reported using the approach outlined in the M&V section of this Plan.

My Energy: Customers will be randomly divided into appropriately-sized Treatment and Control Groups. Those customers are selected from all PSCo residential customers, excluding Home Energy Report email or print Treatment and Control Group participants. We expect customers to realize ongoing savings of approximately 0.8% of electricity use and 0.4% for natural gas consumption as a result of using the tools available in My

Energy. Actual savings will be measured and reported using the most appropriate methodology as determined by a third-party evaluator and outlined in the M&V section of this Plan.

My Energy follows an opt-in model where randomly selected customers will receive targeted marketing messages encouraging them to access My Energy and actively participate. This varies from the Home Energy Reports, where customers are selected to receive reports unless they opt-out. Some My Energy participants may be single fuel service customers while others may receive both natural gas and electricity service from Public Service. Therefore, each fuel service counts as a “participant,” meaning a multi-fuel customer will count as a gas participant and also as an electric participant.

Budgets

The budgets were developed based on third-party implementer input and internal administrative cost estimates for 2015/16.⁵⁰ The majority of the product’s budget is allocated to third-party implementation, which includes preparing and mailing the Home Energy Reports, data analytics, marketing and conducting an ongoing regression analysis of participants and the Control Group to determine the electric and natural gas savings, and continually improving data analytics models to drive participants to behave in ways that deliver deeper energy savings. Administrative costs for customer data extraction and product administration to be completed by Xcel Energy are based on costs derived from the pilot.

The budget for My Energy is largely fixed due to the information technology and delivery method, and does not change as more customers use the tools and services. A share of the multi-state My Energy online portal license fees are apportioned to this product’s budget based on customer counts for each state and fuel type. M&V costs have also been budgeted for My Energy due to the complexity and unique challenges of measuring behavior savings from this service.

C. Application Process

There is no customer application. Participants for the print and email Treatment Groups are secured using a random selection process administered by the third-party implementer. New participants will be informed of their selection at the beginning of treatment and will be given the opportunity to opt-out from receiving the Treatment Group communications at any time. Appropriately-sized Control Groups are identified by the third-party implementer and enable isolation of effects attributable to each Treatment Group. The Control Group customers have not and will not be directly contacted or influenced by the Company or the third-party implementer regarding this product.

⁵⁰ The third-party implementer contract pricing will be negotiated at the end of 2014, upon contract renewal.

D. Marketing Objectives & Strategies

Home Energy Report participants will continue from the original pilot, and thus, no additional marketing is needed to attract those customers. New participants will be selected and randomized by the third-party implementer who will not require any specific marketing tactics. The results from 2013 show that customers who receive the reports are more likely to take advantage of other DSM products, resulting in an average 4.92 percent lift in participation across all DSM products. The effects are even more pronounced when a program is cross-promoted on the Home Energy Report itself. Xcel Energy plans to continue to utilize this effective tool for targeted promotion of other energy-saving products.

My Energy will be available to all Colorado residential customers who engage in the My Account portal. Active engagement of those customers will be initiated through:

- Customer visits to the My Account portion of Xcel Energy's website, which features customized energy feedback results and a prominent button for customers to select to see more details and use the portal tools. My Account customers receive periodic reminders to visit My Account to view their bill, make payments, or track energy use (i.e. using My Energy).
- General marketing and promotion of My Energy tools and services as part of Xcel Energy's Company communications.
- Outbound marketing efforts to targeted customers within the My Energy Treatment Group may include email, on-bill messaging and promotion, social marketing, outreach event demos, special offers, and direct mail.

We will implement various marketing channels, methods and strategies within the [My Energy](#) Treatment Group only. However, the Control Group also will have access to the My Energy information and tools due to its prominence within the My Account page.

E. Product-Specific Policies

Customer confidentiality and data privacy practices will be stringently applied in accordance with Xcel Energy's Privacy Policy, available on the Company's website, here:

<https://www.xcelenergy.com/staticfiles/xe/Admin/Xcel%20Online%20Privacy%20Policy.pdf>.

Customer assistance will be provided to participants and non-participants in the same manner.

Other policies will be determined as needed.

F. Stakeholder Involvement

The Energy Feedback pilot, under which Public Service initiated study of energy behavior products, was based on recommendations from the DSM Roundtable in 2010. Public Service proposes to offer Energy Feedback as a product in 2015-2016, based on Commission approval received in Decision C14-0731.⁵¹

G. Rebates & Incentives

Rebates are not offered as part of the product.

⁵¹ Decision C14-0731, Paragraph 81, pgs. 28-29 (Proceeding No. 13A-0686EG).

➤ ENERGY STAR New Homes

A. Description

The ENERGY STAR® New Homes product provides homebuilders with an incentive to exceed state and local building codes, applying innovation beyond common construction practices. Homebuilders are encouraged to consider a “whole-house” approach to energy conservation when constructing new single-family and small multi-family homes. This approach combines energy saving construction methods with energy-efficient appliances to achieve significant energy savings and provide the customer with lower energy bills, fewer maintenance concerns, higher resale value, and a more comfortable, quiet home.

Builders have the flexibility to mix and match efficient technologies and building techniques to meet the product requirements and qualify for a rebate. In order to qualify for a rebate, participants are required to build homes that exceed state and local building energy codes by at least 10%. In order to measure this, a Performance rating must be completed on all homes by a Residential Energy Services Network (RESNET) certified home energy rating system (HERS) rater. HERS raters will complete the Performance rating for each home using REM/Rate software and will submit selected output information to the Company’s third-party implementer for evaluation. Energy savings are determined individually for each home based on the difference between the energy used by the reference home (or baseline home; modeled to match the local jurisdictional energy code) and the energy used by the new as built home.

Builders will receive a rebate based on the percent improvement achieved over their jurisdictional energy code and can earn a \$100 bonus rebate if their home is ENERGY STAR certified. Additional rebate dollars are available to the builder if qualifying energy-efficient appliances are installed at the time the home is rated. See section G below for rebate details.

Xcel Energy has received several awards from ENERGY STAR for this product:⁵²

- *2011 Leadership in Housing Award*
- *2011 ENERGY STAR Partner of the Year*
- *2012 Leadership in Housing Award*
- *2012 Sustained Excellence in Energy Efficiency Program Delivery*
- *2013 Leadership in Housing Award*

The Company utilizes a third-party implementer to encourage builders to participate in the product, working jointly with local raters to get homes enrolled in the product. The HERS rater will model and test the home and, in conjunction with the third-party implementer, determine whether it meets the product requirements and is eligible for a rebate. HERS rating companies have the flexibility to participate in this product by completing a standard scope of work managed by the Company’s third-party

⁵² View the ENERGY STAR Awards Archive: <https://www.energystar.gov/about/awards/awards-archive>

implementer. HERS raters in the state of Colorado have established strong relationships with the builder community they serve and the Company wishes to build on those relationships and support the raters in their efforts. The third-party implementer will provide product training for the rater and assist with builder training as needed. The third-party implementer will also be responsible for obtaining rating information from the rater and reporting it to the Company.

Product Improvements toward a Year-Round Offering

The Company recognizes that in 2012 and 2014, the product became fully subscribed prior to the end of the calendar year, which drew concern from interested stakeholders. The Company has made several improvements to the product since implementation of the 2014 DSM Plan, aimed at keeping the product open throughout the calendar year in 2015 and 2016:

- Rebates will no longer be based on the HERS index achieved but instead based on the homes improvement over local energy code. This change better aligns the rebate level with the level of energy savings. Homes built in jurisdictions where IECC 2012 or higher is adopted are generating a low HERS index (low is better), but many of these homes do not provide a high level of energy savings since the baseline home is now more efficient.
- In late July of 2014, the Company implemented a 60-Day Notice which modified how incremental capital costs (ICC) are assigned to each home. The ICC for the reference (baseline) home is now calculated, rather than deemed. This change does a better job aligning the ICC incurred by the builder and the energy savings being claimed by the Company.
- Previously the Company offered an incentive to energy raters for each home that earned a rebate, which is being reduced from \$200 to \$75 starting in 2015. Here forward the Company will refer to this as an “administrative fee.” The reduction of this fee improves the product’s cost-effectiveness.

B. Targets, Participants & Budgets

Targets and Participants

The product’s energy savings and participation targets are based on historical product performance—the product was fully subscribed prior to calendar year end in 2014—and a forward look into new construction trends based on available market intelligence. Nationally, new home construction starts in 2014 reached their highest level since 2008, but remained below pre-2008 levels. While, the Colorado market seems to be growing at a faster pace than the national market, growth levels are anticipated to be modest. In addition, the Company has changed its methodology for calculating rebates to be based on the percentage of improvement over local energy code requirements⁵³ (rather than

⁵³ Reference is to an individual participating home’s presiding local energy code requirements.

being based on the HERS Index)—resulting in some homes no longer qualifying for rebate. Nonetheless, the Company is forecasting product participation to increase approximately 7% in 2015 (from 2014 targets) and 8% in 2016 (over 2015 targets).

Budgets

The budget for this product is driven by forecasted participation levels for 2015/16 and includes costs for: product administration, builder rebates, promotional and outreach activities, measurement and verification, and internal Company labor. Product administration costs include third-party implementer services. Builder rebates are the single largest expense component for this product.

C. Application Process

Enrollment for this product is typically completed by the HERS raters on behalf of their clients (builders). HERS raters have strong, long standing relationships with most of the builders operating within the Company's Colorado service territory. To initiate the enrollment process, HERS raters will contact builders to encourage their participation, or the builder will contact a rater and express interest in constructing a better-than-code home. The rater will explain the product and potential rebates available, review the home's blueprints and building schedule, and enter the home details into the third-party implementer's tracking database. The rater will also consult with the builder throughout the construction phase to construct the home to better-than-code standards.

When the home is completed, the HERS rater will perform an air tightness test on the house and determine the energy impacts using REM/Rate. This information is submitted to the third-party implementer who will review and approve each request. The builder will receive a rebate based on a percent improvement achieved over the prevailing jurisdiction's energy code. The percent improvement achieved in each home is used to determine the rebate level earned. Specific gas and electric savings are determined by the HERS raters modeling. There is no rebate application for the builder or rater to complete since all required information is entered by the HERS rater into the third-party implementer's database using a web portal interface. The third-party implementer reviews and ensures all information is accurate and captured and works directly with the energy rater to correct any omissions or errors. Once the data is deemed complete, the third-party implementer is responsible for manually entering a portion of the collected data for each home into the Company's database.

D. Marketing Objectives & Strategies

The Company will update existing marketing materials to distribute to participants and possibly develop new materials for homebuyers and other stakeholders such as realtors and builder's sales agents. The development of new materials will be driven in large part by the outreach plans of the third-party implementer selected for 2015/16. The objective of the marketing material is to effectively communicate the benefits (energy, economics, and comfort/durability) and requirements of participation to existing and new

participants. The product does not utilize mass marketing campaign efforts as a method of driving participation.

The Company's third-party implementer will engage in outreach activities with participants and stakeholders. The objective of outreach efforts is to maintain working relationships with builders and raters, ensuring that they are satisfied with the product offering and are provided clear communications and customer service. This is accomplished through a combination of in-person and conference-call meetings with raters and one-on-one meetings and routine email and phone communications with raters and builders.

The third-party implementer will develop and offer training to participants (primarily raters) on the use of their database system and REM/Rate modeling software, with the objective of improved efficiency and more accurate data output, and to encourage energy-efficient building practices resulting in increased energy savings. Additionally, the third-party implementer will work the Company to identify key stakeholders and will be responsible for developing specific outreach plans designed to increase product visibility and awareness. Key stakeholders may include organizations such as local homebuilder associations, the Colorado Energy Office (CEO), and other related industry organizations.

E. Product-Specific Policies

This product applies to builders of residential single-family buildings, small multi-family (duplex, triplex, fourplex) buildings and town homes that receive combined electric and gas service, or gas only service, from Public Service. Structures that have common conditioned space such as hallways and elevator shafts are not eligible for the product.

HERS raters must be RESNET certified and must use the REM/Rate modeling software for each home. All qualifying homes must be rated using the widely adopted Performance path method, which requires independent verification by a qualified, participating HERS rater. The HERS rater must complete the Thermal Enclosure System Rater Checklist and the home must pass all applicable sections in order for the builder to qualify for a rebate.

Homes do not need to be ENERGY STAR-certified to receive rebates; however, homes achieving ENERGY STAR certification may be eligible for an additional \$100 bonus rebate. The requirements for the ENERGY STAR-certified rebate tier are detailed in Section G below.

Natural gas only participants are not eligible to receive the appliance rebate for installing the ENERGY STAR refrigerator or Lighting Efficiency measures. Natural gas only participants that do not install a natural gas water heater are not eligible for the ENERGY STAR dishwasher or clothes washer rebate. Homes that receive electric service only from the Company are not eligible to participate in this product. In other words, the

home must receive gas only service or combined gas and electric service from the Company in order to participate.

The product does not include the impacts of a PV or other renewable generation systems when calculating the percent better-than-code achieved by a home. Incentives for PV systems are paid through the Company's Solar*Rewards product, under separate application. Accordingly, energy savings credit for installed PV systems are not captured within this product.

F. Stakeholder Involvement

The product continues to evolve due to changes occurring in the new homes marketplace. The Company maintains on-going relationship with the U.S. Environmental Protection Agency (EPA) and U.S. Department of Energy, which jointly oversee the national ENERGY STAR program. The Company is an active Sponsor and participant in the national program, recognizing the strong customer awareness of the ENERGY STAR brand.

In 2013, the Company initiated product research, conducted with participating builders and energy raters, recognizing that the product savings were declining due to jurisdictions adopting increasingly stringent energy codes. Product changes would be necessary to maintain cost-effectiveness. The Company also solicited feedback on the product's operational strengths and weaknesses, and sought input on test concepts for future product design. Some of the key findings included:

- The builder and energy rater's relationship is highly valued by both parties and builders want the freedom to choose their rater.
- Builders value third-party testing conducted by energy raters and the assurance it provides that installation is done properly.
- Participants responded positively to the concept of awarding rebates based on a home's percent improvement over local energy code.
- Builders value the rebate offered by the Company and a tiered approach that increases the reward as additional energy efficiency levels are achieved.
- Builders would like assistance communicating the benefits of energy efficiency to homebuyers and specifically suggested a more robust website that helps potential homebuyers find participating builders.
- Participants wanted the Company to design a product that would allow year-round participation.

In addition, the Company serves on the new home construction committee of the Consortium for Energy Efficiency (CEE), which meets regularly and works closely with the EPA. The third-party implementer attends RESNET conferences on behalf of the Company.

Public Service will strive to work with the CEO and other Colorado stakeholders, such as the City of Denver, to continue the product's success, including via consistent messaging.

The Company will continue monthly communications to builders and energy raters, providing year-to-date product updates on participation, achievements and other important product information as it arises.

G. Rebates & Incentives

Builders with qualifying homes are eligible to receive a rebate based on the percent better than local energy code achieved. Additional rebates are available for homes that are ENERGY STAR certified and for installing one, or any combination of, the qualifying appliances. A builder's home must achieve a minimum 10% better-than-code improvement (over their local jurisdiction's building energy code) in order to qualify.

Builder Rebate Levels Based on Percent Better than Local Energy Code

Percent "Better than Local Energy Code"	Rebate
10% - 14.999%	\$200
15% - 19.999%	\$350
20% - 24.999%	\$500
25% - 29.999%	\$650
30% - 34.999%	\$800
35% - 39.999%	\$1,000
40% and higher	\$1,400
ENERGY STAR certified bonus*	\$100

*The ENERGY STAR-certified bonus rebate is only available to combined natural gas and electric homes served by the Company. Gas only or electric only homes served by the Company are not eligible for the bonus rebate. Qualifying homes that earn the ENERGY STAR label are eligible to receive a bonus rebate when the following criteria are met:

- a) The home receives both electric and gas service from Public Service;
- b) The home qualifies for a percent better than local energy code rebate;
- c) The HERS rater has verified the home meets all requirements for the applicable ENERGY STAR certification standard and;
- d) The ENERGY STAR label is applied to the home's electrical breaker box.

For the appliance rebate option, the builder will receive a rebate for installing one or any combination of the qualifying appliances. The appliance rebate option is available to all newly constructed homes served by the Company with combined residential natural gas and electric service. Homes that receive natural gas service only from the Company are not eligible for the ENERGY STAR Refrigerator or Lighting Efficiency product rebates.

Appliance Rebate Levels for Qualifying Homes

Appliance	Rebate
ENERGY STAR Dishwasher	\$10
ENERGY STAR Clothes Washer	\$50
ENERGY STAR Refrigerator	\$10
Lighting Efficiency (minimum 20 CFL lamps)	\$20

Appliance rebates will only be paid to builders for homes that also qualify for a percent better than local energy code rebate. Separate prescriptive rebates offered by the Company for other equipment such as lighting, air conditioners, furnaces, insulation, and hot water heaters are not available for homes participating in the ENERGY STAR New Homes product because the impacts from this equipment are already included in the performance analysis and are reflected within any rebate earned by the participating builder.

➤ Evaporative Cooling

A. Description

The Evaporative Cooling product provides a cash rebate to Public Service's electric customers who purchase high efficiency evaporative cooling equipment for residential use in Colorado.

This product encourages consumers and builders to purchase evaporative coolers rather than less efficient central air conditioning. Through this product, participating Public Service customers benefit by reducing the cost of buying energy-efficient units in addition to experiencing energy savings throughout the lifetime of the equipment. This product not only motivates customers to make energy-wise purchases, but also educates customers on their environmental impact.

Qualifying equipment must be new and be a permanently installed direct, indirect or two-stage evaporative cooling unit. Portable coolers or systems with vapor compression backup are not eligible, neither is used or reconditioned equipment. Customers can replace an existing evaporative cooling or air conditioning unit or purchase a new first-time installed unit to qualify. There are three equipment tiers available for the evaporative cooling product and qualifications include the following:

- *Tier 1:* Qualifying evaporative cooling units having a minimum Industry Standard Rated (ISR) airflow of 2,500 CFM.
- *Tier 2:* Qualifying evaporative cooling units having a minimum Media Saturation Effectiveness of 85% and above. The units must be manufactured with a remote thermostat and a periodic purge water control or have these two features included on the invoice.
- *Tier 3:* Qualifying evaporative cooling units for the whole house must be indirect/directly cooling and be fully ducted in the home with a minimum of four down ducts installed (two at a minimum must be newly installed).

For homes in dry climates, such as Colorado, evaporative cooling provides an experience like an air conditioner, but with significantly less equipment, installation cost and energy use.

B. Targets, Participants & Budgets

Targets and Participants

The target is based on past activity, current market conditions, and projected sales of evaporative coolers. Proposed savings were estimated on a per unit basis using the projected number of participants. However, participation in this product is weather-sensitive. Cooler-than-normal summers result in significant lower participation as customers may forgo their decision to install a unit or choose to delay purchasing a unit if the weather is mild.

Budgets

The budget was developed based on historical and projected participation and the funds needed to promote and administer the product to achieve the associated level of savings.

C. Application Process

Public Service will make customers aware of the product through a variety of sources including bill inserts, sponsorships, events, telemarketing, email, bill onserts, direct mail pieces, the Xcel Energy website, HVAC contractors, builders, retailers, and HERS raters. To participate, eligible customers must submit a completed application with a copy of their invoice or receipt. Customers may self-install the units, provided that the paid sales invoice is included along with the rebate application form. When a customer submits the rebate form with an invoice, it is reviewed for accuracy, ensuring that rebate qualifications are met prior to mailing a rebate check. Invoices or receipts must detail purchased equipment. If the application is for a first time or whole house installation of the evaporative cooler, the customer must provide all receipts for the additional components purchased and/or have these items detailed on the invoice. If the documentation does not meet the first time installation criteria, the application will be processed as a replacement and receive a lesser rebate amount for the qualifying tier.

D. Marketing Objectives, Goals, & Strategy

The main objective of the Evaporative Cooling product is to promote the use of evaporative coolers in place of air conditioning. The product will be promoted through the following strategic marketing efforts:

- Local large and smaller community newspaper advertising and articles City newsletters
- Magazine articles
- Internet digital ads that will track number of page views and “clicks”
- Customer emails
- Employee communication via articles and video monitor displays
- Lifestyle newsletters
- Sponsorships and partnerships
- Event presence and customer outreach education
- Bill onserts (printed on the customer bill pages)
- Contractor education/training/packets to registered contractors in Colorado
- Point of Purchase advertising at big box retailers
- Special customer and contractor bonus incentives
- Social media
- Telemarketing with follow-up direct mail, email, website education

Promotional efforts take place in the spring and summer months when the cooling season is in full swing and also extend into the fall months to extend awareness and offer promotions.

Public Service has partnered with over 500 dealers and over 150 retailers in the state of Colorado who receive our product literature and help to promote the product. Contractors and builders in Colorado are also an essential partner in creating customer awareness of the product, and, thus, will receive information on any product changes directly.

In addition, Public Service utilizes a channel manager to assist with communicating product details to the dealer and distributor channels. Other activities of the channel manager may include: training sessions on product specifics, product related mailings, and overall relationship development and management.

E. Product-Specific Policies

Customers must purchase qualifying units in order to be eligible for a rebate. Units are qualified for the product based on the manufacturer's specifications. Equipment is added to the list of qualifying units as Public Service is notified of their release.

Rebate applications must be submitted by July 31 of the year after installation to qualify for a rebate.

F. Stakeholder Involvement

In order to determine qualifying evaporative cooling equipment, Public Service worked with manufacturers to verify current and new equipment efficiencies and qualifications to meet each tier. The following manufacturers, but not only limited to these, were contacted:

- Champion Manufacturers
- Coolerado Corporation
- Essick Air Products
- Jenrus Corporation
- Phoenix Manufacturer Incorporated
- Seeley International
- Speakman Company
- Symphony Comfort Systems
- Tradewinds

G. Rebate Levels

Three rebate levels are available for the Evaporative Cooling product. For rebate Tier 1 and Tier 2, the program offers a replacement rebate and a first time installation rebate.

Tier 3 customers can earn a rebate for a newly installed whole house ducted evaporative cooling system. Coolers must be permanently installed, direct, indirect, or two-stage evaporative cooling units for customer equipment rebates.

- *Tier 1:* Qualifying evaporative cooling units have a minimum Industry Standard Rated (ISR) airflow of 2,500 CFM. The first time installation rebate amount is the lesser of \$250, or the purchase price of the unit, and replacement rebate is \$100. Taxes and ancillary items, such as hoses, are not covered by the rebate. Retailers and or contractors will receive a \$50 incentive for every approved rebate application received.
- *Tier 2:* Qualifying evaporative cooling units have a minimum Media Saturation Effectiveness of 85% and above. The units must be manufactured with a remote thermostat and a periodic purge water control or have these two features included on the invoice. The first time installation rebate amount is the lesser of \$600 or the purchase price of the unit, and replacement rebate is \$500. Contractors or retailers will receive a \$75 incentive for every approved rebate application received.
- *Tier 3:* To qualify for the whole house rebate, the whole house cooler must be indirect/directly cooling and fully ducted in the home with a minimum of four down ducts installed (two at a minimum must be newly installed). The rebate amount is \$1,000 to the customer. Builders and/or contractors will receive a \$100 incentive for every approved rebate application received.

➤ High Efficiency Air Conditioning

A. Description

The High Efficiency Air Conditioning (HEAC) product comprehensively addresses energy efficiency opportunities related to central air conditioners, air source heat pumps and ground source heat pumps. The HEAC product is comprised of five measures, each meeting a different need in the cooling marketplace.

- **Plan A New Equipment Rebates** – Central air conditioners and air source heat pumps that meet certain energy efficiency standards, as outlined in Section G below, are eligible for a rebate. The goal is to encourage consumers to purchase units that meet or exceed the ENERGY STAR efficiency standard of 15.0 SEER. Equipment must be Air Conditioning and Refrigeration Institute (AHRI) performance-certified at standard rating conditions and have a thermostatic expansion valve (TXV). The TXV improves energy efficiency by matching the flow of liquid refrigerant to the cooling load of the home.
- **Quality Installation** – All Plan A New Equipment rebates must also include a Quality Installation (QI). The QI process is based on standards developed by the Air Conditioning Contractors of America (ACCA) which dictate the steps a contractor must take to ensure a true quality installation. This QI measure, which starts with a load calculation to determine the proper size of the equipment to be installed, helps ensure that the total energy savings potential of newly installed equipment is realized.
- **Plan B Trade-In Rebates** – This measure is intended to motivate homeowners to replace older, lower efficiency residential central air conditioning or air source heat pump units that are still operable. These units may be working well now or may need some capital dollars for repair. Customers will be required to replace them with high efficiency units (14.5 SEER or higher) before the end of the unit's useful life. This measure is expected to bring in new incremental participation that would not have been realized otherwise.
- **Ground Source Heat Pumps** – The Ground Source Heat Pump (GSHP) equipment measure serves a small market niche of consumers who seek out the most highly efficient technology. To be eligible to participate, residential electric customers must purchase and install a unit that is ENERGY STAR certified. The ENERGY STAR certified GSHP's performance criteria are a minimum of 3.3 COP and 14.1 EER. Rebates will be available for GSHPs that are installed as closed-loop systems and are used for both heating and cooling. The rebates are only available for electrically heated homes where natural gas is not in use. This measure will require a similar QI standard as required in Plan A.
- **Western Cooling Control** – The Western Cooling Control (WCC) device effectively increases the capacity of a central air conditioner or air source heat pump unit by capturing cooling energy left in the refrigerant within, as well as the water condensed on, the cooling coil after a cooling cycle has completed. Due to the fact that many newer cooling units have built-in features that provide similar benefits to the WCC device, this measure is available only to customers with units installed in 2009 or

prior. The Company will include some training on the WCC device during a Quality Installation course in 2015.

Participating contractors installing central air conditioners or air source heat pumps must have a technician on staff that holds current North American Technical Excellence (NATE) certification in air conditioning or air to air heat pump installation.

Participating contractors installing ground source heat pumps must have a technician on staff that holds current NATE-certification in ground source heat pump loop installation or accreditation through the International Ground Source Heat Pump Association (IGSHPA).

B. Targets, Participants & Budgets

Targets and Participants

Participation and energy savings levels for this product are based primarily on past product performance in the Colorado marketplace. Approximately 70% of all participants are projected to qualify through Plan B. The HEAC product's tiered SEER levels are designed to move customers beyond the 14.5 SEER level. New rebate tiers are in place for 2015 and 2016. Plan A New Equipment rebates for 14.5 SEER/12.0 EER units are eliminated, while a new tier has been added for 17.0 SEER/13.0 EER units. Although the HEAC product is not cost-effective, it is included in the portfolio to encourage the use of high efficiency air conditioners in the marketplace.

Budgets

The 2015 and 2016 budgets were established primarily based on the costs per participant. The high efficiency equipment rebate begins at a minimum of 15.0 SEER for Plan A and 14.5 SEER for Plan B. Contractors are paid a QI incentive at all SEER levels, further encouraging their support of the product and a financial interest to continue quality installation practices. The budget also includes costs for verifying a percentage of the new equipment installations in the field to ensure they meet ACCA quality installation standards and expected energy savings.

C. Application Process

The application process requires that the customer use a registered contractor with a NATE-certified technician. 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, here: https://www.xcelenergy.com/Save_Money_&_Energy/Residential/Supplemental_Information/Contractor_Legal_Disclosure.

The customer must select a new central air conditioning or air source heat pump system with an overall efficiency of 15.0 SEER or higher for a Plan A New Equipment rebate and 14.5 SEER or higher for a Plan B Trade-In Equipment rebate. All new equipment

installed for this product *must* meet Quality Installation standards to receive an equipment rebate. The system must meet the following requirements to be eligible:

- The equipment, components and/or system must be listed in AHRI's Residential Directory.⁵⁴ This directory is used to identify product classification, determine efficiency ratings, and confirm matched systems. Ductless mini-splits are not eligible for rebates within the HEAC product.
- Multi-stage air conditioning units are eligible for rebates if an earlier matching furnace was installed and is part of the high efficiency air conditioning system per AHRI Residential Directory listings. The homeowner or contractor must supply the furnace model number and serial number on the application and invoice.
- For single-stage systems, the use of a furnace's variable speed fan to increase the SEER rating above the nominal rating will be allowed for determining rebate eligibility, provided that the customer purchased and installed the furnace and air conditioner within two years of each other. The overall furnace and air conditioning rating must be found in the AHRI's Residential Directory.

In order to verify that the equipment has been properly installed, the contractor must bring the system to a steady state and perform QI tests—as specified in the Xcel Energy quality installation guidelines based on ACCA standards.⁵⁵ There is no separate application process for the contractor QI incentive; there is a section within the customer application to indicate the quality installation process is being followed. Testing can only occur when the outside temperature is 67 degrees or higher (or 60 degrees or higher if the FDSi diagnostic tool is used).

Public Service requires that a dated sales receipt/invoice with the following information accompany the rebate application:

- Purchase date
- Equipment manufacturer
- Condenser model and serial numbers
- Evaporator coil model and serial numbers
- Furnace model and serial numbers (if installed simultaneously with a new system or to increase the SEER rating per AHRI listings).
- Size or Capacity
- Efficiency levels
- Customer name and installation address

Additionally for the Trade-In Equipment measure, the following retired (existing) unit information must accompany the rebate application:

- Make, model and serial number of the condenser
- Unit SEER and/or EER rating as given by the manufacturer.

The equipment installation and testing for QI must be completed before the rebate application is submitted for processing by Public Service. All information on the

⁵⁴ <https://www.ahridirectory.org/ahridirectory/pages/home.aspx>

⁵⁵ <http://www.acca.org/quality-standard/qi/>

receipt/invoice must match the information on the rebate application exactly. In addition, the application form will require the name and signature of the NATE-certified technician indicating that the NATE-certified technician has reviewed the new equipment installation on the application. An AHRI certificate, printed in the same year as the installation, must accompany the rebate and invoice for approval.

WCC installations require a separate rebate application. Public Service requires that a dated receipt/invoice with the following information accompany the rebate application:

- Purchase date
- Age of the existing unit
- SEER rating of the existing unit
- Cooling capacity (in tons) of the existing unit
- Customer name and installation address

D. Marketing Objectives & Strategies

The High Efficiency Air Conditioning product seeks to increase demand for and availability of high efficiency cooling equipment and to increase awareness and penetration of the QI process within Public Service's service area. The ultimate goal is to increase energy savings for the customer. To support this goal, Public Service 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, letters and newsletters with regular frequency to keep the trade informed and engaged in the product. In addition, a qualified contractors 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.
- Advertising will include utilizing print, radio and interactive online strategies to increase awareness. Print and radio advertising media plans will target the areas in which Public Service provides service.
- Public Service bill inserts and newsletters will be used to create customer awareness.
- Xcel Energy's website also includes information regarding the product and is updated as needed to more effectively reach customers. This includes information on proper equipment sizing and airflow, product details and where to find qualified contractors. The site also hosts webpages designed specifically for HVAC trade partners to obtain information about the product.

E. Product-Specific Policies

In order to be eligible for a Plan A New Equipment rebate, customers must purchase a qualifying unit. High efficiency equipment rebates will not be paid without QI from an approved contractor. Contractors must have a NATE-certified technician on staff, attend

all required trainings conducted by the Company, follow all program guidelines, and be approved by Public Service. Contractors who do not comply with the product requirements and guidelines are not allowed to participate in the product, including suspensions during the calendar year.

In order to be eligible for the Plan B Trade-In Equipment rebate, the retired (existing) unit must have a SEER of 12.0 or lower. This will be determined by the contractor at the time of removal from the customer's premise. The retired unit information will be included in the rebate application. If the SEER or EER cannot be determined by the contractor, the unit will not be eligible for the rebate.

In order to be eligible for a Ground Source Heat Pump rebate, customers must purchase a qualifying unit. High efficiency equipment rebates will not be paid without QI from an approved contractor. Contractors must have a NATE-certified or IGSHPA accredited technician on staff, attend all required trainings conducted by the Company, follow all program guidelines, and be approved by Public Service. Contractors who do not comply with the product requirements and guidelines are not allowed to participate in the product, including suspensions during the calendar year.

In order to be eligible for the WCC device rebate, the existing air conditioning or air source heat pump equipment must have been installed in 2009 or prior.

F. Stakeholder Involvement

Public Service considers stakeholders for the HEAC product to be the HVAC contractors and distributors, the Colorado Energy Office (CEO), local municipalities within the PSCo service territory, and environmental organizations. Stakeholders will be invited to share their product suggestions during the Company's quarterly DSM Roundtable Meetings. In addition, Xcel Energy is a member of the Consortium for Energy Efficiency (CEE), and monitors and participates in its initiatives related to residential HVAC equipment.

G. Rebates & Incentives

Public Service will pay rebates for the purchase and QI of qualifying high efficiency air conditioning equipment or for the purchase and installation of a WCC device. Plan A New Equipment, Plan B Trade-In Equipment, Ground Source Heat Pump and WCC device rebates are paid directly to the customer, while QI incentives are paid to the contractor. Plan B Trade-In Equipment rebates include the same rebate levels as Plan A New Equipment measures, as well as an additional rebate for the trade-in of the existing unit that is assumed to be functioning or in need of minor repairs. New equipment measures must meet both the SEER and EER standards to receive a rebate under either the Plan A New Equipment or Plan B Trade-In Equipment rebate options. The rebate is paid according to the lesser value of the SEER/EER. The following tables describe the customer rebate and contractor incentive levels available.

Plan A New Equipment and Plan B Trade-In Equipment with QI Rebate Levels

Equipment Tier	SEER	EER	Plan A New Equipment Rebate*	Plan B Early Retirement Rebate*	Total Customer Rebate Available*	Total Contractor QI Incentive*
	13.0	below 12	\$0	\$0	\$0	\$50
	14.5	12.0	\$0	\$500	\$500	\$50
Tier 1	15.0	12.5	\$350	\$500	\$850	\$50
Tier 2	16.0	13.0	\$500	\$500	\$1,000	\$50
Tier 3	17.0	13.0	\$650	\$500	\$1,150	\$50

*Rebates and incentives are dependent on contractor participation/acceptance into the Public Service product and contractor following QI guidelines.

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 negotiate with the homeowner as to who will receive the rebate. The QI incentive is paid to the contractor on submittal and approval of a completed application signed by the customer.

Western Cooling Control Rebate Level

Eligible customers can receive a \$35 rebate for a WCC device installation onto an existing unit.

Ground Source Heat Pump Rebate Level

Eligible customers (electrically heated homes where natural gas is not in use) can receive a rebate for GSHPs with QI as closed-loop systems used for both heating and cooling.

Ground Source Heat Pump Rebate Levels

GSHP Application	Rebate/Ton	Average Tons	Average Total Rebate*
Existing Homes	\$300	3.4	\$1,020
New Homes	\$300	6.0	\$1,800

* Rebates are dependent on contractor participation/acceptance into the Public Service product and contractor following QI guidelines.

Customers who receive a rebate through another Public Service DSM product (e.g., Home Performance with ENERGY STAR 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.

Rebate applications must be submitted by July 31 of the following year after purchase and installation to qualify for a rebate.

➤ Home Energy Squad®

A. Description

The Home Energy Squad product offers installation services and discounted equipment costs to customers who seek to improve their homes' energy efficiency, increase their comfort, and lower their utility bills. The Company seeks to expand the market for Home Energy Squad based on a successful track record implementing the product in other jurisdictions.

The Home Energy Squad product installs a number of moderate-impact, low-cost measures for combination gas and electric, and electric-only, customers. The product seeks to assist customers in overcoming barriers related to making energy improvements. Such barriers include confusion on which products are right for their home, product cost and payback, and finding qualified installers.

The main product offerings include:

- Electric conservation measures:
 - Compact fluorescent light (CFL) bulbs of various wattages
 - Installation of new, or temperature setback of existing, programmable thermostat (primarily leading to cooling electric savings in summer months)
- Electric conservation measures, available for customer purchase:
 - LED bulbs or fixtures of various wattages
 - Power control timers for TVs & electronic accessories
- Gas conservation measures:
 - High efficiency showerheads
 - Low flow sink aerators
 - Installation of new, or temperature setback of existing, programmable thermostat (primarily leading to natural gas heating savings in winter months)
 - Weather-stripping of one external door
 - Insulation blanket for hot water heater
 - Temperature assessment and setback of water heater
- Gas conservation measures, available for customer purchase:
 - Weather-stripping of an additional door
 - Installation of second programmable thermostat

This product offers the delivery and installation of energy conservation measures bundled within one package with flat pricing. The price covers the cost of the measures; Xcel Energy pays for the labor. Customers also can purchase additional measures that are priced individually.

B. Targets, Participants & Budgets

Targets and Participants

The product participation and savings targets were developed based on Colorado residential market size and experience with similar products in Xcel Energy's other jurisdictions.

Budgets

Budgets were determined by evaluating vendor cost estimates and potential participation levels in Colorado, and historical product expenses in other Xcel Energy jurisdictions. Spending for advertising, promotion and outreach generate awareness, interest and participation in targeted areas. Primary budget drivers are:

- *Administration* – program administration costs for third-party implementation and the installation of energy efficient measures in customers' homes.
- *Advertising and Promotion* – print, radio, broadcast, direct mail, interactive media and event promotion.

C. Application Process

During an in-home visit, the Home Energy Squad technician will work directly with customers to determine which energy-saving measures will make their home more energy efficient. Customers pay a trip charge (in the range of \$75–\$125) and receive a suite of energy-saving items such as CFL bulbs, high efficiency showerheads and aerators, etc. The installation labor and materials are included in the trip charge, and therefore they immediately begin saving energy and money. The Home Energy Squad trade partner reports the installation of energy-saving measures to the Company, and, therefore, the customer does not need to submit a post-project rebate application.

D. Marketing Objectives & Strategies

This product, and its approach to direct installation of measures in residential customer homes, is new to the Colorado market. Therefore initial marketing objectives will be focused on building awareness and product interest, and driving initial customer participation.

Marketing strategies and tactics will include mass media advertising, online interactive, email, neighborhood canvassing, telemarketing, local-market advertising and special promotions. Participating trade partners will also be an important means to building product awareness, referrals and participation. Customers who have completed a Home Energy Audit but have not taken action on the recommendations may be a good fit for cross promotion of Home Energy Squad's energy-saving measures and services.

E. Product-Specific Policies

A Home Energy Squad participant must be a combination gas and electric, or electric-only, customer. Initially the Company may target more-concentrated neighborhoods in the Denver Front Range area until proof of concept is achieved. PSCo will connect customers with participating contractors to begin the product engagement.

The Company will share technical assumptions with other residential products such as Home Lighting & Recycling and Energy Efficient Showerhead to consistently report measure costs and energy savings.

F. Stakeholder Involvement

The Company will partner with its existing array of customer and trade stakeholders regarding program design and introduction, awareness building and ongoing product feedback. This may include partnering with other gas utilities where PSCo is the electric-only provider.

G. Rebates & Incentives

A customer co-pay, in the range of \$75 to \$125, will be required to receive the direct-installed energy-saving items such as compact fluorescent light bulbs, high efficiency showerheads, etc. This process differs from most prescriptive rebate programs where the customer submits a rebate application after equipment is installed and operational. Home Energy Squad trade partners will report the installed measures to the Company, and 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 dispose of them in an environmentally-friendly manner. Compact fluorescent light (CFL) and light-emitting diode (LED) bulbs are an easy way for customers to save electricity. Public Service provides an avenue for customers to purchase discounted energy efficient bulbs through local retailers. For recycling, customers can recycle CFLs free of charge through Ace Hardware.

Bulb Discounts

Public Service motivates customers to purchase CFLs and LEDs by offering in-store retail discounts. The discounts are provided through Company collaboration with the bulb manufacturers and retailers. The three entities combine resources to offer instant rebates enabling customers to purchase a variety of energy efficient bulb models at a discounted price. Public Service partners with retailers such as Home Depot, Walmart, Costco, Ace Hardware, and King Soopers. Customers receive the discounted price at the register. There is no mail-in rebate form.

In 2015 and 2016, Public Service will focus on increasing the awareness and sales of LED bulbs, placing less emphasis on standard CFL bulbs that have higher saturation rates in the market. The percentage of LED bulbs being discounted via the Home Lighting product is projected to double from 13% in 2014 to 26% in 2015, reaching 33% in 2016. It is important to build the market and usage of LEDs because the Company plans to discontinue CFL incentives in 2017. Increasing the pipeline for LED participation helps:

- to minimize the gaps in energy savings during this transition time.
- customers who were unwilling to adapt CFLs, save energy by using LED technology.
- to educate consumers and minimize confusion in the marketplace regarding LEDs, CFLs and halogen options.

As a result of the 2007 Energy Independence and Security Act (EISA) standards shift, the Company's use of a blended halogen-incandescent baseline for both LED and CFL installations has been fully transitioned to use a halogen bulb for EISA impacted bulbs starting in 2015. The baseline shift from the incandescent bulb in 2012 to the halogen bulb used in 2015 has reduced savings by 30%. The net-to-gross (NTG) ratio is 70% for CFLs and 100% for LEDs. Market saturation and the NTG ratio application for CFLs continues to decrease product impacts, reducing the energy savings claimed by PSCo by an additional 30% on top of the EISA impacts. Any further reduction in the NTG ratio would increase product costs and thereby reduce cost-effectiveness. The Home Lighting & Recycling product has planned a comprehensive evaluation in 2015, which is anticipated to shed light on actual market penetration of CFLs and LEDs, among other analyses.

The chart below demonstrates the increase in costs and the reduction in savings for the product over the past six years. Public Service anticipates this trend continuing into the future.

Year	CFL NTG	Average kWh per Unit	Average Rebate Cost per Unit	Rebate Cost per 100 Net Gen. GWh
2011	90%	48	\$0.98	\$ 2,024,793
2012	85%	44	\$1.34	\$ 3,073,394
2013	85%	40	\$1.36	\$ 3,421,384
2014*	70%	23	\$1.76	\$ 7,652,174
2015*	70%	22	\$2.67	\$ 12,136,364
2016*	70%	22	\$2.82	\$ 12,818,182

*Savings and costs for 2014-2016 are estimated.

Recycling of CFLs

The CFL Recycling component of the product provides an environmentally-friendly method for customers to dispose of CFLs. Public Service maintains a partnership with Ace Hardware to serve as the retail arm for CFL recycling. Customers can bring spent CFLs to any Ace Hardware store throughout the state 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. Public Service covers the cost to ship and recycle the bulbs that are submitted for recycling at participating retailers within the Company's service territory.

B. Targets, Participants & Budgets

Targets and Participants

The energy savings target for the product was derived by analyzing the market potential and historical sales data, with considering new technologies, market potential, available retail channels and participating customer segments. All Public Service electric customers are eligible to participate in the Home Lighting & Recycling product.

Budgets

The 2015 and 2016 the Home Lighting & Recycling budgets have increased significantly from previous years due to increased energy savings potential and increased incentive costs for LED bulbs. Although the costs of LEDs have dropped over the past few years, LEDs continue to be much more expensive when compared to CFLs. The incremental costs of LED bulbs are 11 times higher than CFLs when including a-line and specialty models in the analysis. The rebate cost per kWh for CFLs is \$0.06 and for LEDs its \$0.18 per kWh—three times more expensive. Public Service has worked hard to control administration and advertising costs for the product, with administration costs remaining consistent with 2014 expenditure levels. Despite these efforts, the overall 2015/2016 budgets have increased significantly due to the cost of LED incentives (82% of the product costs in 2015 are for incentives, versus 75% in 2014). LED bulb costs will

continue to decline, but as higher cost 100 Watt- and 75 Watt-equivalent LEDs become more widespread, the over average cost of LEDs may increase.

C. Application Process

Customers do not need to apply to participate in the Home Lighting & Recycling product. Public Service works with retailers and manufacturers to provide a discounted price on bulbs through upstream incentives. The incentive varies depending on the type of bulb and the manufacturer/retailer partner. The customer receives the discounted price at the cash register. 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, persuade them to try using LEDs, and encourage them to recycle CFLs when they burn out. Public Service will focus most of the advertising on building awareness and sales of LED bulbs in 2015 and 2016. The Company will promote the product through various media channels which may include television, radio, in-store signage, publications, bill inserts, local events, and on the Xcel Energy website. The peak sales period for CFLs is in the fall and winter, as such, promotions are focused during these peak time periods.

Public Service uses an RFP process each year to select participating retailers and endeavors to enable partnership with a variety of retailers (including big box, mass merchandiser, and hardware and grocery outlets) to ensure optimal pricing and to help reduce free-ridership.

CFL Recycling is marketed locally through the local retail partner, Ace Hardware. The Company also markets recycling through CFL and LED promotions and through the Xcel Energy website.

E. Product-Specific Policies

To ensure optimal performance of the discounted bulbs, Public Service requires all discounted bulbs to be ENERGY STAR-certified.

Public Service selects retailers within the Colorado service area and assumes that the customers purchasing the discounted bulbs live within the given area. Although there may be crossover sales with bordering utilities' territories, the Company assumes that the crossover coming in and out of the territories is equal.

The third-party implementer will be responsible for delivering the calculated savings, actual high efficiency product prices, and the types and quantities sold each year to be used in the DSM Annual Status Report.

Public Service currently uses a third-party implementer for CFL recycling. The selected implementer is known to be the best in industry because they separate 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

Xcel Energy collaborates with several organizations to monitor and incorporate best practices into lighting product design. These activities include: serving on Consortium for Energy Efficiency's lighting committee,⁵⁶ participating annually in the national ENERGY STAR Lighting meeting, and interfacing and working with E-Source, the American Council for an Energy-Efficient Economy (ACEEE), the U.S. Environmental Protection Agency, and the U.S. Department of Energy.

G. Rebates & Incentives

The upstream markdown incentives account for 30% to 70% of the incremental cost, depending on the bulb. The cost savings are passed on to the customer as an instant rebate.

⁵⁶ CEE, Committee Work: <http://www.cee1.org/content/committee-work>.

➤ Home Performance with ENERGY STAR

A. Description

The Home Performance with ENERGY STAR (Home Performance) product is targeted for existing single-family homes that are in need of multiple energy efficiency improvements. By providing these customers with rebate incentives, Public Service is able to incorporate a whole house approach to energy efficiency. In order to participate in the product, all qualified Public Service customers must receive either both natural gas and electric service, or have electric service only with electric heat.

Home Performance was developed using principles from the nationally recognized ENERGY STAR® “Home Performance with ENERGY STAR” product.⁵⁷ The concept of the product is to provide the customer with one-stop for all of their home efficiency needs. In this comprehensive approach, the customer receives an energy audit; the audit is then used to generate a scope of work. The contractor, who may also be the auditor, reviews the recommended improvements, completes the work, and receives an independent verification of the improvements after completion.

This product leverages the Company’s Home Energy Audit offering, requiring an advanced in-home blower door audit as the first step in the process for product participation. After the customer completes the audit and meets the product eligibility requirements, the customer may sign up to participate in Home Performance. Customers must achieve at least a 20% energy reduction in their home energy consumption by implementing qualifying savings improvements to earn rebates.

Contractors interested in performing installations are required to hold current certifications in one of the following: BPI Building Analyst, BPI Envelope, BPI Heating, BPI Residential Building Envelope Whole House Air Leakage Control Installer or Crew Chief, and/or NATE certification (with the exception of evaporative cooling and water heaters, which don’t require a certified contractor). Trade contractors must also complete the Home Performance contractor training – which takes approximately five hours to complete. The primary focus of the training is to provide contractors with information on the product components, how the process works, and the diagnostic testing required as part of the efficient measure installations. All participating contractors must sign the contractor agreement before providing installs for participants in the product. Once contractors have completed this training, they will be included on the approved contractor list, which is included in the customer packets and on the Xcel Energy website, here: http://www.xcelenergy.com/Save_Money_&_Energy/Residential/Supplemental_Information/Contractor_Legal_Disclosure.

⁵⁷ Learn more about EPA’s Home Performance with ENERGY STAR:
https://www.energystar.gov/index.cfm?Fuseaction=hpwes_profiles.showSplash&s=footer

B. Targets, Participants & Budgets

Targets and Participants

The product targets were developed based on the 2013 product results and performance of similar products in Xcel Energy's other service territories. The product experienced significant challenges in 2009 through 2011 due to a poor economy, high costs of participation, and the complexity of the offering. In 2012, the product was redesigned to remove market barriers and simplify the process for customers to participate which resulted in rapid participation growth.

Budgets

The budget for this product is based on the 2013 and 2014 expenditures to-date, third-party implementer costs, and software costs, including measurement and verification inspections, as well as the cost to promote the product through print advertising and collateral. Both cooling and attic measures will include a trade incentive rebate as well.

C. Application Process

Customers interested in participating in the Home Performance product must begin by requesting a Home Energy Audit with blower door test. The auditor will provide information on the Home Performance product as part of their in-home audit, tying specific product requirement information and recommendations to the audit. The customer may then sign up for the product the day of the audit by mailing in the sign up card..

Once a customer has submitted the sign up card, they have one year to complete the required and optional equipment installs. The customer then completes the recommended improvements and works with their contractor to submit the rebate form. Participating contractors will be required to have their first five installation jobs inspected and verified by a third-party implementer. After the first five jobs, a random sample of 10% of the contractor's jobs will be inspected and verified.

The Home Performance product information, product information, and approved contractor list are available on Xcel Energy's website, here: http://www.xcelenergy.com/Save_Money_&_Energy/Rebates/Home_Performance_with_ENERGY_STAR - CO. Customers can receive applications through their registered and approved contractor only. Customers may also contact the Residential Customer Care center (1-800-895-4999) to request product information or guidance on how to obtain rebates.

D. Marketing Objectives & Strategies

Public Service will implement a variety of marketing strategies to provide product information through the website, bill onserts, targeted mailers, and local “green” community events. Incentives will be provided to trade partners for identifying participants that may not be aware of the “whole house option” through Home Performance.

The Home Performance product will be marketed through the Company’s Home Energy Audit promotions directly to customers, and approved Home Performance participating contractors. Public Service will monitor product participation on a monthly basis and implement additional marketing tactics if necessary to achieve the year-end target.

In addition, Public Service will attempt to fully 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, Public Service is offering incentives to participating installation contractors that are designed to increase the number of projects performed. These incentives are designed to provide contractors with additional motivation to promote the Home Performance product.

E. Product-Specific Policies

The Home Performance product requires that customers have either a standard Home Energy Audit with blower door test, or an Infrared Audit performed in order to qualify for participation. The audit is required prior to starting the improvements. Customers are eligible for a Home Energy Audit every two years. Public Service 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. Public Service shall have no liability for contractor work or negligence.

To complete the product and be eligible for the rebates, customers must agree to achieve a 20% reduction in their home’s energy consumption. The customer must complete air sealing, attic insulation, wall insulation, and CFL/LEDs as part of their improvements if they have not made these upgrades previously. The customer will receive rebates for improvements completed and verified by the auditor within one year of signing up under the Home Performance product. The Company will not rebate pre-existing efficient equipment.

F. Stakeholder Involvement

Public Service periodically meets with the Cities of Boulder, Fort Collins, Greeley, and Colorado Springs, the Center for Resource Conservation, the Platte River Valley Authority, the Colorado Energy Office, the U.S. Environmental Protection Agency, the U.S. Department of Energy, Electric & Gas Industries Association, and the Energy Efficiency Business Coalition (EEBC) for product feedback. The Company plans to continue meeting with these organizations, and other stakeholders, for feedback to improve the product.

Additionally, Public Service is an active member of Affordable Comfort, Inc. (ACI)—a leading educational resource for the Home Performance industry; and has an active partnership with the Building Performance Institute (BPI)—a national standards development and credentialing organization for residential energy efficiency retrofit work.

G. Rebates & Incentives

Home Performance product rebates are prescriptive and based on the specific measures installed. Rebate levels are enhanced when compared to rebates offered for similar measures in the Company's related DSM products to encourage customers to pursue whole-home improvements instead of individual upgrades. The rebate levels are provided in the following table.

Rebates for Home Performance Measures

Improvements	Prescriptive Rebates
Attic Insulation*	30% of incremental costs, fixed cap at \$550
Air Sealing, Bypass Sealing & Weather-stripping*	25% air leakage reduction- <u>Up to \$100</u> 33% air leakage reduction- <u>Up to \$160</u>
High Efficiency CFLs or LEDs*	\$2/per bulb up to \$40
Wall Insulation (above grade)	\$800
Evaporative Cooling – Standard System (1 st)	\$275
Evaporative Cooling – Standard System (Replace)	\$125
Evaporative Cooling – Premium System (1 st)	\$625
Evaporative Cooling – Premium System (Replace)	\$525
Evaporative Cooling – Whole House System	\$1,000
Central AC 15 SEER, EER 12.5	\$400
Central AC 16 SEER, EER 13	\$550
Central AC 17 SEER, EER 13	\$700

Central AC Trade-in	\$550
Ground Source Heat Pump	\$300 per ton up to \$1500
Electric Heat Pump	\$550
Programmable Set Back Thermostat	\$25
95% AFUE or higher High Efficiency Furnace	\$200
Electrically Commuted Motor	\$200
Tankless Water Heater .90 EF or higher	\$200
Water Heater .67 EF or higher	\$100
ENERGY STAR Refrigerator/Primary	\$15
ENERGY STAR Dishwasher	\$10
ENERGY STAR Clothes Washer	\$50

*If any of these three measures are a recommended improvement from the Home Energy Audit, they must be completed in order to participate in Home Performance with ENERGY STAR.

➤ Insulation and Air Sealing Rebate

A. Description

The Insulation and Air Sealing Rebate product offers rebates for installing insulation and air sealing measures in existing single-family homes or one-to-four unit properties; Eligible customers include residential electric and natural gas customers within the Public Service territory and with combination service, gas-only or are electrically-heated in our Colorado service territory.

Public Service will rebate the following types of qualifying installations:

- Attic insulation (where existing is R-19 or less) to an R-value of 40 or greater;
- Attic insulation (where existing is R-20 or more) to at least R-25 higher than existing;
- Wall insulation to an R-value of 13 (where existing is an empty wall cavity); and/or
- Air sealing, bypass sealing and weather stripping (required with insulation applications unless the home is 0.45 NACH (Natural Air Changes per Hour) or better).

B. Targets, Participants & Budgets

Targets and Participants

Target energy savings and participation was derived using housing characteristics determined from a third-party analysis of 349 homes, and recent product performance history. The Company anticipates approximately 85% of homes participating will require air sealing. Public Service has split the air sealing measure into three tiers based on the percent of savings they provide. The savings for air sealing measures are calculated using the same baseline home compared against the anticipated average savings within each tier:

Air Leak Measure Tiers	Minimum Percent Savings to Qualify	Estimated Therm Savings Per Home
Tier 1	10%	6.20 therms
Tier 2	25%	12.7 therms
Tier 3	33%	21.5 therms

Budgets

Budgets were based on 2013 and 2014 product performance. The Colorado heating market was also analyzed for typical insulation costs including materials, blower door testing costs and installation costs. The air sealing incremental costs include allocating the cost to the customer for bypass attic air sealing, weatherization and envelope, as well as additional cost of blower door testing. M&V costs are based on a percentage of the

installations to ensure they meet quality installation standards and achieved the expected energy savings.

Typically, this product is promoted through Xcel Energy's website and newsletters, communications to local area insulation contractors, and via community events and by consumer education. For that reason, historically the product has required little budget for promotion and marketing purposes. Some budget dollars have been allocated for contractor trainings and educational opportunities for the trade community.

C. Application Process

The application process requires that the customer use a registered BPI (Building Performance Institute, Inc.) certified contractor. Qualified insulation contractors must be fully licensed, bonded, insured with BPI Analyst, Envelope or Residential Whole House Air Leakage Control Installer or Crew Chief certifications. All registered contractors must also be listed on our trade partner website, here: [http://www.xcelenergy.com/Save Money & Energy/Residential/Supplemental Information/Contractor Legal Disclosure](http://www.xcelenergy.com/Save_Money_&_Energy/Residential/Supplemental_Information/Contractor_Legal_Disclosure). These contractors have agreed to the terms of Xcel Energy trade partner's agreement and meet the requirements related to quality installation practices per BPI.

Qualified customers must complete a rebate application, which is available only by contacting the customer's selected (and Company-approved) insulation contractor. Air sealing and weather-stripping are required for each install, unless the home meets the 0.45 NACH threshold. Pre- and post-blower door results in CFM 50 are required for all projects, with the exception of a home that meets the 0.45 NACH value. Customers must provide Public Service with a copy of their dated invoice reflecting the qualified installation performed. Qualified installs will be processed accordingly by the rebate operations team and checks issued within six to eight weeks. Public Service will issue the rebate directly to the customer, but the rebate form may be submitted through the insulation contractor.

D. Marketing Objectives & Strategies

The Insulation and Air Sealing Rebate product will be marketed through a variety of channels such as the Home Energy Audit, the Xcel Energy website, direct mailings to local area BPI-certified insulation contractors, and environmentally-focused community events. The Company will support this overall marketing strategy with seasonal bundled direct mail efforts, social media, blogs, newsletters and bundled winter onserts to targeted customers. Historically, this strategy has worked well when implemented during the key heating months of December, January, and February, and during summer months to highlight cooling benefits.

Additionally, the Company will incorporate communications activities to local insulation contractors so they can educate qualified customers on how they can benefit from this

rebate. By collaborating with Public Service on outreach to our customers, local contractors may be able to drive more customers to commit to quality assured insulation installations.

Finally, the Company will initiate cross marketing efforts with our other natural gas rebate products. An example of this could be a winter bill onsert that outlines existing rebate and energy efficiency products available to natural gas customers of Public Service. This strategy has proved successful in the past.

E. Product-Specific Policies

To qualify, all projects must fall within the pre- and post-installation R-values set forth for both attic and wall insulation, as well as achieve a 10% minimum energy reduction through air sealing (unless the home meets a 0.45 NACH threshold). Qualified insulation contractors must be fully licensed, bonded, and insured with BPI Analyst, Envelope or Residential Whole House Air Leakage Control Installer or Crew Chief certifications. Self-installations, or installations done by contractors without the BPI certifications listed above, do not qualify for rebates.

All projects are required to perform a pre- and post-blower door test for rebate eligibility, following these requirements:

- Testing using CFM 50 on all projects, unless the pre-blower door test reaches the air tightness threshold of 0.45 NACH.
- Each specific insulation efficiency measure must have the corresponding building shell air sealed.
 - Air sealing is required every time there is insulation installed. Air sealing must be done first.
- If the home is already air sealed, it may receive an insulation rebate only, if the pre-blower door result is equal or better than 0.45 NACH.
- A minimum 10% building envelope air leakage reduction is required unless the building envelope is already air sealed or significantly air tight as described above.

This product excludes new residential construction, new residential additions, insulation of doors, garages, sheds, workshops, below-ground basements, mobile homes, projects with pre R-values of 40 or greater, and 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. Air sealing and weather stripping must follow industry-accepted practices for mitigating air leakage. A combustion appliance zone (CAZ) test check box is included on the rebate application—contractors are required to acknowledge that the testing was completed and/or note a recommendation for CAZ testing to be performed by an HVAC contractor. Public Service reserves the right to inspect installations before issuing a rebate. Rebates will not be issued if the same purchase has already been rebated through other Public Service rebate products, such as

through the Home Performance with ENERGY STAR Product. Customers are eligible for one rebate per calendar year.

F. Stakeholder Involvement

The quarterly DSM Roundtable Meetings provide a forum for stakeholder involvement and feedback regarding this product, as well as the full portfolio of Public Service's DSM products. Public Service continues to conduct meetings with interested trade partners and stakeholders to improve this product, particularly around the issues of quality assurance and air sealing requirements. Public Service also met with other local non-profits and utilities who offer rebates and educational efforts for home insulation in Colorado. Public Service will continue to engage stakeholders in garnering product feedback.

G. Rebates & Incentives

The product will provide a rebate equal to 30% of the total cost of the insulation/air sealing and installation up to a maximum rebate of \$500 per customer per natural gas or electric meter.

Rebates will be offered on a one-time only basis, per calendar year. Public Service will not provide additional rebates through this product for future insulation or air sealing installs at the same residence unless the owner implements additional qualified installs.

➤ Refrigerator and Freezer Recycling

A. Description

Public Service's Refrigerator and Freezer Recycling product strives to decrease the number of inefficient refrigerators and freezers in use, and by doing so, deliver electric energy savings and peak demand reduction. The product is designed to reduce energy usage by allowing customers to dispose of their operable, inefficient primary refrigerators, secondary refrigerators, and freezer units in an environmentally safe and compliant manner. Eligible customers include residential electric customers in the Company's Colorado service territory. Customers with qualifying units will receive an incentive for their participation in this product and will not be directly responsible for any costs associated with pick-up, transportation, disposal, and proper recycling of their refrigerator. Public Service will use the services of a qualified vendor to perform the following:

- Refrigerator/Freezer collection, transportation and storage;
- Verification of eligibility of refrigerator/freezer 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 vendor 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 Public Service's grid.

Customers will also receive two 13-watt Compact Fluorescent Lights at the time of unit collection.

B. Targets, Participants & Budgets

Targets and Participants

Energy savings and participation targets for this product were developed based on historical product performance, as well as projections using annual harvest rates, which is a unit of measurement to determine a segment of the population that would qualify for the recycling program, projected by the Company's third party implementer using program modeling.

Budgets

The Refrigerator and Freezer Recycling product budget was developed based on forecast participation. Recycling-related expenditures account for approximately 40% of the

overall budget. The projected rebates account for nearly 30% of the budget. Marketing, M&V, and labor expenses make up the remaining expenses.

C. Application Process

Customers will either call-in to the third-party implementer's toll-free service number (866-552-8755) or schedule this service online, here: <http://responsiblebynature.com/choices/refrigerator-and-freezer-recycling>. The vendor will ask qualifying questions in order to minimize costs and maximize customer satisfaction. The vendor will schedule an appointment and will be required to pick-up the refrigerator no later than 10 business days after the customer's requested pick-up date. Customers will be called and mailed a letter one to two days prior to their scheduled pick-up date in order to confirm their appointment and remind them to turn on their refrigerator and make sure it is empty. Customers will receive their incentive check within six to eight weeks after their refrigerator has been picked-up by the vendor.

D. Marketing Objectives & Strategies

The product will be available to customers year round; however, the marketing strategy will utilize spring and fall campaigns to promote the product.

The target market consists of customers who are disposing of their primary (usually located in the main kitchen) or second 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 projects. Deployment of our promotional tactics will coincide with these seasonal time periods.

Public Service will utilize several marketing channels for this product, including bill onserts, Company newsletter/blog, radio, social media, and the Xcel Energy website. Additional tactics may include door hangers, sweepstakes or promotional incentives, depending on targets. Similar marketing opportunities exist with other Public Service products such as Home Performance with ENERGY STAR and some of the low-income weatherization products. Targeted direct mail and telemarketing tactics may also be used. Call Center agents will direct any customers inquiring about this product to contact the vendor using their toll free number or website.

E. Product-Specific Policies

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

- Must be an operational primary or secondary refrigerator unit or a standalone freezer. “Operational” is defined as in working order. Refrigerators must be capable of freezing 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 call from the vendor, reminding them to do this). This is to ensure full operation (cooling/freezing and the ability to make ice; freezing capability if a freezer) when inspected at the time of pick up.
- Appliances must be no smaller than 10 cubic feet or no larger than 30 cubic feet.
- There will be a limit of two freezers and/or refrigerators per household. (The maximum rebate per household in a given program year is \$100).

F. Stakeholder Involvement

Xcel Energy is a proud partner of the U.S. Environmental Protection Agency's (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.

Xcel Energy has been responsibly recycling appliances for many years. The Company's voluntary participation in the RAD Program further underscores commitment to helping customers make responsible technology and appliances 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 a \$50 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. The \$50 incentive is on par with many similar programs in the U.S.

In addition to the \$50 incentive, customers will receive the benefit of energy savings, which on average is equal to about \$100 annually; as well as two 13-watt Compact Fluorescent Lights at the time of unit collection.

The maximum rebate per household in a given program year is \$100.

➤ Residential Heating

A. Description

The Residential Heating product provides an incentive in the form of a cash rebate to Public Service's natural gas customers who purchase high-efficiency heating equipment, including furnaces and electronically commutated motor (ECM) furnace fans for residential use.

This product dedicates resources toward increasing energy efficiency in residential homes by encouraging consumers to purchase high efficiency furnaces. Public Service customers benefit by receiving a reduced cost for energy efficient units, in addition to experiencing energy savings throughout the lifetime of the equipment. In making a purchase decision, consumers can check with Public Service or a registered Heating, Ventilating and Air Conditioning (HVAC) contractor participating in the product to ensure all minimum qualifications exist with the chosen system to obtain a rebate. Public Service allows customers to choose a registered heating system contractor or installer. Trade partners must have at least one North American Technician Excellence (NATE) Gas Heating certified technician to register and participate in the Residential Heating product. A list of registered trade partners can be found in the Xcel Energy Trade Partners Resource Center, here: http://hvacreducation.net/xcel-co/public_search.cfm

The product is applicable only for the purchase of qualifying new furnaces and ECM furnace fans installed in new or replacement applications. Rebates are offered for a minimum furnace efficiency of 95% Annual Fuel Utilization Efficiency (AFUE). The Company previously offered rebates for 85% AFUE boilers, but these rebates are being eliminated in 2015 because they are not cost-effective due to the higher incremental equipment and labor costs of installing condensing boilers.⁵⁸

B. Targets, Participants & Budgets

Targets and Participants

Targets were developed based on 2013 and partial-year 2014 participation and energy savings trends, and experience with similar products in Xcel Energy's other jurisdictions. Total participant and savings targets for this product are similar to 2014 targets and will remain consistent from 2015 to 2016.

Budgets

Budgets were developed based on the cost per participant from 2013 and partial-year 2014 product results. Budget dollars are focused on rebates for residential furnaces and ECMS. The budget also includes costs needed to engage the HVAC contractor base in

⁵⁸ The Company will honor rebates for 85% AFUE boilers purchased prior to the 2015/2016 DSM Plan approval, where invoices are submitted by July 31, 2015.

order to serve the customers in the territory, and assist trade partners in obtaining NATE Gas Heating Certification via classroom training and testing. Building participation among the contractor community is essential to the success of this product. The budget includes promotional costs for newsletters and informational letters to the contractor community to build their awareness so they can assist customers with purchasing energy efficient units and submitting the rebate application to Public Service once installation is complete. The budget also contains contingency funding, to be used if needed, to further incentivize HVAC contractors to influence product participation—on a fixed reward basis per rebate application. In the recent past contractor incentives have helped to increase customer participation during months where heating systems sales are slower; this tactic has been utilized throughout Xcel Energy’s service territories.

C. Application Process

Customers learn about the Residential Heating product primarily through the Company’s website content, bill messaging, advertising, mailings, and the HVAC contractor community. The typical sales cycle begins with a customer hiring a registered trade partner, learning about energy efficient models, and purchasing and installing the unit. Following installation, the customer or trade partner submits a completed Public Service 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 Public Service account number, mailing address if different from installation address, customer signature, trade partner signature and the unit’s efficiency level.

Equipment eligibility is determined by using the Air Conditioning and Refrigeration Institute (AHRI) Directory of Certified Product Performance,⁵⁹ Xcel Energy personnel review each application and verify that all the required data has been provided as well as the unit’s energy efficiency level. Rebates are typically mailed within four to six weeks.

D. Marketing Objectives & Strategies

The Residential Heating product’s primary objective is to increase demand for high efficiency heating equipment among Public Service customers, and through consumer demand, assist the overall effort to increase the availability of high-efficiency heating units in the marketplace. Another objective is to help Public Service customers save energy with their heating needs and understand the immediate and long-term value of purchasing and installing high efficiency equipment.

⁵⁹ <http://www.ahridirectory.org>

Residential heating and residential HVAC systems typically have a short- to medium-term sales cycle. Public Service uses the following marketing communications strategies to make customers aware of the Product:

- Print and online banner advertising (radio on contingency basis). Advertising is an effective way to reach a broad audience. Banner advertising will be strategically placed on local popular news and weather sites, in addition to local larger print newspaper sites. Print advertising media plans will include the larger print papers serving the metropolitan areas, and print papers in smaller cities and other parts of the state.
- Public Service bill messaging. Bill messaging is timed according to appropriate seasons for the equipment. Typically, heating season promotion begins as early as July to coincide with the busy summer trade season when heating and cooling equipment is being replaced or installed simultaneously in customer homes. Bill messaging for high efficiency heating equipment has also proven to be effective in the spring, when winter has ended and customers have had recent experience with high heating bills.
- Xcel Energy website. The website contains heating-related pages targeted to both customers and energy partners—installers, contractors and distributors. The pages are updated according to equipment efficiency changes and available promotions. The rebate schedule is always available on these pages, along with links to related pages or to forms and collateral.
- Trade Relations Manager. Public Service utilizes a trade relations manager to communicate product details to the contractor and distributor channels (i.e. trade community) and conduct training sessions on product specifics. The Company will also participate in appropriate tradeshows and presentations related to heating.
- Trade Community. The primary promotional channel is the trade community. Training, meetings, telephone calls, letters and newsletters with quarterly frequency keep the HVAC trade informed about the product and help to increase awareness among new contractors. Contractors are required to register with Public Service as a product participant and obtain contractor ID numbers, and are required to acquire NATE Gas Heating Certification. This number is a unique identifier and helps with trade promotions internally.

E. Product-Specific Policies

Eligibility requirements for participation include having a residential natural gas account with Public Service for gas furnace rebates, and a residential electric account with Public Service for the ECM furnace fan rebate. The product is applicable only for the purchase of qualifying new furnaces and ECMs installed in new or replacement applications.

HVAC contractors and installers must be NATE Gas Heating certified, attend any required company trainings, follow all program guidelines, and be approved by Public Service to participate.

F. Stakeholder Involvement

Public Service considers its stakeholders for the Residential Heating product to be the HVAC contractors and distributors, the Energy Efficiency Business Coalition (EEBC), the Colorado Energy Office (CEO), local municipalities within the service area, and environmental organizations. Stakeholders are able to share their product suggestions during the Company's quarterly DSM Roundtable Meetings. In addition, Xcel Energy is a member of the Consortium for Energy Efficiency (CEE), and monitors its initiatives related to residential HVAC equipment.

G. Rebates & Incentives

The Residential Heating product offers three different rebate levels, depending on the type and efficiency of the equipment purchased:

- Furnaces above 95% AFUE qualify for a rebate of \$120;
- ECM furnace fans qualify for a rebate of \$100,

The proposed incentive amounts encourage customers to move to the highest efficiency furnace, 95% AFUE and above.

➤ School Education Kits

A. Description

The School Education Kits offer a turnkey product that combines a set of classroom activities with projects in the home to install energy efficiency and water conservation measures. The product is targeted for sixth grade students in the Colorado service territory. Public Service 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 participant receives a Kit containing the following:

- Two (2) Compact Fluorescent Bulbs (13 Watt – 60 Watt Equivalent)
- Three (3) Compact Fluorescent Bulbs (18 Watt – 75 Watt Equivalent)
- One (1) LED Bulb (11 Watt – 60 Watt Equivalent)
- 1.5 gpm High Efficiency Showerhead
- 1.5 gpm Kitchen Faucet Aerator
- 1.0 gpm Bathroom Faucet Aerator
- LED Night Light
- Filtertone Alarm
- Digital Water / Air Thermometer
- Parent Evaluation Card

An evaluation of the K-12 schools in Colorado indicates that there are roughly 66,000 students in sixth grade in a given year. The sixth grade was chosen for Kit participation to align with Colorado State learning requirements. Specifically, the topics covered in Science Standard 4, Earth Sciences call for discussion of renewable/non-renewable natural resources, solar heat in the environment, and water circulation through the hydrologic cycle.

In Colorado, individual school districts have the ability to establish their own standards, which supersede state requirements, so there may be some local areas where kit participation is moved to another grade level to accommodate these local preferences. The same materials and kit measures are provided to those districts.

This product has many advantages—it enables an educational program to have direct-impacts on energy conservation, it helps build awareness of energy conservation among children, and can impact customers at all income levels. Xcel Energy offers similar products in its New Mexico and Minnesota service territories.

B. Targets, Participants & Budgets

Targets and Participants

School enrollment data was updated recently and has identified approximately 50,000 students in the service territory served by the Company. Historical data indicated that approximately 80% of teachers offered participation in the program choose to participate.

Budgets

The product cost is all-inclusive, made up of not only the kits, but also the curriculum support materials for the teacher, the pre- and post-surveys, and third-party implementer website support. The product budget was developed based on participation targets and an approximate cost per kit. Labor, administration fees, and postage have been added to the budget as well. M&V of installation will be conducted by the third-party implementer and those costs are included in the product's administration fees. This product does not require advertising; schools districts within the territory served by the Company are eligible to participate.

C. Application Process

The teachers may enroll through various means (i.e. phone, email, mail, or via the website⁶⁰). 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 program date. Third-party implementer staff will remain in contact with the teachers via phone, email, and mail at various times throughout the program 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 on average three months after each program begins.

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.

⁶⁰ <http://thinkenergy.org/xcelenergy>

- Sending out customized marketing materials to help enroll the classrooms. These materials explain the program, and the fact that it's offered free of charge to their classroom thanks to the sponsoring agency (Public Service).
- The third-party implementer and Public Service will work together to determine the eligibility of interested schools.

E. Product-Specific Policies

Only those schools that are selected to participate in the product are able to distribute the School Education Kits. All kits must come 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 curriculum. The Company has also presented the product to the Colorado Association of School District Energy Managers.

G. Rebates & Incentives

Public Service will fund 100% of the cost of the School Education Kits. There will be no rebate provided to participants.

➤ Water Heating

A. Description

The Water Heating product is designed to encourage Colorado customers to purchase and install high efficiency natural gas or electric water heating equipment for residential use. The product's objectives are to increase demand for high efficiency water heating equipment among Public Service customers and increase the availability of high efficiency water heaters in the marketplace. An additional product objective is to help Public Service customers capture energy savings with their water heating needs and understand the immediate and long-term value of purchasing and installing high efficiency equipment. In addition to providing a cash incentive and long-term operational savings to customers, this product also is intended to promote market transformation through increasing customer demand for high efficiency equipment in the marketplace. Participants receive a rebate for the purchase and installation of qualifying water heaters.

Customers may choose their own independent residential water heating contractors or installers, or may install the unit themselves. Eligibility requirements for participation include being either a residential natural gas or electric customer. The product is applicable only for the purchase of qualifying new standard storage tank water heaters, tankless water heaters or electric heat pump water heaters installed in new or replacement applications. Qualification for a rebate requires a minimum efficiency of 0.67 Energy Factor (EF) for standard tanks, tankless 0.90 EF, and electric heat pump water heaters.

The U.S. Department of Energy has changed the standards for minimum efficiencies for water heater manufacturing—to 59.4% (40 gallon storage tank) and for 2016, 61.5% (40 gallon storage tank)—which will take effect on April 16, 2015 which results in a baseline shift in the product's technical assumptions.⁶¹ Although the Water Heater product is not cost-effective, it is included in the portfolio to encourage the purchase of high-efficiency water heaters as a common replacement item in customers' homes.

B. Targets, Participants & Budgets

Targets and Participants

The energy savings and participation targets were developed based on historical participant data, current market conditions, and projected sales of water heaters. Proposed savings were estimated on a per unit basis using the projected number of participants.

Budgets

Budgets for the Water Heating product were developed based on the expected costs per participant, and include costs associated with engaging heating, ventilation, and air

⁶¹ U.S. Department of Energy, EERE, Building Technologies Program, Appliance and Equipment Standards, Residential Water Heaters, *Table 2. Amended Energy Conservation Standards for Residential Water Heaters*: http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/27.

conditioning (HVAC) installers in the Colorado service territory. Specifically, this includes newsletters and email to the contractor community. An internal Trade Relations Manager will also reach out to trade allies and develop key relationships to ensure product success. The overall marketing budget for consumers was determined by the number of marketing communications necessary to continue education and awareness of the product and to encourage participation. This product also is promoted in large retail big box stores by a third-party marketing consultant; and is often cross-marketed with the Residential Heating product as yet another way for customers to save on natural gas and electric costs in the home.

C. Application Process

Customers can expect to receive a rebate six to eight weeks after submitting an application. The product does not require preapproval. Customers receive rebate checks via mail (rather than a bill credit). Rebates for new home construction are negotiated between the builder and resident / new homebuyer to determine who will receive the cash rebate.

The customer will learn about the Water Heating rebate product through bill messaging, in store point of purchase retail educational and marketing materials and retailers that sell water heaters on site, the HVAC community and advertising such as newsletters and email. The typical sales cycle starts with either a customer purchasing and installing a water heater or their own or hiring an HVAC technician to install a water heater, which could be purchased through the contractor or through a retailer. Following installation, a completed rebate application form and invoice are submitted to Public Service. Forms are mailed or emailed to the utility by either the contractor or the customer. Invoices must reflect the same information provided on the rebate application form, specifically manufacturer and model number, size or capacity (gallons), BTU, Energy Factor, equipment type, serial number and installation and purchase dates. Other information gathered on the rebate application form includes the unit size, efficiency level, the customer's Public Service account number, mailing address (if different from the installation address), customer signature, and contractor signature, unless the equipment was self-installed.

D. Marketing Objectives & Strategies

Marketing tactics may include the following: email, communications on the Xcel Energy website, tradeshows, trade communications, trainings, point of purchase education and marketing materials at retail stores, direct mail, newsletters, and HVAC community relationship building.

Specifically:

- Public Service contractor communications are timed according to appropriate seasons for the equipment. Since water heating demand is year-round, this provides flexibility with marketing seasonality. To maximize the value of

messaging, the Water Heating product is often cross-marketed in bill messaging with the Residential Heating product.

- Internet pages for Water Heating are developed for customers and the pages are updated according to equipment efficiency changes and available promotions.
- The Company will participate in tradeshows related to water heating to provide information about the product, and/or make a formal presentation. The channel manager also presents product details, objectives and policies to trade partners at various contractor meetings.
- Trade partners also support Water Heating promotions. Training, meetings, telephone calls, letters and newsletters with quarterly frequency keep the trade informed about the product and help increase awareness among new contractors as well as ensure proper application rules are followed. Customers can obtain information on contractors from the Xcel Energy website, here: <http://www.xcelenergy.com/Save Money & Energy/Residential/Supplemental Information/Contractor Legal Disclosure>. Contractors are encouraged to register with Public Service as a registered contractor and obtain a contractor ID number.
- Public Service has partnered with large retailers—such as Home Depot, Lowe's and Sears—to promote the product. Point of purchase materials, namely application forms and product details are made available and staff is trained on the materials.

As the important marketing channel, the HVAC community helps ensure product guidelines, eligibility requirements and processes are clearly communicated. This product relies heavily upon HVAC installers who are on the frontline with customers as trusted individuals that customers hire to perform service installation projects in their homes.

E. Product-Specific Policies

Customers and installers must adhere to all product rules that are listed on the reverse side of the rebate application form. An invoice for the equipment is required along with the rebate application form. Invoices must reflect the same information provided on the rebate application form, specifically manufacturer and model number, size or capacity (gallons), BTU, Energy Factor, equipment type, serial number and installation and purchase dates.

Equipment eligibility is determined using the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Directory of Certified Product Performance⁶² or ENERGY STAR Qualified Products on the ENERGY STAR® website.⁶³ Xcel Energy's Rebate Operations team reviews each application for accuracy and qualifications prior to mailing a rebate check. In the event of insufficient information, the rebate application and the invoice are returned to the customer with a letter requesting additional information.

⁶² <https://www.ahridirectory.org/ahridirectory/pages/home.aspx>

⁶³ <https://www.energystar.gov/>

Customers applying for a water heater rebate will be rebated at the level indicated in that calendar year's approved DSM Plan. Customers are allowed to submit a rebate application for more than one water heater at a time, as some larger homes may require more than one; however, if more than one unit is installed at an address, one application per unit is required to receive a rebate for each unit.

F. Stakeholder Involvement

Ongoing consumer awareness and usability research studies are used to identify potential product modifications and enhancements. Product-specific studies are conducted every few years, allowing past participants and contractors to provide feedback about their experiences with the product. Public Service staff also engages with stakeholders for best practice sharing via the Consortium for Energy Efficiency's (CEE) High Efficiency Residential Gas Water Heating Initiative.⁶⁴

G. Rebates & Incentives

Rebates for qualifying equipment are shown in the table below.

Water Heater Type	Rebate
Standard Tank Water Heater 0.67 EF	\$70
Tankless Water Heater 0.90 EF	\$100
Electric Heat Pump Water Heater	\$450

Rebate applications must be submitted by July 31 of the following year after purchase and installation to qualify for a rebate.

⁶⁴ CEE Energy Efficiency Program Library: <http://library.cee1.org/content/cee-high-efficiency-residential-natural-gas-water-heating-initiative>.

Low-Income Program

A. Description

The Low-Income Program includes Public Service's energy efficiency and education products targeted at income-qualified customers. Public Service continues to make a substantial commitment to both low-income gas and electric energy efficiency in 2015 and 2016. The Company recognizes that low-income products offer a unique opportunity to both substantially improve the efficiency with which customers use energy and to directly improve their quality of life. Energy efficiency products likely provide other non-energy related benefits to low-income customers in the form of health, safety, comfort, and other improvements. Reductions in low-income customers' utility bills can have a disproportionately beneficial effect on household income as compared to non-low-income customers because a larger percentage of a low-income customer's income is spent on energy.

With these factors in mind, Public Service will continue to offer the same four products from 2014 intended to reach a large percentage of the low-income community while leveraging resources already in place to serve this customer group. The Company continues to partner with Energy Outreach Colorado (EOC) and the Colorado Energy Office (CEO) who actively work with this customer segment.

The Low-Income Program consists of the following four products:

- Energy Savings Kit
- Multifamily Weatherization
- Non-Profit
- Single-Family Weatherization

Low-Income Product Rankings

All products in the DSM portfolio were ranked through the same process⁶⁵ and the results for low-income products are shown in Table 11 below. Criteria used to rank the products included: market segments, customer classes, natural gas energy savings, electric energy savings, number of participants, participant rate (percent of the entire customer class), and MTRC test ratio results.

Table 11: Low-Income Program Product Rankings

2015/2016	Rank
Energy Savings Kit	12
Single-Family Weatherization	25
Non-Profit	28
Insulation & Air Sealing	29
Multifamily Weatherization	31

⁶⁵ The entire DSM product ranking can be found in [Appendix C](#) of this Plan.

B. Targets, Participants & Budgets

Targets and Participants

The Company developed participation and energy savings targets based on historical experience with these products. Participation rates were established in partnership with CEO, EOC, low-income agencies, and vendors to further refine the goals and budgets.

Public Service relies on customers who request and qualify for energy assistance on their energy bills to determine eligibility and is rapidly exhausting this list of prospects to market these offerings to.

Budgets

Budgets for low income DSM products have remained at 2014 levels, consistent with Commission guidance received in Decision No. C14-0731.⁶⁶

Table 12a: 2015 Electric Low-Income Program Budgets and Goals

2015	Electric Budget	Net Generator kW	Net Generator kWh	Electric MTRC Test Ratio
Low-Income Program				
Energy Savings Kit	\$289,831	112	1,008,759	2.02
Multifamily Weatherization	\$816,964	252	1,917,554	1.12
Non-Profit	\$518,267	216	1,838,130	1.62
Single-Family Weatherization	\$1,402,432	219	2,350,230	0.98
Low-Income Program Total	\$3,027,493	799	7,114,674	1.22

Table 12b: 2016 Electric Low-Income Program Budgets and Goals

2016	Electric Budget	Net Generator kW	Net Generator kWh	Electric MTRC Test Ratio
Low-Income Program				
Energy Savings Kit	\$289,831	112	1,008,759	2.08
Multifamily Weatherization	\$816,964	252	1,917,554	1.15
Non-Profit	\$518,267	216	1,838,130	1.67
Single-Family Weatherization	\$1,358,190	223	2,379,324	1.02
Low-Income Program Total	\$2,983,251	803	7,143,767	1.26

⁶⁶ Decision No. C14-0731, page 27 paragraph 76.

Table 12c: 2015 Natural Gas Low-Income Program Budgets and Goals

2015	Gas Budget	Net Annual Dth Savings	Annual Dth/\$M	Gas MTRC Test Net Benefits	Gas MTRC Test Ratio
Low-Income Program					
Energy Savings Kit	\$116,186	8,623	74,217	1,085,233	7.78
Multifamily Weatherization	\$686,120	10,442	15,218	-193,411	0.86
Non-Profit	\$309,044	2,429	7,860	-173,982	0.69
Single-Family Weatherization	\$2,287,908	34,670	15,154	643,122	1.16
Low-Income Program Total	\$3,399,258	56,164	16,522	1,360,962	1.22

Table 12d: 2016 Natural Gas Low-Income Program Budgets and Goals

2016	Gas Budget	Net Annual Dth Savings	Annual Dth/\$M	Gas MTRC Test Net Benefits	Gas MTRC Test Ratio
Low-Income Program					
Energy Savings Kit	\$121,186	8,623	71,155	1,098,930	7.65
Multifamily Weatherization	\$686,120	10,442	15,218	-173,843	0.87
Non-Profit	\$309,044	2,429	7,860	-168,289	0.70
Single-Family Weatherization	\$2,268,610	35,754	15,760	834,215	1.20
Low-Income Program Total	\$3,384,960	57,247	16,912	\$1,591,014	1.25

C. Marketing Objectives & Strategies

The Low-Income Program aims to educate low-income customers on the importance of and value provided by energy efficiency. The Company will work with low-income providers, cities/counties and other community organizations to promote all available services. Marketing and promotion activities will occur primarily through partners with collateral material developed by Public Service. This tends to be the most effective way to target the low-income customers, as other targeting methods are limited. 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.

D. 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 be a residential customer or own multi-family buildings whose rental units are a minimum 66% occupied by customers certified as low-income per product guidelines. Non-Profit Weatherization

participants have business electric and gas accounts with Public Service since they are a business. Specific products within the Program may have different eligibility requirements depending on the services offered, funding partners or customers served.

E. Stakeholder Involvement

Public Service received significant input and assistance in originally developing and modifying products for the Low-Income Program and will rely heavily on stakeholders to deliver successful products. Perhaps more than any other Program, the Low-Income 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 Low-Income 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.

F. Rebates & Incentives

Low-income rebates are unique in that the incentive level assigned for the measures offered under these four DSM products covers 100% of the incremental capital cost.

G. Evaluation, Measurement & Verification

The specific product measurement and verification plans are included in the EM&V section of this Plan.

The Company plans to conduct a comprehensive product evaluation of the Low-Income Non-Profit product in 2016.

➤ Energy Savings Kit

A. Description

The Energy Savings Kit provides home energy efficiency measures bundled and distributed to low-income customers through direct mail campaigns and partnerships. 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.

Income-qualified customers will receive an offer through the mail informing them of their eligibility to receive a free Energy Savings Kit. The offer details the contents of the kit and how much money they could save on their energy bill if they install all the measures provided. If the customer chooses to receive a kit, they will send the pre-paid postage business reply card to the third-party implementer. Customers will receive a kit within six to eight weeks.

The Energy Savings Kits will include the following electric and natural gas efficiency measures:

- Four (4) Compact Fluorescent Bulbs (13 Watt – 60 Watt Equivalent)
- Four (4) Compact Fluorescent Bulbs (20 Watt – 75 Watt Equivalent)
- 1.5 gpm High Efficiency Showerhead
- 1.5 gpm Kitchen Faucet Aerator
- 1.0 gpm Bathroom Faucet Aerator

B. Targets, Participants & Budgets

Targets and Participants

The Company set the participation target (number of kits to be sent out) based on 2013 product performance and participation projections for 2015 and 2016. Energy savings targets were developed based on the installation rate of the kit measures in 2013.

Budgets

The budget is based on the number of forecasted kits. The budget includes the costs of kit contents, and production, distribution, and fees from the third-party implementer.

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 Public Service's territory will be sent an offer via mail to receive 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 Public Service on a regular basis. Income-qualified customers are eligible to receive a kit once every ten years.

D. Marketing Objectives & Strategies

The overall objective of the product is to increase and expend education among the low-income customers on the importance of energy efficiency and the value of taking action to improve efficiency in their homes. Public Service will work with local and state agencies to obtain customer mailing lists to reach more customers annually.

E. Product-Specific Policies

In order to participate, customers must receive LIHEAP, LEAP, or any energy assistance funding (including county assistance and fuel fund assistance) or other low-income state assistance programs.

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

Public Service will fund 100% of the cost of the Energy Savings Kits. There will be no rebate provided to customers.

➤ Multifamily Weatherization

A. Description

The Multifamily Weatherization product is designed to provide funding for a wide variety of equipment and process improvements for electric and natural gas efficiency measures in low-income multifamily buildings. This offering differs from the Single-Family Weatherization product in that these dwellings have common areas, greater overall square footage, more appliances and other potential energy-saving measures.

The product will be implemented in partnership with Energy Outreach Colorado (EOC). Public Service funds will supplement federal weatherization grants to produce incremental, cost-effective electric and natural gas savings. The EOC works jointly with the Colorado Energy Office (CEO) and other entities to identify and qualify multifamily 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.

B. Targets, Participants & Budgets

Targets and Participants

Participation and energy savings targets were developed by evaluating 2013 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. The majority of the budget is allocated to electric and natural gas rebates benefiting tenants in low-income multifamily 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 and must have a comprehensive audit performed on the building prior to submitting an application. Low-income 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% low-income households.

D. Marketing Objectives & Strategies

The overall marketing objective is to increase education among low-income 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 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 multifamily housing complexes with at least 66% of the rental units occupied by low-income customers whose income is below 80% of the local area median. Customers meeting the U.S. Department of Energy Weatherization Assistance Program funding guidelines,⁶⁷ as determined by the Colorado Energy Office (CEO), EOC, local governments, or their agencies, are automatically deemed income eligible.

F. Stakeholder Involvement

When designing the product, Public Service worked with external consultants to determine which measures would ensure customer comfort while saving money on energy costs. Public Service will continue to evaluate historical projects with EOC to determine measure implementation and needs trending.

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 G: 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, benefit/cost ratio and payback. Projects will be bundled in order to pass the MTRC test ratio for the product. Testing, study, engineering and project management fees may be included in the project costs.

⁶⁷ <http://energy.gov/eere/wipo/where-apply-weatherization-assistance>

➤ 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 service territory. The product's focus is on helping organizations that serve low-income individuals, such as shelters, safe houses, and residential treatment centers.

The product will be implemented in partnership with Energy Outreach Colorado (EOC). EOC utilizes funding through their existing Non-Profit Facilities Program Grants (NEEP) Program targeting non-profits. Public Service funds will supplement federal weatherization grants to produce incremental, cost-effective electric and natural gas savings. The EOC works to identify and qualify non-profit facilities for the product. Details of energy-saving measures, rebates, reporting processes, M&V procedures will be evaluated on a per project basis using a detailed engineering analysis.

B. Targets, Participants & Budgets

Targets and Participants

Participation and energy savings targets were developed by evaluating 2013 projects completions and information provided by EOC on anticipated participants.

Budgets

Historical costs and participation information were tracked and analyzed to develop a budget estimate. The majority 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.⁶⁸ 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. 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 501c3 and documentation showing the financial stability of the organization. A committee made up of non-profit industry

⁶⁸ <http://www.energyoutreach.org/grants/facility-energy-efficiencyfacilities>

leaders then determines the applicant's needs and how the EOC and Public Service funding can help.

D. Marketing Objectives & Strategies

The overall marketing objective is to increase and expand education among the low-income 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 at the facility. The EOC markets the product through various channels, including communications through non-profit association literature, community resource center announcements, and local low-income 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 low-income 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 (electricity, natural gas, or both) provided by Public Service to the facility.

Participating low income agencies must agree to the following:

- Installation of an energy use monitoring and reporting system;
- A comprehensive energy audit by a qualified entity;
- Set target 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 product, Public Service worked with external consultants to determine which measures would ensure customer comfort while saving money on energy costs. 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 G: 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, benefit/cost ratio and payback. Projects will be bundled in order to ensure that the product passes the MTRC test ratio. Testing, engineering and project management fees may be included in the project costs.

➤ Single-Family Weatherization

A. Description

The Single-Family Weatherization product will offer natural gas and electric efficiency measures to low-income single-family households. Depending on need, Public Service may provide rebates to qualifying PSCo customers for any of the following measures:

Natural Gas Measures

- Furnace efficiency upgrades
- Wall insulation
- Attic insulation
- Crawl space insulation
- Attic insulation for manufactured homes
- Water heaters
- Storm windows
- 1.5 GPM showerheads
- GPM aerators
- 0.5 GPM aerators
- Air Sealing

Electric Measures

- Refrigerator replacements
- Compact fluorescent light (CFL) bulbs (rebated per CFL installment)
- Cooling savings for building shell measures

In addition to these measures, a major focus of this product will be customer education on ways to reduce energy use in the home. Low-income auditors will provide educational materials, historical energy usage information, and bill analysis to these customers during the weatherization process. Public Service will not claim any energy savings associated with the educational component of this product.

The Single-Family Weatherization product is delivered in partnership with a third-party implementer. The third-party implementer secures public grants and private funds which, when matched with Public Service funds, produce incremental, cost-effective gas and electric savings for low-income households. The third-party implementer also develops annual contracts with local weatherization agencies within the PSCo service territory. Processes for reporting measure detail, rebates, and measurement and verification (M&V) are managed by the third-party implementer with the local weatherization agencies.

B. Targets, Participants & Budgets

Targets & Participants

Energy savings and participation targets were established in partnership with the third-party implementer and involved low-income state offices, using historical product participation in 2013 and 2014 (to date) as a guide. Recommendations from the third-party implementer on expected workflow were also considered when developing energy savings targets and participation rates.

Budgets

Budgets for the product were developed based on the historical incremental cost of measures installed in low-income homes.

C. Application Process

In order to participate, customers must purchase retail electricity or gas from the Company on a residential tariff and have a household income below 80% of the area median income (AMI). Public Service customers will be informed of the Single-Family Weatherization product when they sign up for Low Income Home Energy Assistance Program (LIHEAP) funding from the U.S. Department of Energy's (DOE's) Weatherization Assistance Program, among other outreach avenues. LIHEAP qualification is at 150% below the Federal Poverty Line (FPL) and approximately 50% AMI depending on the county. DOE allows for 200% below the FPL which is usually around 60% AMI.

Once it is determined that the customer meets the income guidelines and receives energy services from the Company, they will be qualified by their local weatherization agency, and the third-party implementer, to receive weatherization services. Local weatherization agencies will actively seek out customers that qualify to participate in this product, and customers can inquire about it on their own as well.

D. Marketing Objectives & Strategies

The overall marketing objective of this product is to deliver energy savings that support low-income customers in the reduction of energy costs and increased comfort. A secondary objective is to increase and expand education among low-income customers on the importance of energy efficiency and the value of taking action to improve efficiency in their homes. Public Service will work with low-income providers, such as local weatherization agencies and community organizations to encourage promotion of all services available. Information will be posted on Xcel Energy's website⁶⁹ directing

⁶⁹ [http://www.xcelenergy.com/Save Money & Energy/Rebates/Income Qualified Weatherization - CO](http://www.xcelenergy.com/Save_Money_&_Energy/Rebates/Income_Qualified_Weatherization - CO)

customers to their local weatherization agency. The Company may also partner with other low-income groups to market this product to low-income customers.

E. Product-Specific Policies

In order to participate, customers must purchase retail electricity or gas from Public Service on a residential tariff and have a household income below 80% AMI. Customers meeting the DOE Weatherization Assistance Program funding guidelines, as determined by the third-party implementer, local government, or local agencies, are automatically eligible.

The third-party implementer will contract with subcontracted agencies to perform weatherization measures. All contractors will be trained to follow BPI installation requirements for weatherization services. These contractors are funded through the third-party program implementer and other state funding and have agreed to weatherize homes following state regulations and guidelines.

F. Stakeholder Involvement

When designing the product, Public Service worked with external consultants to define which measures would save customers money on their energy costs while ensuring comfort in their home. The product is delivered in partnership with federal, state, and nonprofit low-income weatherization organizations.

G. Rebates & Incentives

Public Service will pay 100% of the costs to install a subset of the predetermined electric and natural gas energy efficiency measures available to low-income, single-family customers.

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, with the exception of 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 of 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 five customer-facing education and market transformation products, including: Business Education, Business Energy Analysis, Consumer Education, Energy Efficiency Financing, and the Home Energy Audit. 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.⁷⁰

Planning and Research

The Company will operate five internal DSM services: Evaluations, Market Research, Measurement & Verification, Planning & Administration, and Product Development.

⁷⁰ 4 CCR 723-4-4751(n)

B. Targets, Participants & Budgets

Targets and Participants

Most indirect products and services do not have savings or participation targets, with the exception of some pilots, whose energy savings and participation targets 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 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 13a through 13b provide the overall Indirect products and services energy savings and participation targets, if applicable, and budgets, broken out by each product / service.

Table 13a: 2015 Electric Indirect Products & Services Goals & Budgets

2015	Electric Budget	Net Generator kW	Net Generator kWh	Electric MTRC Test Ratio
Indirect Products & Services				
Education/Market Transformation				
Business Education	\$152,457			
Business Energy Analysis	\$986,149			
Consumer Education	\$1,082,674			
Energy Efficiency Financing	\$60,000			
Home Energy Audit	\$580,543			
Education/Market Transformation Total	\$2,861,823			
Planning and Research				
DSM Planning & Administration	\$482,174			
Program Evaluations	\$297,496			
Market Research	\$328,046			
Measurement & Verification	\$15,140			
Product Development	\$1,210,582			
Energy Feedback Pilot - Business	\$149,163	86	2,586,342	2.12
Multifamily Buildings Pilot - EE	\$146,644	80	480,653	1.72
Smart Thermostat Pilot - EE	\$353,363			
Building Optimization DR Pilot	\$74,704			
Product Development Total	\$1,934,456	166	3,066,995	0.42
Planning and Research Total	\$3,057,312	166	3,066,995	0.27
Indirect Products & Services Total	\$5,919,135	166	3,066,995	0.18

Table 13b: 2016 Electric Indirect Products & Services Goals & Budgets

2016	Electric Budget	Net Generator kW	Net Generator kWh	Electric MTRC Test Ratio
Indirect Products & Services				
Education/Market Transformation				
Business Education	\$152,457			
Business Energy Analysis	\$986,149			
Consumer Education	\$1,082,674			
Energy Efficiency Financing	\$60,000			
Home Energy Audit	\$580,542			
Education/Market Transformation	\$2,861,822			
Planning and Research				
DSM Planning & Administration	\$519,364			
Program Evaluations	\$427,266			
Market Research	\$1,060,924			
Measurement & Verification	\$15,340			
Product Development	\$1,360,582			
Multifamily Buildings Pilot - EE	\$193,655	206	560,772	1.61
Smart Thermostat Pilot - EE	\$204,563	602	1,023,251	1.11
Building Optimization DR Pilot	\$59,904	321	2,607,231	2.02
Product Development Total	\$1,818,704	1,129	4,191,254	0.83
Planning and Research Total	\$3,841,598	1,129	4,191,254	0.50
Indirect Products & Services Total	\$6,703,420	1,129	4,191,254	0.34

Table 13c: 2015 Natural Gas Indirect Products & Services Goals & Budgets

2015	Gas Budget	Net Annual Dth Savings	Annual Dth/\$M	Gas MTRC Test Net Benefits	Gas MTRC Test Ratio
Indirect Products & Services					
Education/Market Transformation					
Business Education	\$43,920				
Business Energy Analysis	\$98,563				
Consumer Education	\$250,557				
Energy Efficiency Financing	\$60,000				
Home Energy Audit	\$596,304				
Education/Market Transformation Total	\$1,049,344				
Planning and Research					
DSM Planning & Administration	\$110,037				
Program Evaluations	\$11,730				
Market Research	\$154,582				
Measurement & Verification	\$2,200				
Product Development	\$214,640				
Energy Feedback Pilot - Business	\$101,337	11,993	118,350	\$67,284	1.66
Multifamily Buildings Pilot - EE	\$78,384	2,653	33,847	\$138,275	2.05
Smart Thermostat Pilot - EE	\$117,788				
Product Development Total	\$512,149	14,646	28,598	-\$83,120	0.85
Planning and Research Total	\$790,698	14,646	18,523	-\$361,669	0.57
Indirect Products & Services Total	\$1,840,042	14,646	7,960	-\$1,162,613	0.39

Table 13d: 2016 Natural Gas Indirect Products & Services Goals & Budgets

2016	Gas Budget	Net Annual Dth Savings	Annual Dth/\$M	Gas MTRC Test Net Benefits	Gas MTRC Test Ratio
Indirect Products & Services					
Education/Market Transformation					
Business Education	\$43,920				
Business Energy Analysis	\$98,563				
Consumer Education	\$250,557				
Energy Efficiency Financing	\$60,000				
Home Energy Audit	\$596,304				
Education/Market Transformation Total	\$1,049,344				
Planning and Research					
DSM Planning & Administration	\$110,826	0	0		
Program Evaluations	\$320,148	0	0		
Market Research	\$381,001	0	0		
Measurement & Verification	\$2,250	0	0		
Product Development	\$254,640	0	0		
Multifamily Buildings Pilot - EE	\$132,698	8,428	63,515	\$259,945	1.62
Smart Thermostat Pilot - EE	\$68,188	8,215	120,480	-\$3,368	0.99
Product Development Total	\$455,526	16,644	36,537	-\$90,463	0.92
Planning and Research Total	\$1,269,751	16,644	13,108	-\$904,687	0.54
Indirect Products & Services Total	\$2,319,095	16,644	7,177	-\$1,705,631	0.44

C. Application Process

Most indirect products and services do not have rebate applications, with the exception of 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 2015 and 2016, 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, 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 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 targets or offer rebates, with the exception of 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 Evaluation, Measurement and Verification (EM&V) plan for 2015 and 2016, which describes the EM&V approach for all of the DSM 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 the EM&V methodologies, while the Market Research group will oversee third parties conducting the research. These efforts are described in more detail within the EM&V and Market Research sections below.

➤ Business Education

A. Description

The goal of Business Education is to improve public knowledge concerning the benefits of energy efficiency and conservation. The Company views this as an important part of a long-term effort to create educated, engaged customers who are ready to act on energy efficiency opportunities. The following key messages will be incorporated into all of the product's marketing efforts:

- DSM is a more cost-effective resource than building new generation resources.
- DSM costs incurred today are an investment that defers incurring higher costs for new generation equipment later.

Further, the purpose of Business Education is to induce permanent changes in customers' energy usage through long-term education and proactive customer interactions. A key to the success of market transformation is creating sophisticated consumers who have information that allows them to make more informed and effective decisions. Among the behavioral and attitudinal changes that will affect market transformation are shifts in conventional thinking, heightened awareness, and increased knowledge. Specifically, the Company will educate customers about how to use energy wisely, how to change energy usage behaviors, and how to buy energy efficient appliances, such as those that are ENERGY STAR-rated. Going beyond the initial education, the true intent of this product is to engage customers about energy conservation and efficiency and motivate them to reduce their energy usage.

Primary emphasis is placed on:

- Energy efficiency and conservation messaging through email and print newsletters;
- Focused customer segment events and sponsorships through business and trade associations;
- Utilizing mass market advertising such as radio, print and Internet to create awareness in energy efficiency;
- Customer outreach through energy efficiency workshops.

B. Targets, Participants & Budgets

Targets and Participants

Business Education is targeted to all Colorado natural gas and electric business customers, with strong emphasis on small- to mid-sized customers.

Budgets

Public Service's budget for this product was determined through estimates of material, labor, and past activities in Colorado and other states. The majority of the budget is driven by customer education, conservation promotion, and internal labor.

In 2015 and 2016, the Company will allocate \$25,000 of the Business Education budget to support communities in codes training, in consultation with interested stakeholders.

C. Application Process

This indirect program 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 resulting in engaged customers who will proactively take steps to reduce energy consumption by upgrading to high efficiency measures.

E. Product-Specific Policies

This indirect program has no specific policies.

F. Stakeholder Involvement

Public Service 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 program does not offer customer rebates.

➤ Business Energy Analysis

A. Description

The Business Energy Analysis product is an indirect impact product that offers analysis services to identify energy saving opportunities for Colorado business and industrial customers. The goals of this product 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; Public Service representatives have and continue to use this as a selling point for engagement in other PSCo energy efficiency products. Participation is heavily dependent on promotion by internal Public Service representatives, as well as the trade partners and outside business customer assistance programs.

The Business Energy Analysis product offers three different types of assessments: online assessments, onsite audits, and engineering assistance studies, which vary in customer involvement and capital investment. The reports in all three assessments provide detailed information about cost and paybacks, which will assist in creating a business case to make energy efficiency upgrades.

- *Online energy assessment:* An online energy assessment is a free online tool developed and operated by a consultant. This online assessment interviews the customer about their equipment and operating conditions to uncover areas where energy and cost savings opportunities may exist. Based on industry averages and trends, regional data, and customer knowledge of the facility, the online tool is a starting point for determining energy saving opportunities. This tool requires the customer to invest time, but no money in the analysis, making it virtually risk-free. For the purposes of the online assessment, the online tool uses an industry average facility based on a regional data derived from the Energy Information Administration (EIA) and ESource.
- *Onsite energy audit:* Public Service sends an energy advisor to a customer's facility to conduct an onsite energy audit, which is a comprehensive audit of the facility and its energy use. The customer receives a detailed report including energy conservation opportunities with the associated payback, savings, cost, and available rebates. Qualified auditor(s) are selected through an RFP process to perform the onsite assessments.
- *Engineering assistance studies:* Provides guidance when the customer is seeking to replace or upgrade a major process or system. The customer will hire a provider of their choice to analyze the facility and develop recommendations for the most energy efficient equipment options. The analysis targets customers who are focused on analyzing their refrigeration, cooling, custom, or space and processing heating systems.

B. Targets, Participants & Budgets

Targets and Participants

The 2015-2016 targets 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, 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 goal.
- *Labor Charges*: Estimated costs for program 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 DSM advertising campaigns.

C. Application Process

Customers may become aware of this product through their Account Manager or the Business Solutions Center (BSC), contracted trade allies, external customer assistance products, and/or marketing efforts including mailings, newsletters, and the Xcel Energy website. All avenues are essential for increasing product awareness in conjunction with marketing efforts.

If a customer is interested in an online assessment, preapproval is not necessary. Customers will find the free online tool on the Xcel Energy website, here: <http://www.energyprofiletool.com/xcel/>.

Onsite audits and engineering assistance studies require preapproval prior to project initiation. Customers may access the onsite audit preapproval application on the Xcel Energy website, here:

http://www.xcelenergy.com/Save_Money_&_Energy/Rebates/Energy_Analysis_-_CO and work with the Company 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 engineer within three months from applying for preapproval. This time allows for internal processing, onsite engineer walkthrough of the facility, creation of the report, and a final review by Public Service internal engineering staff, as needed on a case-by-case basis. The customer must select an engineering firm prior to preapproval, because a project proposal including the scope of work must be included with the preapproval application to determine funding levels. Engineering studies typically take

three months to complete and to be reviewed and approved by Public Service internal engineering staff.

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 products throughout Colorado, to increase awareness in the Business Energy Analysis product and partner in the audit process. Though the target markets will differ by assessment type, both online assessments and onsite audits are popular with small business customers. Methods used to reach and educate customers include:

- *Xcel Energy website*: Provides a description of the product offering, and links 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 piece to gain awareness and understanding of the product offerings;
- *Email campaigns*: Brief email from Public Service representatives to gain interest in the product from customers;
- *Newsletters*: Another medium to gain customer awareness and 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 that contribute to achievement of goals. Once an onsite audit or engineering 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 that they participate in (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 allies to develop and streamline the audit process. The Company also receives recommendations and feedback from stakeholders via the DSM Roundtable.

G. Rebates & Incentives

Customers do not receive a rebate for participation in the Business Energy Analysis product, but they do receive study funding assistance for the onsite audit and the engineering study. Business Energy Analysis offers two types of study funding based on whether an onsite audit or engineering study was completed. Participants in an onsite audit are responsible for paying a small fee, depending on the building square footage, which is approximately 10-15% of the actual cost of the audit. Public Service will pay up to 75% of the engineering study cost, up to \$25,000; funding is based on the potential energy savings of the project and the cost of the study.

➤ Consumer Education

A. Description

The Consumer Education program focuses on creating awareness of energy conservation while providing residential customers with information on what they can do in their daily lives to reduce energy usage. The residential market segment in Colorado is demographically varied; thus, Xcel Energy will employ a wide variety of marketing channels to communicate key energy efficiency messaging.

Communication strategies include:

- Annual community and conservation events, and outreach;
- Social media (Facebook, Twitter, blogs, etc.) and radio;
- Online messaging through local media websites;
- Direct mail marketing to address seasonal usage challenges;
- Sponsorship of local Earth Day events;
- Sponsorship of local conservation publications;
- Conservation messaging through seasonal bill messaging;
- Publication of reference materials; and
- Sponsorship of community events supporting residential conservation and energy efficiency.

Participating in direct customer outreach events creates an opportunity for meaningful conversations with customers. Outreach and participation in these events is valuable for creating active engagement with residential customers. Xcel Energy will continue to focus on renewing existing community partnerships that have provided consistent customer participation and engagement. Maintaining diversity in our communication channels will continue to increase our customers' knowledge of energy efficiency and provide them with access to a variety of resource options and services.

B. Targets, Participants & Budgets

Targets and Participants

Consumer Education is widely targeted to all Colorado natural gas and electric residential customers. Targets are established through targeted outreach to customer segments and use of multiple channels for delivery of energy efficiency messaging.

Budgets

Public Service's budget for this product was determined through estimates of material, labor, identification of customer growth patterns, and past activities in Colorado and other states. 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 majority of the budget is driven by customer education, conservation promotion, community partnerships, and internal labor.

C. Application Process

This indirect program does not include an application process.

D. Marketing Objectives & Strategies

The primary objective of the Consumer Education program is to initially heighten residential customers' awareness about energy efficiency and conservation and then develop engaged customers who will proactively take steps to reduce energy consumption. The goal of the program is to get customers to conserve and consider upgrading to high efficiency measures, when possible, thereby reducing energy consumption. The program will deliver communications that provide behavior-altering strategies that customers can implement in their daily lives to conserve energy (e.g. move customers from awareness to action).

Our strategy will continue to utilize a wide variety of communications channels including social media, print and event outreach. While messaging will continue to align with the overall portfolio strategy of seasonal energy-saving tips and information for residential customers focused on reducing their energy usage, active engagement through outreach events and premier partnerships with key community partners will also be. Historically, seasonal messaging has been effective in the residential market. The Company's residential customer education strategy will continue to promote the financial and environmental benefits of energy conservation and the ease of measure implementation. To engage the customer in energy efficiency there will be a focus on expansion of existing channels such as the Mobile Resource Centers which provide residential customers with energy efficiency tips and program resources for reducing their energy usage. These Mobile Resource centers will continue to be placed in public libraries and at community partnership locations. Additional channel expansion and integration will also likely include digital and social media channels. The channels that are utilized will continue to be focused on targeted segments and will continue to align with the overall residential communication strategy.

E. Product-Specific Policies

This indirect program has no specific policies.

F. Stakeholder Involvement

Public Service 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 indirect program does not offer customer rebates.

➤ Energy Efficiency Financing

A. Description

Energy Efficiency Financing is an indirect impact product launched in 2013.⁷¹ This product offering is aimed at increasing the availability of financing to overcome economic barriers to customer participation in the Company's other energy efficiency products. As an indirect impact product no direct attributable energy or demand savings are recorded, but the product plays an important role in shifting markets and attitudes toward greater energy efficiency implementation.

Rebate programs are strong and proven tools for driving energy efficiency; however, some customers indicate that upfront capital investment is a barrier to adoption of energy efficiency measures. The Energy Efficiency Financing product encourages residential and small commercial customers to participate in existing direct impact products by augmenting existing rebate programs with financing options. The Company facilitates the financing of these projects through partnerships with existing financial institutions and financing programs and by assisting in the creation, by existing lenders, of financing options in areas where such programs don't exist. Public Service is not providing capital for these loans, offering a loss reserve, servicing loans, or offering on-bill financing in connection with this product.

Public Service conducted extensive interviews with parties who currently offer energy efficiency loans in Colorado including private sector lenders, non-profit lenders and government entities throughout the state. In all cases these parties have access to capital to fund loans or leases, a credit enhancement to provide a loan loss reserve, or both. The gap that these entities have identified is not a lack of capital, but a need for assistance in marketing to drive volume. These existing lenders appreciate the fact that PSCo is not confusing the marketplace by offering a competing loan product, but is enhancing the existing marketplace by driving business to these lenders for financing energy efficiency.

PSCo will actively market selected loan products to targeted customer segments, including by leveraging lender relationships, using the following channels:

- Contractor Training
- Direct Outreach and Marketing
- Bill Onserts
- Web Links
- Rebate Integration
- Loan Customer Case Studies

The Company will ensure organized resources for staff and allies to reference.

⁷¹ This product offering was first launched in response to stakeholder input, as noted within the 2012/2013 Biennial DSM Plan (Proceeding No. 11A-631EG) Settlement Agreement.

The Company has identified loan products that best match the financing needs of customers to include:

1. *Residential Unsecured Loans* – These loans are for short term, reactive needs. The customer has an immediate need for a product and may be willing to upgrade the system if an attractive financing option were available. Participants in the Evaporative Cooling, High Efficiency Air Conditioning, or Insulation products would be ideal for this product.
2. *Residential Secured Loans* – These loans are for homeowners planning a major retrofit of their home. Participants in the Home Performance with ENERGY STAR product, or those implementing other combined projects, that need a larger sum of money may prefer this type of loan.
3. *Business Loans or Leases* – This type of financing requires a quick turnaround from the lender. Having the loan or lease available may drive the customer to make the improvement immediately. Participants in the Lighting Efficiency, Lighting – Small Business, or Motors and Drive products could be interested in this type of loan or lease.

B. Targets, Participants & Budgets

Targets and Participants

The primary goal of this product is to drive incremental participation in existing direct impact energy efficiency products that include:

- Business Program:
 - Lighting Efficiency
 - Lighting – Small Business
 - Motor & Drive Efficiency
 - Custom Efficiency
- Residential Program:
 - Evaporative Cooling
 - Residential Heating
 - High Efficiency Air Conditioning
 - Insulation
 - Home Performance with ENERGY STAR

The product's achievements are measured by the number of participants rather than direct energy savings. The target for each year is 300 participants, including 25 business loans and 275 residential loans. These targets have been developed through research of similar programs, review of participation factors for the direct impact products, historical participation, and discussions with industry experts.

For planning purposes, the Company estimates that approximately 10% of these loans might be “incremental” in that the resulting energy savings would have not occurred had the Energy Efficiency Financing product not been available.

Budgets

Public Service's 2015 and 2016 budgets for this product were determined through estimates of material, labor and past activities in Colorado.

C. Application Process

Customers are made aware of financing options at the same time they become aware of rebates. Awareness may be driven by Account Managers, the Business Solution Center (BSC), trade allies, external customer assistance programs, and/or marketing efforts including mailings, newsletters, and the Xcel Energy website.

Customers will be directed to one or more lending alliances suited to their needs. Loan applications will be completed by the customer and submitted directly to the participating lender.

Billing and payment processing will also be between the customer and the participating lender without the Company's involvement.

D. Marketing Objectives & Strategies

The product's marketing objective is to identify customers that want to implement more energy efficiency but require financial assistance, linking those customers with the most appropriate rebates and loan products.

Direct and indirect marketing strategies will be employed. Direct marketing will be done in partnership with the Product Managers of the targeted direct impact products. Indirect Marketing involves broad communication that spans multiple (or all) direct impact products. The best example is contractor training and education. Understanding that many customers interact primarily or exclusively with a contractor, the Company will ensure these contractors are armed with the knowledge, expertise, and collateral to educate customers about the best available financing option for their situation.

E. Product-Specific Policies

An Invitation for Alliance is sent on an annual basis to invite financial institutions to collaborate as a participating lender for this product. This Invitation is intended to create transparency and an even playing field upon which PSCo can select lenders to deliver Energy Efficiency Financing to our customers.

F. Stakeholder Involvement

Public Service worked closely with stakeholders to develop this product. Channels for this involvement have included the following:

- *Political Engagement* – PSCo Government Affairs has been actively involved in liaising with legislative interests, as well as with the banking and realtor communities, to make sure that their issues are represented in the development and delivery of this product.
- *Stakeholder Meeting* – A stakeholder meeting was held in 2012 to gather and incorporated stakeholder input into the product design. Ongoing communication with many of the participants has helped shape this product.
- *DSM Roundtable Meetings* – Product updates have been presented and discussed at quarterly DSM Roundtable Meetings.

G. Rebates & Incentives

No rebates or incentives are offered through this product.

H. Evaluation, Measurement, & Verification

Basic product operations will be monitored and reported regularly. Metrics reported in preparation for the quarterly DSM Roundtable Meetings includes loan participation and expenditures. These measures are of interest, and aligned with reporting for other indirect product offerings, but will not fully characterize the achievement or shortcomings of this product. Thus, program evaluation was performed by an independent third party in 2014 to obtain preliminary feedback on this product. The evaluation involved surveying participants and stakeholders to:

- Measure incremental direct impact participation and resulting energy/demand savings;
- Evaluate customers' and lenders' experience with the product; and
- Estimate how much energy efficiency and other benefits the alliances created outside of existing direct impact products.

This evaluation allowed for attribution of the product's indirect costs to results achieved by the direct impact products—identifying cost-effectiveness with and without this product.

Preliminary first-year evaluation results have informed product changes for 2015-2016, including:

- Adjustment of participation targets based on historical loan volume
- Meeting with lenders to discuss the benefits of combining energy efficiency upgrades with solar incentives to create a complete package of improvements
- Providing organized resources for staff and allies to consult on specific questions and to quickly inform partners of any updates
- Focus marketing efforts on the program entry channels that show the most promise historically
- Increase contact and relationships between lenders and trade allies

- Identify a residential lender that can offer a statewide unsecured consumer loan product
- Follow up with loan customers when the lender receives an application
- Update marketing materials to include a few “briefers” that incorporate details of completed projects
- Take a lead role in marketing, designing and implementing marketing campaigns

A second year of evaluation was planned, initially in 2015,⁷² but with the product still being in the early stages of implementation, the Company feels that delaying the second year of the evaluation until the first year of evaluation recommendations are integrated into the product would make the results more valuable. This approach ensures greater stability for the product model which will support sustained participation as well as increase credibility for the evaluation by closely tracking the observed market reaction. Lastly, a 2016 evaluation is prudent given that a 2015 evaluation could yield very similar results and recommendations from those identified in 2014—the delay in the evaluation is likely to capture whether changes initiated in 2015 (described above) yield the desired improvement in participation levels.

Cost-effectiveness for this indirect offering will be measured in two ways:

1. Multiply the net benefit intensity for each direct impact product by the incremental and attributable energy saved with this product. If the sum of all of those net benefits exceeds the costs incurred by the indirect product, Energy Efficiency Financing will be considered cost-effective.
2. Examine the cost-effectiveness of each direct impact product with and without the Energy Efficiency Financing costs and attributed incremental achievements. This secondary analysis will identify any product that is not improving its cost-effectiveness via financing, enabling the Company to take action to ensure prudent expenditures going forward.

⁷² See page 196 of the 2014 DSM Plan (Proceeding No. 13A-0773EG).

➤ Home Energy Audit

A. Description

The Home Energy Audit product offers Public Service 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 improve energy savings by influencing homeowners' and renters' behaviors through conservation education.

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; and
- Energy savings recommendations derived from energy modeling software.

Typically, the audit begins with the auditor's review and analysis of billing history since this is often an indication of what the customer may need to address first. The auditor also takes this opportunity to discuss any concerns or questions that the customer may have regarding their homes energy usage and related comfort. Once the areas of concern are identified, the auditor initiates the onsite inspection. This process begins with a shell assessment of the exterior of the home, identifying cracks or exterior signs of air leakage or maintenance needs. The auditor then begins the interior evaluation with inspection of the attic or crawl space to determine what insulation has been installed prior to the audit and upgrades the customer should consider, such as additional insulation and sealing bypass areas.

Next, the auditor reviews the home's heating and/or air conditioning systems for efficiency ratings and discusses monthly maintenance tips. The auditor will also show the customer how to implement suggested maintenance options like changing air filters on a regular basis. As the auditor moves through the home, they 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 leave behind efficiency product collateral on relevant rebate products. The entire Standard Audit process takes about two hours to complete and can vary depending on size of home.

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 combustion appliance zone (CAZ) test. The blower door test will be conducted in every home 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. A blower door 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 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 that they may have overlooked prior to the testing. This tool can also identify potential venting issues around a home's heating system.

Infrared Audit

The Infrared Audit includes all Standard Audit components as well as an infrared scan to evaluate internal structures such as drywall and insulation, and to determine temperature differences where insulation is present, missing, or not working effectively. Blower door testing is also a mandatory part the Infrared Audit. Benefits of infrared testing include identifying insulation needs, moisture problems, and air leakage paths within walls, attics, windows and doors, as well as providing a quality check for 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 will be available to all natural gas customers and electrically-heated homes—those with electric only, provided gas by another utility or use propane as a heat source, are not eligible for the Infrared Audit because it is primarily used as an inspection to detect where your home is losing heat. As with the Standard Audit, customers receive a cash rebate from Public Service and pay the auditor directly.

Public Service uses the Home Energy Audit product to support and drive participation in the Home Performance with ENERGY STAR (HPwES) product. Customers must begin the HPwES process with a home audit to identify areas for improvement and to educate them as to whether or not their house is a good candidate for participation. The audit also assists in developing a scope of work for their project, and encourages completion of the recommended improvements.

B. Targets, Participants & Budgets

Targets and Participants

The Home Energy Audit product includes a participant goal, but no energy or demand savings goals 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 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 Public Service through the customer call center or via the Xcel Energy website⁷³ to find a qualified and participating auditor. The customer calls 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 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.

D. Marketing Objectives & Strategies

Historically, Xcel Energy's Home Energy Audit product has proven to be a popular offering. This product will be marketed primarily through seasonal bill onserts, social media, trade partners, and media relations. Further, Public Service will market this product through general customer inquiries regarding their energy bill and cross-marketing efforts with other Public Service residential energy efficiency products. In addition, the Company will identify "green event" opportunities within the community and provide product collateral as part of the overall marketing plan. Product activity will be monitored on a monthly basis to quickly implement the above strategies, if warranted.

Completed audits and monthly totals are processed and reported on a weekly and monthly basis. To confirm the continuing quality of the product, Public Service will implement a quarterly Customer Satisfaction Survey to gauge customer satisfaction with their experience with the Home Energy Audit product, specifically focusing on the independent contractor's performance and the audit experience. This will also be used as

73

[http://www.xcelenergy.com/Save Money & Energy/Residential/Energy Audits/Home Energy Audit - CO](http://www.xcelenergy.com/Save_Money_&_Energy/Residential/Energy_Audits/Home_Energy_Audit_-_CO)

a tool to monitor auditor performance and to identify any significant changes or trends that may impact the product's success.

In addition to a satisfaction survey, Public Service 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 DSM product they participate in (HPwES, Saver's Switch, Refrigerator & Freezer Recycling, etc).

E. Product-Specific Policies

In order to qualify for the product, participants must be residential customers living in Public Services' Colorado service territory. Infrared Audit customers must be residential customers that receive natural gas or electric-only service with electric heat from Public Service to qualify for participation. Qualifying customers may receive an audit once every two years.

Qualified auditors have a minimum of BPI or RESNET HERS certification and one year of audit experience, or comparable training/in-field experience to provide audit services for this product. Participating auditors will also be required to attend mandatory product training, which will include training on the product modeling software. There will be a \$150 per auditor membership fee which will be 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.

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, we will require auditors to use a specific energy modeling software package.

F. Stakeholder Involvement

Public Service collaborates with trade allies such as the Energy Efficiency Business Coalition (EEBC), Colorado Energy Office, other utilities, local communities, and contractors. The Company also provides updates to interested parties at the quarterly DSM 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 that 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.

➤ DSM Planning & Administration

A. Description

DSM Planning & Administration is an indirect service with internal staff that manages all energy efficiency-related compliance filings, including this Plan, the annual DSM Status Report, and other regulatory filings. This group performs the benefit-cost analyses of all of 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 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 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 of the states where Xcel Energy offers energy efficiency products, we are able to lend consistency and share best practices across all of the jurisdictions.

B. Targets, Participants & Budgets

Targets and Participants

As an indirect service, DSM Planning & Administration does not have savings or participation targets.

Budgets

The DSM Planning and Administration budget is made up primarily of internal labor required to manage DSM filings, regulatory proceedings, stakeholder meetings, and cost-effectiveness analysis. Employee expenses, consulting and contracting services are a very small portion of the total budget. Actual expenditures in 2013 were used as a guide for development of the 2015 and 2016 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

This product has no specific policies.

F. Stakeholder Involvement

Public Service considers its stakeholders for DSM Planning and Administration to be both the internal groups who manage the DSM products and require DSM 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 products. The DSM Planning and Administration group meets with its external stakeholders regularly through the DSM Roundtable, but also meets with parties at other times as needed.

G. Rebates & Incentives

There are no customer rebates associated with this service.

➤ 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 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, 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 14 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 products, also reported via 60-Day Notice, will include a detailed EM&V process consistent with the approach described herein.

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 gross energy savings are accurate. These performance year activities include:

Rebate Application Validation

This validation procedure applies to all 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 all 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 application is sent back to the account representative or customer. For custom products, engineering staff reviews the project documentation to verify customer information, equipment eligibility, and proper rebate amounts, and then delivers final numbers to Rebate Operations.

Step 2: Daily Audit – Rebate Operations then audits all business and residential applications to verify that 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 approaches, 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 the onsite verification information gathered between November 1 and October 31 to confirm energy efficiency measure installation rates for each calendar year (within the DSM Annual Status Reports). Using an offset calendar will allow the inspector to gather the required information by January 1 each year.⁷⁴

Prescriptive products use stipulated or deemed technical assumptions assigned to each measure in order to calculate gross 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 conduct field inspections for a sample of 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 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 contractor may confirm the manufacturer, model number, efficiency rating, equipment size, capacity or output, application of measure (e.g. motors that run 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

⁷⁴ Previously, the Company utilized a January 1 through December 31 M&V period for each calendar year. Moving forward, the Company will use the time period November 1 through October 31 for its M&V period, which will reduce lag time in data reporting, enabling 12-months of M&V data to be available by year-end to support data analysis for the DSM Annual Status Report. For the first year of this approach, the Company will compare January 1, 2014 – October 31, 2014 M&V against January 1, 2014 – December 31, 2014 to identify if there is a deviation in the final sampling from the required 90% confidence interval, with 10% precision. If no significant variance is observed the January 1 – October 31, 2014 data will be utilized for the 2014 DSM Annual Status Report; if a variance is observed, the Company will utilize the data that includes November and December 2014 for the 2014 DSM Annual Status Report. Starting in 2015, the November 1, 2014 – October 31, 2015 data will be utilized for the 2015 DSM Annual Status Report; and the November through October M&V period will continue into the future.

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 in order to ensure that the realization rate accuracy exceeds the accuracy goal for the product. Sampling bias will be reduced using random selection of sample points and a requirement to inspect these 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 product as a whole is the ratio of the product’s total verified savings to the total rebate reported savings. The product 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 components of these products, adhere to the prescriptive M&V process:⁷⁵

Business Products	Residential Products
<ul style="list-style-type: none"> • Commercial Refrigeration Efficiency • Compressed Air Efficiency • Computer Efficiency • Cooling • Data Center Efficiency • Heating Efficiency • Lighting Efficiency • Lighting – Small Business • Motor & Drive Efficiency • Process Efficiency 	<ul style="list-style-type: none"> • Evaporative Cooling • Residential Heating • High Efficiency Air Conditioning • Insulation and Air Sealing • Water Heating

The general M&V process for the following prescriptive products, or prescriptive components of products, is outlined below.

1(a). General Prescriptive DSM 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 each business and residential product rebate application and associated vendor invoices, checking the customer information, equipment eligibility and proper rebate amounts. If information

⁷⁵ Note: these products may have both prescriptive and custom components, in which case they will be subject to both prescriptive and custom M&V.

is missing or incorrect, the application is sent back to the account representative or customer to make changes.

3. If the project qualifies for rebate, Rebate Operations enters rebate application data into Salesforce (customer relationship management system) and authorizes rebate payment. Prior to authorizing rebates, all applications are verified in a daily audit.

Ongoing M&V

4. Public Service sends the VC a list of all of the projects completed on an agreed to schedule.
5. The VC selects a statistically valid sample of projects to inspect. The sample size is designed to achieve 90% confidence with 10-20% precision.
6. The VC contacts the customer to schedule the inspection or complete the phone survey.
7. The VC visits the customer site and verifies the savings factors or checkpoints for that measure.
8. The VC inputs the verified savings factors into the calculation system 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 equal.
9. The VC calculates 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 particular products. The following products, or components of these products, require exceptions to the prescriptive M&V process:⁷⁶

Business Products

- Data Center Efficiency

Residential Products

- Energy Efficient Showerhead
- ENERGY STAR New Homes
- Home Energy Squad
- High Efficiency Air Conditioning
- Home Performance with ENERGY STAR
- Refrigerator and Freezer Recycling
- School Education Kits

Low-Income Products

- Energy Savings Kits
- Multifamily Weatherization
- Non-Profit
- Single-Family Weatherization

⁷⁶ Note: these products may have both prescriptive and custom components, in which case they will be subject to both prescriptive and custom M&V.

The unique M&V processes for these products are described below:

Data Center Efficiency

For verification of the EC plug fan 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.

Energy Efficient Showerhead

The Energy Efficient Showerhead product offers Residential natural gas and combination gas and electric customers a free high-efficiency showerhead and kitchen and bathroom aerators to help reduce their utility costs. The third-party implementer reports on the quantity of showerheads distributed. A third-party survey company determines the installation rates of each component.

ENERGY STAR New Homes

The ENERGY STAR New Homes product utilizes the HERS raters' report outputs as the basis for product M&V. The third-party implementer conducts Quality Assurance/Quality Control (QA/QC) of the HERS raters' results. Each project is verified by a HERS rater and the third-party product implementer prior to issuing a rebate to the builder using the following process:

1. Builder contacts HERS rater to express interest in building an energy efficient home and participating in the ENERGY STAR New Homes product.
2. HERS rater works with builder to construct the home to meet or exceed the ENERGY STAR New Homes product requirements. The HERS rater visits the home during construction to inspect the building method used and the equipment installed.
3. Once the home is completed, the HERS rater performs a blower door test on the house and then calculates the final HERS Index. The HERS rater models the home by entering the individual home characteristics into REM/Rate, a software product approved by RESNET. When the rating of the home is completed, the electronic model for the house is submitted to the rater's HERS provider. RESNET sets forth the role of the provider and provides accreditation. The HERS rater may be employed by the provider but must not be the same individual performing the quality assurance duties for the provider. The provider shall not be the same person that rated the home. The HERS provider will review the file for accuracy and errors. RESNET requires that HERS providers perform quality assurance on 10% of each rater's building files and fully replicate 1% of the home ratings annually.
4. The rater submits the specific REM/Rate reports and the final HERS Index to the Company's third-party product implementer, at which point the implementer performs QA/QC. The builder's rebate is calculated based on the percent by which the new home exceeds the local building jurisdictions energy code requirements, which has a direct correlation to gas and electric savings. There is no rebate application for this product because the REM/Rate reports and supporting information submitted to the product third-party implementer includes the data used to determine each individual home's

rebate amount. The third-party implementer ensures that all the information entered by the HERS rater into their software system (database) is correctly entered and tracked. The third-party implementer then enters the required information into Salesforce, including the key REM/Rate output data. The REM/Rate data is used by the Company to calculate the energy savings achieved for each home.

5. Public Service tracks and stores key parameters such as the home address, square footage, builder name and address, HERS Index, blower door test score, gas and electric energy saved, date tested, and rebate amount paid to the builder.

Home Energy Squad

The third-party implementer verifies and reports implemented measures to the Company.

High Efficiency Air Conditioning

The High Efficiency Air Conditioning (HEAC) product has 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 must verify that a Public Service-approved load calculation was performed, that the unit was 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 sends the VC a list of all projects completed on an agreed to schedule.
2. The VC selects a statistically valid sample of projects to inspect. The sample size is designed to achieve 90% confidence with 10-20% precision.
3. The VC contacts the customer to schedule the inspection.
4. The VC verifies that a PSCo-approved load calculation was used to size the equipment.
5. The VC visits the customer site and tests the loaded, equilibrium performance of installed air conditioning equipment for proper refrigerant charge and air flows.
6. The VC verifies duct sealing by observation of sealing mastic or other Air Conditioning Contractors of America (ACCA)-approved sealing means on accessible joints.

7. The VC compares 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 considered to be 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 G).
8. The VC inputs the verified savings factors into an M&V calculator spreadsheet to calculate the project's verified energy savings.
9. The VC calculates the project's RR by dividing the recalculated or verified savings by the reported or rebated savings. At one or 100%, the verified and rebated savings are equal.
10. The VC then calculates the product's RR, which is the 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 October 1 to September 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 are applied to the gross verified savings to determine net savings.

Home Performance with ENERGY STAR

The Home Performance with ENERGY STAR product is designed to take a whole house approach to improving the energy efficiency of existing single-family homes. Contractors will have their first five completed projects inspected and then 10% of their completed projects thereafter. The M&V process for Home Performance with ENERGY STAR is as follows:

1. Customer receives a Home Energy Audit with blower door test.
2. Customer submits product application form.
3. Within one year of enrollment in the product, the customer installs the required measures. As required depending on the number of the projects completed by the contractor, the contractor schedules a final verification inspection with our selected third-party implementer.
4. During the verification inspection, the VC performs a blower door test and a Combustion Appliance Zone (CAZ) test and verifies that the homeowner has performed all of their planned energy efficiency improvements. If the contractor tests out of this requirement (for their first five projects), a random inspection of 10% of projects completed thereafter will be conducted by the third-party implementer.
5. When the inspection is completed, the third-party implementer and/or contractor submit a rebate form to the Company, along with copies of invoices for all of the completed improvements.

Refrigerator and Freezer Recycling

The Refrigerator and Freezer Recycling product is designed to reduce energy usage by allowing customers to dispose of their operable, inefficient primary or secondary refrigerators or freezers in an environmentally safe and compliant manner. Customers call the vendor directly to sign up for the product and schedule an appointment, and are verified by the vendor using data provided by the Company. The vendor sends monthly reports to Public Service of all customers who participated in the product, which are uploaded into an internal customer database. The VC conducts phone surveys to verify removal of refrigerator and that the refrigerator/freezer was operable at time of removal.

School Education Kits

School Education Kits is a turnkey product designed to provide households with information and equipment to realize immediate energy savings. The third-party implementer issues the kits and completes follow-up surveys to a sample of the participants to determine if the equipment was installed. An installation rate—calculated by the third-party implementer—is then applied to the gross savings for the calendar year.

Energy Savings Kit (Low-Income)

The Energy Savings Kit product provides a bundle of home energy efficiency measures and educational items in a kit that can be distributed to low-income customers. A third-party implementer manages the kit fulfillment and another third-party partner completes follow-up phone surveys to a sample of participants to confirm whether the kit contents were installed. Through the survey results, the third-party partner determines the installation rate, which is then applied to the gross savings for the calendar year.

Single-Family Weatherization (Low-Income)

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 actually install the measures. The specific product process, including verification, is outlined below.

1. The third-party implementer guides income-qualified 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 (Low-Income)

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 actually installs the measures. The specific product process, including verification, is outlined below.

1. Income-qualified 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. 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 (Low-Income)

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 actually installs the measures. The specific product process, including verification, is outlined below:

1. Income-qualified 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. Consultant produces an audit report outlining savings opportunities and potential savings.
4. 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 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 in order to calculate the energy and demand savings. For all Custom projects, one of the Company's energy efficiency engineers calculates 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 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 may also 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	Low-Income Products
<ul style="list-style-type: none"> • Commercial Refrigeration Efficiency • Compressed Air Efficiency • Cooling • Custom Efficiency • Data Center Efficiency • Energy Management Systems • Heating Efficiency • Lighting Efficiency • Motor and Drive Efficiency • Process Efficiency 	<ul style="list-style-type: none"> • Multifamily Weatherization • Non-Profit

2(a). General Custom Project M&V Process:

The general custom project M&V process includes pre-approval, M&V site verification, and rebate approval and payment.

Pre-Approval Steps:

1. Customer submits custom application describing the proposed project, purpose, and potential for energy savings.
2. Public Service energy efficiency engineer or outside engineering firm reviews the application and calculates the 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 particular type and size of project in question.
3. 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:

7. If monitoring is required, a Public Service energy efficiency engineer drafts a project-specific M&V plan, which is sent out for customer review and signature.
8. 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.
9. After the designated pre-monitoring period, the customer completes the project installation and submits all required documents.
10. Outside engineering firm collects post-installation monitoring data and sends post data to Public Service.
11. 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.
12. For non-managed customers completing custom projects, the Company's Business Solutions Center and Program Manager will review project documentation.

Approval & Rebate Payment:

13. 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.
14. 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.
15. 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 and incremental cost will be booked for the project.

2(b). Exceptions to Custom DSM Product M&V

The following Business products, having special design elements, are verified using processes unique to the product or component:

- Energy Management Systems
- New Construction
- Recommissioning
- Self Direct

The M&V process for each of these products is described below:

Energy Management Systems

The original EMS product components, including installation of systems that control and reduce a building's energy usage both on- and off-peak, will follow the general Custom M&V process. The new Energy Information Systems (EIS) component of the 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:

Measure Type	Description	M&V Protocol
New system or process automation opportunities	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 opportunities	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 Unique Custom M&V Process used for Recommissioning product.
Behavioral or Operation Opportunities	Measures that require manual intervention to achieve energy savings that may not be feasible through system automation.	Within the EIS, tracking mechanisms will be established to check the ongoing performance of each behavioral measure. On an annual basis the third-party implementer, with review by Xcel Energy engineers, will analyze data from the EIS 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. Since the period of participation is expected to last five years, 1/5 of the annual savings for each behavioral measure will be claimed each year in the Company's DSM Annual Status Report.

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. 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 and 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. Customer submits an application describing the proposed project.
2. Third-party implementer conducts an introductory meeting with the design team/customer.
3. Customer applies for rebates based on the energy efficiency measures they have incorporated into their design plans.
4. Third-party implementer reviews construction documents compared to application submitted.
5. Third-party implementer visits site and 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. Third-party implementer determines final savings based on data logging and verification.
8. Rebates are issued to customer based on final savings.

Recommissioning

The Recommissioning product identifies existing functional systems that can be “tuned up” to run as efficiently as possible through low- or no-cost improvements. Because Recommissioning projects are difficult to meter, a combination of metering and calculations may be used. The specific product process, including verification, is outlined below.

Study Pre-Approval

1. Customer hires an engineering firm (Recommissioning provider) to draft a proposal to conduct a study.
2. Customer submits application and proposal from Recommissioning provider to Public Service for study pre-approval.
3. After pre-approval, Recommissioning provider or customer can begin study of the building to identify savings opportunities and determine energy savings for each measure. Approved customers may perform their own measure analysis and/or use our Recommissioning calculator tool with standard savings calculations.

Study Approval

4. Completed study is submitted to Public Service for review.
5. If study is approved, the provider will present study to customer and Public Service issues study rebate. If study is not approved, Public Service will follow up with provider or customer to reconcile issues.
6. Public Service follows up (generally within seven business days) with a detailed M&V plan that the customer must sign. Public Service engineer reviews all savings calculations and identifies if any individual measures will require metering (measure savings > 1 GWh or 20,000 Dth). If metering is needed, Public Service will send out a letter alerting customer that one or more measures will require metering.

Implementation

7. Customer notifies Public Service of measures to be improved. For those measures > 1 GWh or 20,000 Dth, Public Service notifies the VC that pre-installation metering is needed. Pre-metering must be completed prior to measure recommissioning in accordance with the M&V plan.
8. Customer implements selected measures and notifies their Public Service account manager of their completion. For measure savings > 1 GWh or 20,000 Dth, Public Service notifies the VC that the customer is ready for post-metering.
9. Post-monitoring data is submitted to Public Service engineer for analysis and determination of final savings and rebate amount.

Approval & Rebate Payment

10. Account manager collects invoices and signed rebate form identifying which measures were installed.
11. The invoices are reviewed and if the invoice details match what was submitted on the rebate form, then the pre-approved rebate is awarded. If there are discrepancies, the account manager works with the customer to provide additional detail and reconcile differences.
12. Rebate is issued to the customer based on final 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 in order 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.

3. M&V Process for Products Delivering Upstream/Midstream Incentives

Beginning in 2015, the Company will offer midstream incentives to distributors for Cooling and Lighting Efficiency measures. The rebate treatment (administration vs. participant incentive) and NTG will be 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:

3(a). Computer Efficiency

The Computer Efficiency product offers upstream incentives to manufacturers that produce and sell PCs and servers with high efficiency power supplies to Public Service electric business customers and downstream incentives for Desktop PC Virtualization and PC Power Management to business customers who implement these strategies. These two product components have different M&V processes.

For the high efficiency power supplies, Public Service tracks the quantity and model number of the computers and servers sold through a third-party implementer and pays incentives to the manufacturer. The specific product process, including verification, is outlined below:

1. Participating manufacturers provide monthly sales reports to the third-party implementer, listing the model, quantity, ship-to zip code, and number of computers sold.
2. Participating manufacturers provide monthly reports to the third-party implementer listing customer returns to be credited.
3. To determine the efficiency and rebate level, each PC and server model are assigned by the third-party implementer to one of four rebate tiers based on the efficiency of the model's power supply.
4. The third-party implementer enters the information into a tracking system and submits monthly reports on the data to Public Service.
5. Public Service will receive quantity of units sold/returned, zip codes, efficiency levels, and incentive levels, and calculate energy savings from the monthly reports provided.

Installation rate is assumed to be 100% because computers are purchased to be put into service and are not inventoried for long periods due to their high cost and short shelf-life.

3(b). Cooling

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 product 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 and calculation of the demand and energy savings using technical assumptions provided by PSCo.
3. The VC will audit the database output by examining and comparing against retailer sales reports. The VC will adjust the calculations if errors are found and provide the final verified savings for all equipment for year-end, validating the NTG and rebates paid.

3(c). *Lighting Efficiency and Small Business Lighting*

Within the Lighting Efficiency and Small Business Lighting 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 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 are 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 program participants. If there is no evidence that a portion of the rebate is passed on to program 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 Lighting 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 PSCo.
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 program 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 program year. The NTG for this approach is deemed within this Plan, but calculation of the measure penetration will be completed at year-end to inform future NTG treatment.

3(d). *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 PSCo. High efficiency bulb costs will be forecasted in the Plan based on estimated costs, observed costs will be captured throughout the year will be used to calculate

the actual average incremental capital cost reported in the DSM Annual Status Report. The baseline bulb costs will be deemed within the Plan will be used within DSM Annual 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.

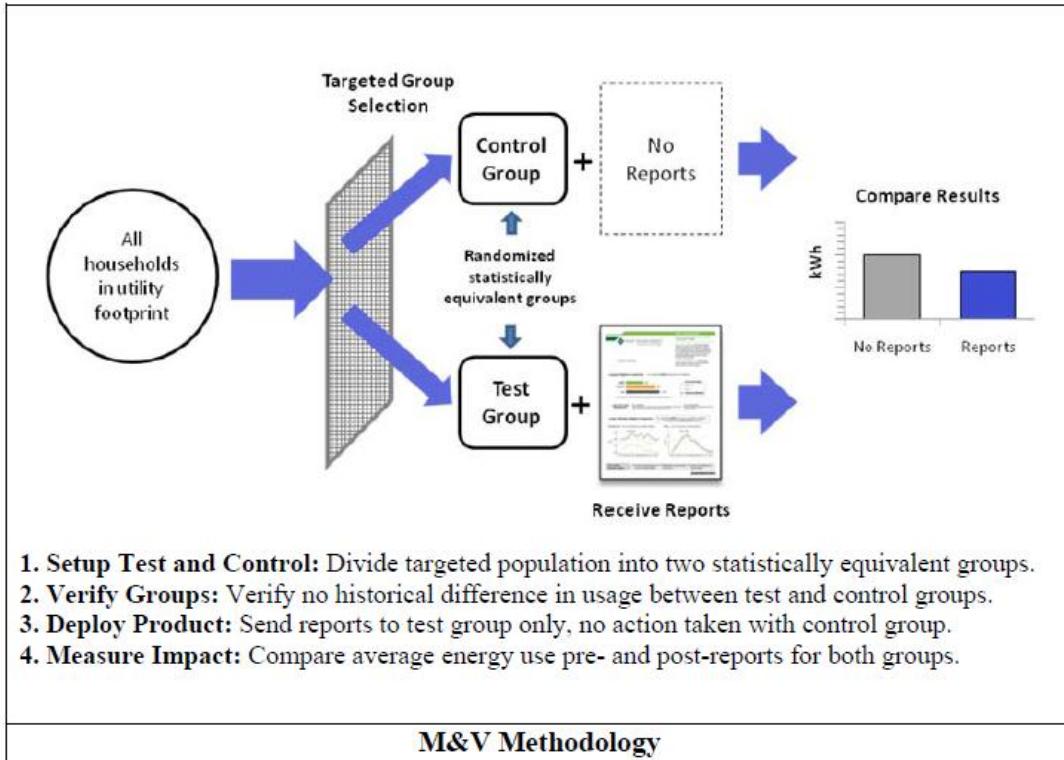
4. M&V Process for Energy Feedback Behavioral Products

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 Energy Feedback products is described below.

Energy Feedback – Residential and Business Opt-out Products

The Energy Feedback products provide targeted communication of energy-use comparisons and information to our residential and business 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 program. Meter data for all participants, comparison homes/businesses, and control homes/businesses 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.



Moreover, the M&V methodology incorporates recommendations made by the Center for Energy and Environment (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 course of the program. 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.

The following regression model is used to estimate $\hat{\beta}$, the average energy saved per day per household/business. The model is estimated separately for electricity and gas.

Where:

Variables:

- $usage_{it}$ is average daily usage for meter read t for household/business i in the post-treatment period
- $treatment_i$ is an indicator for assignment of household/business i to the treatment group
- pre_usage_i is average daily usage across household/business i 's available pre-treatment meter reads
- pre_winter_i is average daily usage over the months of Dec, Jan, Feb, and Mar across household/business i 's available pre-treatment meter reads. This value is imputed, if missing, with household/business i 's value for pre_usage_i .
- pre_summer_i is average daily usage over the months of Jun, Jul, Aug, and Sep across household/business i 's available pre-treatment meter reads. This value is imputed, if missing, with household/business i 's value for pre_usage_i .
- mm_t is a vector of month-year dummies

Parameters

- β is the average treatment effect of interest
- α_0 is a common intercept term
- α_1 , α_2 , and α_3 are the effect of the control variables pre_usage_i , pre_winter_i , and pre_summer_i on $usage_{it}$ in the reference month.
- γ is a vector of parameters capturing the average effect of each month-year dummy on $usage_{it}$
- δ_1 , δ_2 , and δ_3 capture the effect of the control variables pre_usage_i , pre_winter_i , and pre_summer_i on $usage_{it}$ in each month-year (mm_t) of the post-period
- ε_{it} is an error term
- i is notation for the i th customer
- t is notation for the first, second, third, etc.. month of the post-treatment period

kWh/Dth saved by Treatment Group = $-\hat{\beta} * \text{total_treatment_days} - \text{kWh/Dth saved by rebated equipment for the same time period and same customers}$

Kilowatt (kW) demand reduction will be determined by first estimating the daily energy savings from the monthly energy savings, then apportioning the daily energy savings over the system peak hour.

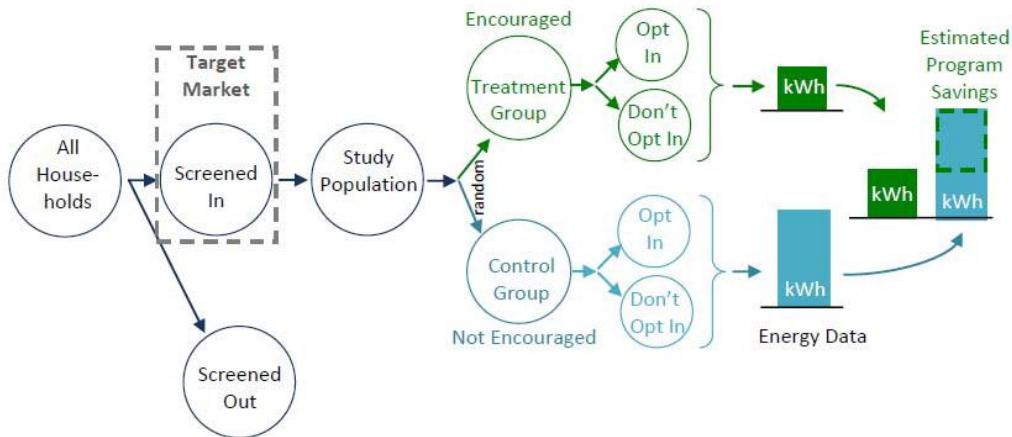
Online Energy Feedback (My Energy) Opt-in Product

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. Due to the nature of the opt-in online offering, Public Service proposes applying two methodologies and evaluating if one or both are able to measure the energy savings and participation

attributable to the My Energy portal. This methodology test will conclude with results reported in the 2014 DSM Annual Status Report. Any adjustments to the methodology used during the 2015/16 DSM Plan will be communicated via a 60-Day Notice after 2015/16 DSM Plan is approved.

Method 1: Randomized Control Trial with Random Encouragement

This EM&V option offers robust statistical significance and an unbiased approach, but is potentially limited in its applicability for the My Energy portal due to the portal's prominent integration into our popular My Account service. That service has already attracted more than 500,000 residential customers in Colorado and is still growing, which makes it difficult to fully isolate the Control Group from the tools and information within the portal.



Random Test Control with Encouragement Design (Source: Evaluation, Measurement, and Verification (EM&V) of Residential Behavior-Based Energy Efficiency Programs: Issues and Recommendations, SEE Action, May 2012)

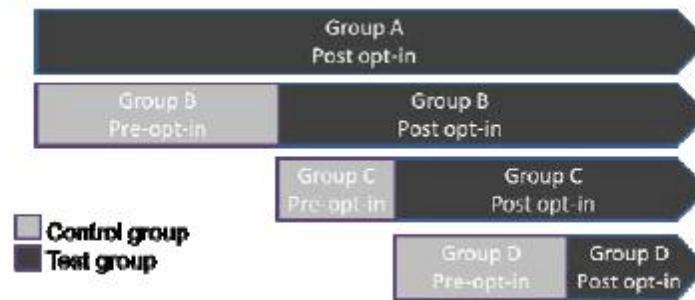
This methodology relies on a statistically significant increase in opt-ins due to outbound marketing efforts in order to establish a comparison in energy use between the Treatment and Control Groups. While Public Service believes this is possible, we acknowledge the challenge, along with the following shortcomings of this methodology:

- Screened out participants who opt-in via new My Account exposure will have their savings extrapolated from the Treatment/Control Group variations to determine a per-participant savings number that is then applied to all opt-in customers. We will determine and report on the appropriateness of this technique based on demographic, usage and/or life stage matching results, and the extent of this group's engagement.
- The difference in energy usage between the Treatment and Control Groups must be statistically significant. This requires extensive targeted marketing outreach to the Treatment Group, and limited engagement through My Account by Control Group customers.

Because the Control Group engagement is outside of the control of this methodology, we will employ a parallel measurement method to ensure we are able to measure savings in a statistically significant manner.

Method 2: Variation in Adoption (With a Test of Assumptions)

This methodology allows for the comparison of the energy usage of households that opt-in to the energy usage of households that have not yet opted in but will opt-in at a later point.



The benefits of this method include:

- Calculation of savings from all opt-in participants, regardless of marketing outreach efforts or whether we have electronic contact information for them. This makes this measurement methodology a potentially more accurate representation of the impacts of offering the My Energy portal.
- The ability to universally market the My Energy portal to all customers using less expensive marketing methods such as on-bill messaging and cross-promotion with other communication and marketing materials. Because this methodology does not require a significantly sized control group to be isolated for the duration of the product, it increases the potential of the product to encourage energy savings to a larger population, thus increasing the portal's potential energy savings.

The drawback to using this methodology is that the longer the product runs, the more likely it is that early participants will differ in demographics, energy use or life stages than much later participants. Because of the complexity of normalizing for these factors, Public Service is working with an independent M&V firm with experience in this area to calculate energy savings using this methodology in a statistically acceptable manner.

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 2015 and 2016 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 Energy Feedback results to prevent double counting.

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.

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 DSM Annual Status Report, according to the following formulas:

$$\begin{aligned} \text{Net verified kW savings} = \\ \text{Peak customer kW} * \text{Line Loss} * \text{Installation Rate} * \text{Realization Rate} * \text{NTG} \end{aligned}$$

$$\begin{aligned} \text{Net verified kWh savings} = \\ \text{Customer kWh} * \text{Line Loss} * \text{Installation Rate} * \text{Realization Rate} * \text{NTG} \end{aligned}$$

$$\begin{aligned} \text{Net verified Dth savings} = \\ \text{Gross Dth} * \text{Line Loss} * \text{Installation Rate} * \text{Realization Rate} * \text{NTG} \end{aligned}$$

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 Compressed Air Efficiency, Data Center Efficiency, or Recommissioning, 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) Comprehensive Product Evaluations

In addition to the performance-year M&V described above, Public Service will hire independent third-party consultants to complete comprehensive evaluations for specific products each year. Comprehensive product evaluations are conducted on a staggered schedule so that all products receive comprehensive evaluations at least once every eight years. The principal objectives of the comprehensive product evaluation is to assess customer satisfaction with the DSM product and implementation processes, conduct a thorough review of industry-wide approaches (process evaluation), and/or to assess changes that should be made to NTG ratios based on the evaluator's primary research (impact evaluation). 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.⁷⁷

⁷⁷ Order Addressing Application for Rehearing, Reargument, or Reconsideration & Motion for Extension of Time to File 2012-2013 Plan. Docket No. 10A-554EG, Order No. C11-0465, Pages 6 – 7.

Factors that are taken into consideration in determining the priority 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, and availability of other studies regarding the particular measures. Discussions with portfolio managers, product developers, and technical consultants are used to finalize the priority and schedule of evaluations.

The Company plans to conduct comprehensive evaluations of Home Lighting & Recycling and Lighting Efficiency in 2015⁷⁸ and Computer Efficiency, Lighting – Small Business, and Non-Profit in 2016. Residential Water Heating is also scheduled as a process only evaluation. A second year of evaluation of the Energy Efficiency Financing product is planned in 2016, to capture whether changes initiated in 2015 as a result of the first year of evaluation will yield the desired improvement in participation levels. This schedule will be reviewed at the beginning of each year and may be adjusted based on costs, scope, and need.

c) Portfolio-Wide Technical Assumption Evaluations

In lieu of evaluating product-specific technical assumptions in each comprehensive product evaluation, Public Service has initiated an ongoing portfolio-wide review of its technical assumptions whereby the assumptions for all programs are reviewed approximately every two years. This process will ensure that the Company is using the latest, best information available in every product offered. The next portfolio-wide technical assumptions evaluation will be conducted in 2016.

In June 2013, a third-party contractor conducted an evaluation of the Company's NTG ratios, filed as Appendix F of the 2014 DSM Plan. NTG ratios will be updated as comprehensive product evaluations are completed, but will not be addressed in the portfolio-wide technical assumptions evaluation.

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 California Evaluation Framework. The following links are to some of the common reference materials describe these protocols in more detail:

California Evaluation Framework:

http://www.calmac.org/publications/California_Evaluation_Framework_June_2004.pdf

⁷⁸ Within the 2012-2013 DSM Biennial Plan Stipulation and Settlement Agreement (11A-631EG), the Company agreed to perform "comprehensive program evaluations of Residential Home Lighting and Business Lighting in 2014-2015."

National Action Plan:

<http://www.epa.gov/cleanenergy/energy-programs/suca/resources.html>

SEE Action EM&V Resource Portal:

<https://www4.eere.energy.gov/seeaction/topic-category/evaluation-measurement-and-verification>

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. Targets, Participants & Budgets

Targets 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 DSM 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 "Program 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 "Program Evaluation" budgets, respectively, under the Indirect Products and Services section of the Plan.

The Company realizes the EPA may require enhanced EM&V protocols for utilities implementing energy efficiency programs in order for those energy savings to count toward future EPA Clean Power Plan targets. If this occurs, we understand this may increase the amount we need to spend annual on EM&V for our electric energy efficiency programs. Since the EPA plan is still in draft as of October 2014 and the EM&V requirements have not been clarified, the Company has not proposed to increase 2015 or 2016 EM&V budgets at this time. If EM&V spending needed to be increased during the

2015-16 time period, the Company's intention would be to use the budget flexibility within the energy efficiency \$84.3 million spend cap.

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 14 below.

Table 14: Measurement and Verification Summary by Product

Product Name	Program Component	M&V Protocol	2015/2016 M&V Plan
Business Electric:			
Commercial Refrigeration Efficiency	Direct Install and Prescriptive	General Prescriptive	Verification Contractor selects random sample & performs field inspections of deemed savings factors from direct installed measures and implemented measures.
	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 PSCo 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).
Compressed Air Efficiency	Prescriptive	General Prescriptive	Prescriptive rebates available for Variable Frequency Drive Compressors that are less than 50 hp and have no air loss drain valves. Verification Contractor selects random sample and performs field inspections of deemed savings factors -- e.g. size of compressor and number of drains.
	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 PSCo 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 - 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 in order to qualify for the study rebate. A realization rate of 100% is applied to the calculated savings from leak fixes.
Computer Efficiency ²	Prescriptive Rebates	General Prescriptive	Verification Contractor selects random sample and performs field inspections of deemed savings factors -- e.g. equipment type, model of equipment, building type. Information gathered for a sample of VDI devices and extrapolated to total population.

	Upstream/Midstream	Unique Prescriptive	Participating manufacturers will provide periodic sales reports, listing the model, quantity, ship-to zip code and number of computers sold to the third-party administrator. The third-party administrator will enter the information into a tracking system. The administrator will submit monthly reports containing the data tracked to Public Service. Public Service will receive quantity sold/returned, zip codes, efficiency levels, incentive levels and calculate energy savings from the monthly reports.
Cooling Efficiency	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	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 PSCo 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	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 PSCo 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 EC plug fan 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 PSCo 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 Feedback Business (2016)	Behavioral	Behavioral Prescriptive	Actual consumption in the form of meter data is used to M&V this program. Meter data for all participants, comparison businesses, and control businesses 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.
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 PSCo 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 (EIS) 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 PSCo. The 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 PSCo 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).
Motor & Drive Efficiency	Prescriptive	General Prescriptive	Verification Contractor selects random sample and performs field inspections of deemed savings factors -- e.g. horsepower, efficiency, type, speed, application, building type, and use of motor. For VFDs, size, speed, type, application and use of motor drive, and building type. If more than 10 motors, information will be gathered for a sample.
	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 PSCo 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	Custom - Energy Efficient Buildings	Unique Custom	Consultant visits site and 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 and 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.
Process Efficiency	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 PSCo 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).

Recommissioning	Custom	Unique Custom	Customer hires an engineering firm to conduct study of building and to determine energy savings for each measure. Internal energy efficiency engineers reviews and verifies that savings calculations are accurate for 100% of projects. For measures over 1 GWh of savings, pre and post metering is required to verify savings, if feasible. For projects that are very difficult to meter, a combination of metering and calculation may be used.
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. Additionally, 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.
Small Business Lighting Efficiency	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/fixtures.
	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 PSCo engineers complete analysis. Account Manager or Business Solutions Center verifies project installation and collects equipment invoices. Projects \geq 1 GWh savings: Pre & Post Metering verifies savings. (Projects of all sizes may be metered depending on certainty assessment of savings).
Business Gas:			
Commercial Refrigeration Efficiency	Prescriptive	General Prescriptive	Verification Contractor selects random sample & performs field inspections of deemed savings factors from direct installed measures and implemented measures
Heating Efficiency	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 \geq 20,000 Dth savings: Pre & Post Metering verifies savings. (Projects of all sizes may be metered depending on certainty assessment of savings).

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 Feedback Business (2016)	Behavioral	Behavioral Prescriptive	Actual consumption in the form of meter data is used to M&V this program. Meter data for all participants, comparison businesses, and control businesses 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.
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 (EIS) 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.
New Construction	Custom - Energy Efficiency Buildings	Unique Custom	Consultant visits site and 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 and 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.

Recommissioning	Custom - Study Driven Credit	Unique Custom	Customer hires an engineering firm to conduct study of building and to determine energy savings for each measure. Internal engineer reviews and verifies that savings calculations are accurate for 100% of projects. For measures >1 GWh savings or over 20,000 Dth of savings, pre and post metering is required to verify savings, if feasible. For projects that are very difficult to meter, a combination of metering and calculation may be used.
	Custom	Unique Custom	Customer hires an engineering firm to conduct study of building and to determine energy savings for each measure. Internal engineer reviews and verifies that savings calculations are accurate for 100% of projects. For measures >1 GWh savings or over 20,000 Dth of savings, pre and post metering is required to verify savings, if feasible. For projects that are very difficult to meter, a combination of metering and calculation may be used.
Residential Electric:			
Energy Feedback Residential	Behavioral	Behavioral Prescriptive	Actual consumption in the form of meter data is used to M&V this program. 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.
ENERGY STAR New Homes	Prescriptive	Unique Prescriptive	RESNET Certified HERS rater performs multiple site walk throughs and at the end of construction determines final HERS rating - 100% site verification. Rebate amount is determined by the modeled energy consumption (as-built home) percent better than local code requirement (reference home). Home size information, measures installed, and HERS rating are verified by third party product implementer and then submitted to Public Service.
Evaporative Cooling Rebate	Prescriptive	General Prescriptive	Verification Contractor selects random sample and performs field inspections of deemed savings factors; e.g. type of unit (tier 1, 2 or 3), and type of unit if previously installed and if registers and ducting are complete (if applicable to tier).
Home Energy Squad	Prescriptive	Unique Prescriptive	Third-party implementer verifies installation of measures.
Home Lighting & Recycling ¹	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.

High Efficiency Air Conditioning	Prescriptive	Unique Prescriptive	Verification Contractor selects random sample and performs field inspections of deemed savings factors using a defined process. This includes verifying load calc was performed, unit sized properly and that refrigerant charge, air flow, and duct leakage are within acceptable ranges.
Home Performance with ENERGY STAR	Prescriptive	Unique Prescriptive	Third-party product implementer performs a walk through inspection after the homeowner has performed all of 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. PSCO 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.
School Education Kits	Prescriptive	Unique Prescriptive	Third-party product implementer conducts mail 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.
Energy Feedback Residential	Behavioral	Behavioral Prescriptive	Actual consumption in the form of meter data is used to M&V this program. 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.
ENERGY STAR New Homes	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 - 100% site verification. Home size information, measures installed, and HERS rating are verified by product implementer.
Heating System Rebate	Prescriptive	General Prescriptive	Verification Contractor selects random sample & performs field inspections of deemed savings factors; e.g. manufacturer, model, serial number
Home Energy Squad	Prescriptive	Unique Prescriptive	Third-party implementer verifies installation of measures.

Home Performance with ENERGY STAR	Prescriptive	Unique Prescriptive	Third-party product implementer performs a walk through inspection after the homeowner has performed all of 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. PSCO 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 Rebate	Prescriptive	General Prescriptive	Verification Contractor selects random sample & conducts onsite 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 Building Performance Institute (BPI), registered under Xcel Energy's program 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.
Water Heating Rebate	Prescriptive	General Prescriptive	Verification Contractor selects random sample & performs field inspections of deemed savings factors -- e.g. type of unit installed.
Low-Income Electric:			
Energy Savings Kits	Prescriptive	Unique Prescriptive	Verification Contractor selects random sample & 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. PSCo engineer reviews audit report and approves or denies report. Consultant visits site to verify that approved measures were installed and submits final savings in verification report.
Non-Profit Energy Efficiency ²	Prescriptive	Unique Prescriptive	Consultant visits building and completes energy audit. PSCo engineer reviews audit report and approves or denies report. Consultant visits site to verify that approved measures were installed and submits final savings in verification report.
Single Family Weatherization	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 PSCo.
Low-Income Gas:			
Energy Savings Kits	Prescriptive	Unique Prescriptive	Verification Contractor selects random sample & 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. PSCo engineer reviews audit report and approves or denies report. Consultant visits site to verify that approved measures were installed and submits final savings in verification report.

Non-Profit Energy Efficiency ²	Prescriptive	Unique Prescriptive	Consultant visits building and completes energy audit. PSCo engineer reviews audit report and approves or denies report. Consultant visits site to verify that approved measures were installed and submits final savings in verification report.
Single Family Weatherization	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 PSCo.
¹ Comprehensive Evaluation will be conducted in 2015.			
² Comprehensive Evaluation will be conducted in 2016.			

➤ Market Research

A. Description

The Company conducts market research and analysis to support effective design and implementation of DSM products and services. This enhances understanding of 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 products, and business direction for Xcel Energy DSM efforts.

In 2015 and 2016, the Company plans to continue procurement of the following market research resources:

- *E Source* membership provides unbiased, objective research and advisory services that help advance efficiency programs, improve the customer experience, and use energy more efficiently.
- *Dun & Bradstreet* list purchase provides specific demographic information helpful in effectively identifying potential business customers capable of benefiting from existing and planned DSM programs.
- *Consortium for Energy Efficiency* (CEE) membership assists in defining market approaches aimed at more efficient use of regulated energy sources.
- *Attitude, Awareness and Usage* (AAU) research helps gain an understanding of current customer perceptions around energy conservation and gather feedback on product offerings.

In 2015, the Company plans to conduct the following special market analysis:

- *Colorado Lighting Product Market Assessment* – The study objective is to better understand changes in ordering and stocking of residential and business lighting technologies in Colorado, in particular the handling of remaining stock of inefficient bulbs.

In 2016, the Company plans to conduct the following special market analysis:

- *Colorado DSM Market Potential Assessment* – This study will follow on two preceding potential studies procured by the Company in 2009 and 2013, in support of the next DSM Strategic Issues filing.⁷⁹

The list of research projects will be reviewed at the beginning of each year and may be adjusted to align with current information needs.

⁷⁹ In Decision No. C14-0731 (Proceeding No. 13A-0686EG), on page 39, paragraph 116, the Commission states "...we direct Public Service to complete a new study prior to the filing of its next DSM strategic issues proceeding," and in paragraph 117, "we will require Public Service to file another DSM Strategic Issues proceeding in the first quarter of 2017."

B. Targets, Participants & Budgets

Targets 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 product impacts and identify new marketing opportunities. Market trends are reviewed to identify market potential for DSM products and gauge customer understanding and satisfaction with program 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.

G. Rebates & Incentives

This indirect impact product does not deliver customer rebates or incentives.

➤ 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 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 or the Product Development team identifies potential opportunities for new products or measures. The Product Development team works on both energy-efficiency and load-management products.

Opportunity Identification

The Product Development team will screen, research, evaluate, and prioritize these ideas for potential inclusion in the DSM portfolio. New products may be added to the portfolio as a new measure within an existing product, 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 will report analysis and next steps for concepts submitted via the Product Development Opportunity Identification Form at quarterly DSM Roundtable Meetings.

The Company will provide a thirty-day advance notification to the Roundtable, via email, when the Company's PD product development opportunity identification and prioritization effort will be initialized—which occurs approximately every 12-18 months. This notification will serve as a reminder to DSM Roundtable participants to submit Idea Submission Forms for consideration in this process.

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.⁸⁰ Product Development works with other utilities, program administrators and research organizations³ to identify new technologies that have the potential for consistent and measurable energy savings which are close to commercialization. Promising new

⁸⁰ First added in the 2009/10 Biennial DSM Plan (Docket No. 08A-366EG) as part of the Stipulation and Settlement Agreement, Appendix A, Paragraph f, pg. 4; which stated: "The Company agrees to increase the budget for research on emerging technologies and new program development."

³ 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).

technologies are then evaluated through the Opportunity Identification process described above.

Pilots

For 2015 and beyond, the team will continue to be a major contributor to the Company's efforts to cost-effectively achieve its energy-efficiency goals and explore new approaches to increasing energy efficiency among customers. The Company selects measures or products for development based on a variety of criteria, including: potential energy savings, cost of savings, ability to be developed and brought to market quickly and at a reasonable cost, 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 pilots during 2015 and 2016:

- Energy Feedback Pilot – Business⁸¹
- Multifamily Buildings Pilot
- Smart Thermostat Pilot
- Building Optimization DR Pilot

The Company will offer to hold at least two meetings with interested stakeholders, to discuss any new pilots that the Company decides to pursue, prior to 60-Day Notice.

B. Targets, Participants & Budgets

Targets and Participants

This is an indirect program and as such, has no estimated energy or participation targets.

Budgets

The budget was estimated based on actual 2013 and to-date 2014 costs, as well as the historical cost of similar work in other Company service areas. 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 program does not include a customer application process.

⁸¹ Energy Feedback Business will continue in 2015 as a pilot, but will be transitioned to a product within the Business Program in 2016.

Ideas for new products or measures can be submitted for consideration to Xcel Energy by following the detailed instructions included on the forms listed under ‘Product Development’ on this webpage:

[http://www.xcelenergy.com/About_Us/Rates_&_Regulations/Regulatory_Filings/CO_DSM.](http://www.xcelenergy.com/About_Us/Rates_&_Regulations/Regulatory_Filings/CO_DSM)

D. Marketing Objectives & Strategies

This indirect program does not have marketing objectives.

E. Product-Specific Policies

Product Development utilizes the following criteria to consider whether a DSM 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

Public Service 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 Roundtable Meetings and the use of Opportunity Identification Forms found on the Company’s DSM Website.

In 2015 and 2016, the Company will distribute a bi-monthly DSM Pilot/Product Development (“PD”) email update to stakeholders, describing the status of DSM Pilot/PD efforts, including the status of any upcoming and completed solicitations, as well as results of cost-effectiveness evaluations and technical feasibility.

G. Rebates & Incentives

This indirect program does not provide customer rebates.

➤ Energy Feedback Pilot – Business (2015)

A. Description

Business customer behavior-based energy conservation is a large and untapped source of energy savings for both utilities and their customers. The Energy Feedback Pilot – Business is based on the Residential Home Energy Reporting System, a patented program developed by Opower. The pilot provides a targeted direct mailing called the Business Energy Report to small business customers (<250 kW average annual usage) providing specific information and recommendations in order to motivate and to teach customers how to reduce their energy consumption. Customers receive new information with each Business Energy Report. Savings are quantified by comparing the energy consumption of the participating group to a non-participating Control Group; the third-party implementer will provide an analysis of the impacts in 2015. The group of randomly assigned customers receiving the reports is referred to as the “Treatment Group.” The group of randomly assigned customers who do not receive the reports is referred to as the “Control Group.” Energy savings of the “Treatment Group” is compared against this portion of customers.

The pilot’s main offering is the personalized Business Energy Report. The personalized Business Energy Report includes:

- Customers’ energy use compared to the average of 50 similar businesses in similar-sized buildings with the same heating fuel type;
- Targeted efficiency recommendations based on an analysis of the businesses’ energy usage, demographics, and characteristics; and
- Advice on how report recipients can easily implement efficiency measures based on their individual circumstances.

Public Service offers this pilot to quantify how various feedback methods affect small business customer energy usage by providing these customers with different forms of feedback regarding their energy consumption. The feedback communication strategies are intended to result in a permanent decrease in energy usage by inducing changes in the behavior of the end-user and an increased or earlier adoption of energy efficient technologies and energy efficient practices that remain even after the feedback stimulus is removed. The pilot will determine when, how, and why customers may change their consumption behavior when provided with information by utilizing energy use feedback modalities and frequencies.

This pilot will test feedback methods on a statistically significant scale to measure effectiveness in reducing electricity and natural gas use with small business customers. That periodic feedback is coupled with sophisticated communications designed to influence behavior and using the same periodic feedback supplemented with monthly and bi-monthly e-mailed feedback based on data acquired through Xcel Energy’s meter data.

Key research questions addressed by this pilot are:

- How much will electricity and natural gas use be reduced by providing monthly or bi-monthly feedback coupled with behavior change techniques such as social norming, goal setting, public commitment, reinforcement of successes, and motivation and recommendations targeted by market segment?
- Do the reductions in energy use achieved by providing feedback persist over time?
- Can likely high savers be identified and targeted in advance to maximize product cost-effectiveness?
- How do customers perceive the types of feedback, and what actions (behavioral, low-cost, capital investment) account for the savings achieved?
- Is customer feedback of this type cost-effective?

B. Targets, Participants & Budgets

Targets and Participants

The goal of this pilot is to quantify the impact of energy feedback on small business electricity and natural gas use including the persistence of savings over time. Approximately 10,000 participants have already been randomly selected from Public Service's small business customer segment (customers with < 250 kW average annual usage) and are currently receiving printed energy feedback reports as part of the pilot which started in 2014.

Budgets

The budget includes the cost for preparing and mailing the Business Energy Reports and an ongoing regression analysis of the Treatment Groups and the Control Groups to determine the electricity and natural gas savings. Administrative costs for data extraction and product administration are based on actual costs from the pilot in 2014. The main budget driver is the third-party administration which includes implementation, data analytics and marketing costs.

C. Application Process

Customer engagement occurs through random selection of 10,000 participants, called the Treatment Group, and a statistically significant and homogeneous non-contact Control Group. Customers are informed of their selection at the beginning of the treatment and are offered the opportunity to withdraw from the Treatment Group at any time. The Control Group is never contacted or influenced by any contact with this pilot.

Business Energy Reports

Business Energy Reports comprise carefully crafted components designed to work together to drive efficiency gains and maximize engagement. The reports provide customers with contextualized energy use, data-driven insights, and targeted action steps which are intended to motivate customers to take actions which lead to a sustainable drop in electricity and natural gas use. In order to develop targeted messages the third-party

implementer analyzes a vast array of data streams to derive insights about customer segments and individual customers. This data may include historical and meter data, rebate and purchase information, and third-party data such as building demographics (e.g. square footage, building age, and NAICS code), customer usage patterns, past DSM product participation, weather, geography, and more.

Reports are delivered in a varying cadence (e.g. monthly, a bi-monthly, quarterly) as appropriate). The third-party implementer will compile the usage data that has been provided by Public Service and will generate the appropriate analysis to create personalized reports for all eligible customers in the Treatment Group. After the personalized Business Energy Reports have been created, they will be printed and mailed in Xcel Energy-branded envelopes to customers.

Following the receipt of the Business Energy Report, customers may choose to phone our Business Solutions Center and talk to Energy Efficiency Specialists about questions regarding their energy usage or to inquire about participation in other products. Public Service representatives are trained to handle these inquiries and have access to a special customer service system that specifically provides support for this energy feedback product. For customers who can benefit, their enrollment in other products or participation in rebates will be handled through the usual Xcel Energy channels.

Customers in the Treatment Group have the option to log on to the My Account-My Energy portal and view their monthly report (including past reports), adjust their profiles, view energy data and analysis, or opt-out of the pilot at any time.

D. Marketing Objectives & Strategies

The objectives of marketing for the pilot will be to get as many customers as possible to not only read the reports, but complete energy efficiency actions that lower their energy usage. The specific strategies to do this will be fun, easy to comprehend print reports, engaging emails and a web portal experience that keeps customers coming back. These activities will be managed by the third-party implementer.

E. Product-Specific Policies

Customer confidentiality and data privacy practices will be stringently applied in accordance with Xcel Energy's Privacy Policy, available on the Company's website, here:

<https://www.xcelenergy.com/staticfiles/xe/Admin/Xcel%20Online%20Privacy%20Policy.pdf>. Customer assistance will be provided to participants and non-participants in the same manner.

F. Stakeholder Involvement

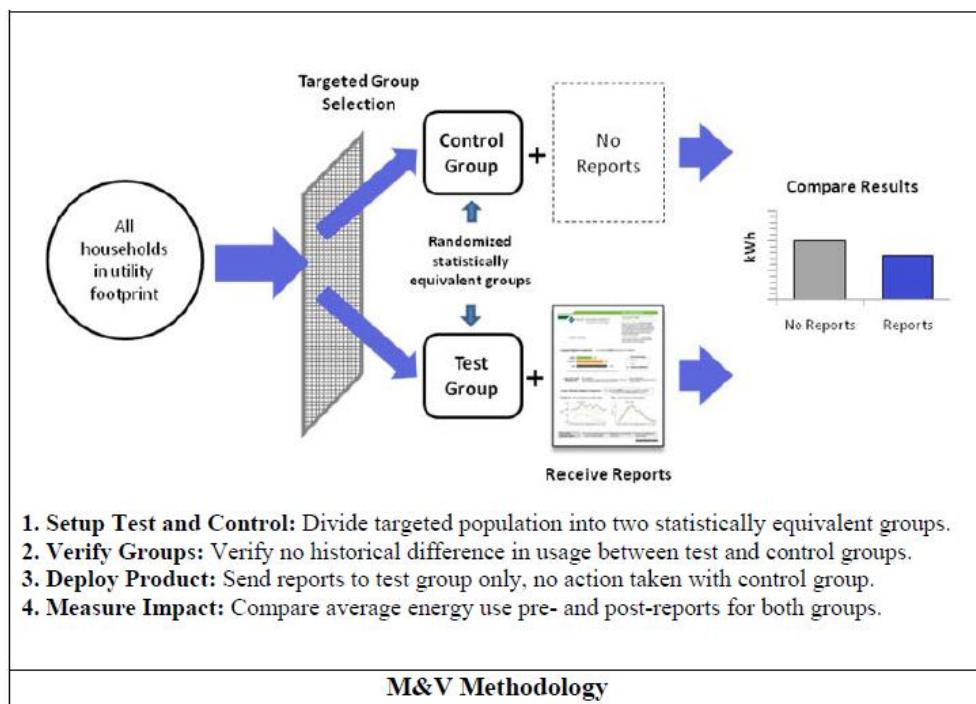
Public Service is studying energy behavior-based products as a result of recommendations from the Colorado DSM Roundtable.

G. Rebates & Incentives

Rebates are not offered as part of this pilot.

H. Evaluation, Measurement, & Verification

This pilot will not claim energy savings in 2015⁸² and therefore will not have any filed M&V; however, the third-party implementer will be measuring savings from the pilot using a Randomized Controlled Trial (RCT) methodology. The following figure depicts the M&V methodology:



This M&V methodology is recommended by the State and Local Energy Efficiency Action Network (SEE Action).

⁸² The Energy Feedback Pilot – Business will not claim savings in 2015, following Decision No. C14-0731 (Proceeding No. 13A-0686EG), paragraph 82, which states: “Because these pilots are less established, we will not permit savings derived from these pilots to be counted towards the overall DSM savings at this time.”

Moreover, the M&V methodology incorporates recommendations made by the Center for Energy and Environment (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.
- Negative “savings” estimates are included in total savings.
- Duplicate records are eliminated. Data preparation steps will remove (if present) duplicate billing records along with records from multiple meters at a customer's business that may have been added during the course of the program. 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 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.

The following regression model is used to estimate $\hat{\beta}$, the average energy saved per day per business. The model is estimated separately for electricity and gas.

Where:

Variables:

- $usage_{it}$ is average daily usage for meter read t for business i in the post-treatment period
- $treatment_i$ is an indicator for assignment of business i to the treatment group
- pre_usage_i is average daily usage across business i 's available pre-treatment meter reads
- pre_winter_i is average daily usage over the months of Dec, Jan, Feb, and Mar across household i 's available pre-treatment meter reads. This value is imputed, if missing, with business i 's value for pre_usage_i .
- pre_summer_i is average daily usage over the months of Jun, Jul, Aug, and Sep across business i 's available pre-treatment meter reads. This value is imputed, if missing, with business i 's value for pre_usage_i .
- mm_t is a vector of month-year dummies

Parameters

- β is the average treatment effect of interest
- α_0 is a common intercept term
- α_1 , α_2 , and α_3 are the effect of the control variables pre_usage_i , pre_winter_i , and pre_summer_i on $usage_{it}$ in the reference month.
- γ is a vector of parameters capturing the average effect of each month-year dummy on $usage_{it}$

- δ_1 , δ_2 , and δ_3 capture the effect of the control variables pre_usage_i , pre_winter_i , and pre_summer_i on $usage_{it}$ in each month-year (mm_t) of the post-period
- ε_{it} is an error term
- i is notation for the i th customer
- t is notation for the first, second, third, etc.. month of the post-treatment period

kWh/Dth saved by Treatment Group = $-\hat{\beta} * \text{total_treatment_days}$ – kWh/Dth saved by rebated equipment for the same time period and same customers.

Kilowatt (kW) demand reduction will be determined by first estimating the daily energy savings from the monthly energy savings, then apportioning the daily energy savings over the system peak hour.

Savings from the Treatment Group will be measured compared to a Control Group of approximately 10,000 non-participant customers that are uninformed by any direct action of this pilot. The third-party implementer will calculate and report savings using a comparison of the Treatment Group and the Control Group as it occurs and only if it occurs. This is a low-risk approach because the results are proven and predictable, but also because they are measured ex-post, so the credit is given for results actually achieved. The number of customers tracked will remain consistent for the entire pilot period.

➤ Multifamily Building Pilot

A. Description

The Multifamily Building Pilot is designed to introduce multifamily building equipment owners to Xcel Energy's DSM products and deploy DSM measures that will lower customers' energy consumption.⁸³ The multifamily customer segment has historically been a difficult market to reach with traditional DSM products because building / equipment owners may not be the metered bill-payer for individual units. The Multifamily Building Pilot is designed to encourage participation by this market segment by offering an energy assessment and in-unit improvements, and some common area measures, via direct-install at no cost to the customer. The assessment will also identify larger efficiency improvement opportunities for participating buildings, which will primarily focus on mechanical and lighting systems and common-area improvements, and rebates will be offered to customers to pursue these larger improvement projects.

The pilot hopes to address the following questions during the course of the 2.5-year period:

- Does the pilot design cost-effectively engage multifamily building owners and/or property managers to pursue energy-efficiency projects?
- What motivates building owners and/or property managers to pursue energy-efficiency projects?
- What is a reasonable energy savings range expected to result from existing multifamily buildings' participation in Stage 2 measures and Stage 3 projects?
- What is the approximate mix of direct-install measures installed in multifamily buildings within Public Service's territory?
- Does providing an energy assessment and direct-install package lead participants to larger capital projects? If so, what percentage of participants can the Company expect to convert into Stage 3?

In order to address these questions, the pilot will engage customers in a three-stage process for multifamily buildings:

- Stage 1. Energy assessment
- Stage 2. Direct-install measures
- Stage 3. Traditional efficiency improvements (comprehensive building upgrades, custom/prescriptive projects, etc.)

The pilot, which launched in late 2014, is anticipated to continue through 2016. However, if the pilot methodology is found to be successful by the end of 2015, the Company will complete an early evaluation and transition the pilot into a product.

⁸³ Equipment owner could be the building owner, the tenant, or other third-party. Also, the equipment owner could designate an Alternative Rebate Recipient, such as a vendor or other implementer, to receive the rebate on their behalf.

Stage 1. Energy Assessment

The first step is completing an on-site energy assessment. The assessment will identify opportunities for improving building energy efficiency via a specific set of direct-install measures (eligible measures listed below under Stage 2). This will include an inspection of sample of units within each building, typically 10% of total. The assessment will be offered at no cost if all of the direct-install measures identified by the assessment are installed by the third-party implementer. If the customer chooses not to complete the recommended Stage 2 installations, they will be required to pay back the cost of the energy assessment performed in Stage 1. The assessment also will identify energy-savings opportunities within individual apartments or units outside of the Stage 2 direct install measures in addition to larger, capital-intensive projects for the whole building (Stage 3).

Stage 2. Direct-Install

The second stage of participation will be third-party installation of all direct-install measures identified via the energy assessment. There are five eligible measures for Stage 2 that will be installed at no-cost to customers:

- CFLs & screw-in LEDs (\leq 15 bulbs per unit)
- Low-flow showerheads
- Kitchen and bathroom sink faucet aerators
- Water heater blankets
- LED exit signs

Participants will work with the third-party implementer to schedule installation, and will have up to three months after the assessment to complete Stage 2 installations.

Stage 3. Traditional Energy Efficiency Improvements

The third stage for participants involves the completion of traditional energy-efficiency improvement projects such as HVAC improvements, common-area lighting upgrades or other projects currently eligible through the Company's Custom Efficiency product or prescriptive programs. It will also include comprehensive building retrofits and renovations, with measures similar to the New Construction product.

The extent to which Xcel Energy is able to convert customers from Stage 2 to Stage 3 by having them complete identified efficiency projects beyond direct-install measures is a major research objective for this pilot. Stage 3 projects are projected to deliver the most cost-effective benefits to the pilot and will help drive the overall cost-effectiveness of the pilot. Though the direct-install measures also deliver savings, the majority of the potential in the multifamily market lies within potential capital improvement opportunities for each building.

It is important to note that conversion to Stage 3 may be difficult to achieve for a number of reasons; be it lack of ownership willingness, long sales cycle, capital constraints, market economics, among others. The most successful utility programs in the market with similar program designs see no more than 30% of participants go beyond direct-

install measures, and those programs have been in the market for nearly 10 years. Mature multifamily programs with a similar design see this conversion rate go up over time as the market develops trust and gains awareness. Thus, the conversion rate would be a metric measured each year the pilot operates. Likewise, the Company would expect to see conversions increase each year the pilot is offered.

Research of other successful multifamily building utility programs has identified that having a single point of contact for customers and participants is a best practice that increases implementation of energy-saving measures. Thus, the third-party implementer is crucial to the success of this pilot, as they are the main point of contact for participants throughout their participation. The implementer will be responsible for advertising and recruiting participants, delivering the Stage 1 on-site energy assessment and Stage 2 measure installations, and successfully converting participants into Stage 3 projects in conjunction with Xcel Energy's Account Managers or Energy Efficiency Specialists.

B. Targets, Participants & Budgets

Targets and Participants

The Company estimates that there are approximately 250,000 units in existing multifamily buildings within Public Service's Colorado service territory today. The level of electric and natural gas savings is expected to vary greatly among participants, due to variances in building size, number of units, eligible direct-install measures, and potential participation in Stage 3 projects. However, all measures to be delivered in this pilot have established technical assumptions.

The Company expects to have participants enrolled and implementing Stage 2 projects starting in 2015. By the end of 2016, the Company does expect to see participation of approximately 1,000 units for Stages 1 and 2 spread across multiple multifamily buildings and complexes. The participation goals for Stage 1 and 2 of the pilot were determined using market research of national multifamily buildings, but variances are expected as each multifamily building is unique and the specific mix of direct-install measures is likely to vary. Stage 3 participation is highly variable and one of the main research objectives for the pilot; thus the Company is only forecasting five multifamily building participants in Stage 3 projects by 2016. Participation goals for Stage 3 were developed from actual projects completed for multifamily buildings via the New Construction program during 2013 and to-date in 2014.

Mid-Stage Review: If the pilot has served less than 200 units, or delivered less than 20% of forecasted direct-install achievements by late 2015, Public Service will re-evaluate the program design and/or consider early close of the pilot.

Budgets

The total pilot budget, from launch in late 2014 through 2016, is estimated to be \$613,850 (electric and gas), with the bulk of the expenditures on customer rebates and program administration.

Public Service expects third-party implementer costs to be somewhat higher for the pilot than they would be for a DSM product due to a combination of flat start-up expenses and implementation costs that decrease as services are brought to scale.

The secondary cost drivers for the pilot are the costs of Stage 2 direct-install measures and rebates for Stage 3 projects. Direct-install costs were developed based on historical costs for these measures as deployed in other Company products; and rebates for Stage 3 are reflective of those received by multifamily buildings participating in the Company's New Construction product.

C. Application Process

This pilot will be available to multifamily buildings that are Xcel Energy electric and natural gas customers. To participate in the pilot, customers must apply through the third-party implementer, who will review applications in conjunction with the Company and approve participants. Applications will be reviewed on a first-come, first-served basis. Upon notification of acceptance into the pilot, customers will work with the implementer to schedule on-site assessments (Stage 1).

D. Marketing Objectives & Strategies

The third-party implementer will be the primary marketing channel used to recruit customers to the Multifamily Pilot by leveraging their existing customer relationships and market expertise. However, Public Service also plans to promote the pilot after launch using identified budget resources by working with the implementer to target large property owners and communities. Options for direct promotion by the Company include the following:

- Marketing materials and brochures
- A Web-page to educate interested customers, explaining how to participate and the benefits of participating
- Attending multifamily events in the Company's service territory
- Co-hosting educational events with the implementer

Due to the difficulty engaging the multifamily customer segment, it is expected that the sales cycle process will be long for Stages 1 and 2. As previously mentioned, converting participants from Stage 2 to Stage 3 is even more difficult, and that sales cycle is expected to take up to several years. This is due to multifamily properties' planning cycles, which typically occur once every 12 months.

The goal of this pilot is to engage customers and prove the benefits and value of efficiency projects through Stage 1 and 2, and gain participants' trust through the process. Thus, when participants are willing and able to move forward with Stage 3 projects (likely on their existing capital improvement schedules), the Company and implementer are ready to guide them through the process.

E. Product-Specific Policies

All multifamily buildings that are Xcel Energy electric and natural gas customers with five or more units per building will be eligible to participate in this pilot. This includes market-rate and low-income qualified buildings.

As previously mentioned, there is one stipulation for receiving the on-site energy assessment at no cost: the participant must complete the installation of all eligible direct-install measures identified by the energy assessment (all or a subset of the measures listed in Stage 2 above) within three months of presentation of the assessment results. Should pilot participants choose not to complete the installation of identified direct-install measures within three months of the assessment date, they will be required to pay the full cost of the on-site energy assessment.

The Company would like to see a diverse participant pool in terms of building sizes, types, age, and location. Thus, no single building/complex can receive more than 10% of the total direct-install budget allotted for the pilot, or have more than 100 units receive direct-install measures. This participation limit is only in place for the duration of the pilot to study this potential program design—if successful, transition to a DSM product would remove this limitation.

F. Stakeholder Involvement

The Company worked closely with a number of external stakeholders throughout the pilot design process in 2014. This began by organizing a Working Group, which included representatives from the following organizations:

- Energy Outreach Colorado
- Colorado Energy Office
- City and County of Denver
- Adams County
- City of Boulder
- Boulder County
- Energy Efficiency Business Coalition
- Southwest Energy Efficiency Project
- Populus
- Cornerstone Apartments
- ACEEE
- Colorado Public Utilities Commission Staff

The Company has also been active with national multifamily working group efforts to research successful utility multifamily programs and network with those program managers and staff. Primarily, the Company has participated in ACEEE's multifamily working group and E Source's multifamily 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.

G. Rebates & Incentives

The pilot provides an on-site energy assessment (Stage 1) and eligible direct-install measures (Stage 2) to participants at no cost; therefore 100% of those costs are considered to be a rebate to customers. The pilot will provide direct rebates for eligible projects completed in Stage 3 based on savings calculations utilized by the Company's Custom Efficiency and New Construction products.

H. Evaluation, Measurement, & Verification

The third-party implementer will calculate savings for all direct-install measures completed, and report those savings to the Company on a quarterly basis. Since all eligible direct-install measures have deemed savings values, the calculation will be based on the number of installations completed.

This product will follow the Company's standard prescriptive product measurement and verification process for deemed savings.

➤ Smart Thermostat Pilot

A. Description

The Smart Thermostat Pilot is designed to evaluate if Wi-Fi connected communicating, “smart” thermostats (see Section E for qualifying device criteria) can save residential customers energy by installing a smart thermostat device and connecting it to the manufacturer’s cloud service. In addition to efficiency benefits, Public Service also plans to evaluate smart thermostats’ capabilities for delivering demand response capacity in the residential market.

Smart thermostats have garnered a great deal of media attention recently. While smart thermostats offer convenience and comfort benefits to customers, the energy efficiency and potential demand response benefits have not been consistently quantified or measured by independent third-parties for utility programs operating in climates similar to Public Service’s Colorado service territory.

In order to test the capabilities, adoption rates, and energy savings associated with these devices, the Company plans to offer a rebate to customers for the purchase and installation of qualifying devices. A condition of receiving the rebate and participating in the pilot will be the release of customers’ data for the purpose of studying whether or not a smart thermostat leads to energy savings (through participant use of automated temperature setback programs and choosing temperature setpoints that provide energy savings during setback periods, or via enabling “smart” capabilities beyond selected thermostat setbacks). The energy savings will be calculated through an evaluation, measurement and verification (EM&V) process by a third-party evaluator.

The pilot hopes to address the following questions:

Energy Efficiency:

- What level of energy savings are attributed to the installation and use of smart thermostats? Can a deemed savings value be determined?
- Is a \$50 rebate sufficient to encourage customers to purchase and install a smart thermostat?
- Is it possible to create a cost-effective DSM product using resulting deemed energy-savings values?

Demand Response:

- Will a pay-for-performance compensation structure encourage consistent participation in demand response events?
- What incentive levels are needed to optimize participation and demand savings during control events?
- To what degree are customers interested in a “bring your own device” type of demand response program model?

Energy Efficiency

The concept of realizing energy savings by programming a thermostat is straightforward: scheduling temperature setbacks during times when home occupants are away or asleep ensures no energy is wasted keeping a home unnecessarily comfortable when no one is home and/or awake. However, the execution of this strategy has proven more difficult, so much so that the U.S. Environmental Protection Agency's ENERGY STAR® program stopped labeling programmable thermostats in 2009 and many utilities stopped providing rebates for these devices, due to the well-documented difficulties customers had programming their thermostats. In fact, much research found that programmable thermostats were utilized like their manual predecessors and thus the programmable capability was never employed.

The purpose of a smart thermostat is to address this scheduling issue while improving upon the overall user experience. First, the device is easier to program and makes deploying efficient setback schedules simple. Second, customers can easily make temporary or daily changes to setback schedules without having to reprogram the device. The combination of these features has led smart thermostat manufacturers to report that 80-90% of customers are running a setback program at any given time, and that figure remains fairly constant as vendors sign up new customers (as compared to less than 50% of programmable thermostat users running a setback program).

In addition to helping customers program their thermostat, smart thermostats provide several other features that claim to increase energy efficiency. By using data analytics in the cloud, these devices can automatically optimize individual HVAC system performance and learn when to raise and lower temperatures to recover from setback periods without wasting additional energy. Some devices use motion sensors or smart phone geofencing capabilities to monitor whether users are home and adjust temperatures accordingly. These devices can also provide data sets and operating run times to interested customers to study system performance.

Demand Response

The Company also plans to test the demand response capabilities of smart thermostats. A smaller subset of participants will be recruited to participate in demand response events executed via their smart thermostat through a utility-controlled demand response portal provided by a participating thermostat manufacturer. The pilot will recruit smart thermostat owners that received the energy efficiency rebate for purchase and installation via this pilot, as well as existing smart thermostat owners that purchased a device prior to the pilot launch. The Company will study how event participation is influenced by providing financial compensation for participation, and measure the load reduction provided by cycling participants' air conditioning.

Through the In-Home Smart Device Pilot,⁸⁴ the Company was able to learn about voluntary participation in demand response events. The pilot saw event participation rates

⁸⁴ The In-Home Smart Device Pilot was included as part of the Company's DSM Indirect Program from 2011 through early 2014. The final pilot evaluation can be found on the Company's website, here:

of 49% in 2012, and 42% in 2013, where customers could opt-out of events at any time, and received no incentive for participation or penalty for non-participation. This pilot looks to research how a pay-for-performance model could influence higher participation levels for demand response events. Customers will be given event notification at least four hours in advance. Participants will have the choice to participate in events or to opt-out. For those that do participate, they will receive financial compensation for participating. For those that opt-out, they will receive no compensation for the events they opt-out of.

B. Targets, Participants & Budgets

Targets and Participants

Based on experience with previous pilots, and other additional research conducted by Xcel Energy, coupled with information from pilot projects currently being conducted by other utilities in the U.S., Public Service expects the Smart Thermostat Pilot to produce annual reductions in electricity and natural gas use in the range of two to five percent for every participating home. Therefore, Public Service estimates pilot energy savings of the following magnitude over the duration of the pilot (2014-2016):

- 1.07 Net Gen GWh
- 620 Net Gen kW (peak-load reduction from energy efficiency)
- 630 Net Gen kW (demand response event reduction)
- 8,558 Net Dth

Energy and demand savings will be reported separately based on the portion of the pilot (DR or EE) delivering the achievements, under Smart Thermostat Pilot – EE and Smart Thermostat DR.

The Company is targeting up to 5,000 participants for the energy efficiency portion of the pilot by 2016. It is anticipated that the majority of participants will join in early 2015 due to the launch of the pilot in late 2014. It is also important to note that reaching the maximum level of 5,000 participants is not believed to be the sole determinant for deeming the pilot a success. To perform a statistically significant evaluation of energy savings in the 2-5% range, the evaluation must include a minimum of approximately 1,500 participants.

Energy Efficiency: The pilot will target Xcel Energy combination electric and natural gas customers with central air conditioning systems for the energy efficiency portion of the evaluation.

Demand Response: The pilot will recruit from two customer groups for demand response: 1) customers participating in the energy efficiency portion of this pilot, and 2) customers with an existing smart thermostat that was purchased and installed outside of the pilot.

<http://www.xcelenergy.com/staticfiles/xe/Regulatory/Regulatory%20PDFs/CO-DSM/CO-2014-IHSD-Pilot-Evaluation.pdf>.

The pilot will allow electric-only customers with central air conditioning to participate in the demand response portion of the pilot.

Budgets

The total budget for the pilot will be \$1,158,500, from launch in late 2014 through 2016. EM&V is the primary cost-driver for this pilot, but is necessary to identify the anticipated energy efficiency savings in a statistically significant manner. The proposed plan is to use a matched control group methodology, which will compare usage of customers with smart thermostats to similar homes based on consumption data, geographic location, and customer segmentation information. Once completed, the Company expects that if a full-scale program were deployed, evaluation costs would be significantly less than for the pilot due to the expected one-time nature of monitoring the kW savings through use of a physical on-site device in order to deem a peak-load kW savings value.

The administration and management of a pilot of this scale with multiple manufacturers requires significant labor time, impacting overall pilot cost. Additionally, vendor charges for access to data, online portal, and mobile app development and support, and demand response portal are a significant cost-driver for the pilot budget.

C. Application Process

To participate in the energy efficiency portion of the Smart Thermostat Pilot, customers must complete a rebate application and proof of purchase and installation form, for a qualifying device. Additionally, the device manufacturers must provide verification to Public Service that the device has been installed and connected to their respective cloud service.

Similarly, customers wishing to participate in the demand response portion of the pilot must complete a demand response pilot application agreement, and for customers wishing to participate with a qualifying device purchased and installed outside of the pilot, they must provide proof of installation of a qualified device.

D. Marketing Objectives & Strategies

The Company plans to work with device manufacturers to co-market qualifying products and the pilot program. This includes manufacturers providing online promotion of the pilot program, marketing materials to existing smart thermostat owners to participate in the demand response portion of the pilot, and in-store materials at retail locations.

However, the Company also plans to directly promote the pilot using a variety of marketing strategies to solicit customers that could include but are not limited to:

- Direct mail and e-mail
- A web-page for interested customers to explain how to apply and the benefits of participating
- In-store materials at participating retail stores
- Engaging contractors who install smart thermostats

E. Product-Specific Policies

Customers interested in participation will be required to agree to and sign a participation agreement as part of the rebate form. By participating, customers agree to share their thermostat usage data with Xcel Energy (in accordance with Colorado state data privacy rules⁸⁵ and Xcel Energy's Privacy Policy). Demand response participants will also agree to the terms of the pay-for-performance model, which states that they will receive no compensation for any event they opt-out of.

To be eligible for the Smart Thermostat Pilot, participants must be Xcel Energy electric and natural gas customers with a central air-conditioning system. Xcel Energy electric-only customers with a central air-conditioning system will be allowed to participate in the Demand Response portion of the pilot.

For the energy efficiency rebate, the Company has set qualifying criteria for eligible devices, which must offer:

- Wi-Fi connectivity for customers;
- a mobile app and online portal, and;
- on-board or cloud-based optimization of the HVAC system.

Participating thermostat manufacturers must also sign an agreement with the Company to provide usage data for rebated devices. This will include, but is not limited to, a historical record of temperature setback schedules and selected temperature setpoints.

Additionally, the Company will restrict qualifying devices for this pilot to those with utility deployment experience, and well-established market share and awareness, as a method for managing pilot costs which could escalate under unlimited numbers of device models and manufacturers. (If, in the future, this pilot delivers results that would justify transition to a full-scale DSM product, based on energy efficiency savings alone, the Company envisions developing a process to allow more thermostat manufacturers to apply for a “qualifying product status.”)

As for the demand response portion of the pilot, the Company will provide an RFP to thermostat manufacturers, which will be used to select a manufacturer to provide the Company with a demand response portal used to call events. The Company is restricting

⁸⁵ CCR 723-3-3026 et seq., available: <http://www.dora.state.co.us/puc/rules/723-3.pdf>.

demand response to one or two manufacturers' devices because the targeted participant group is smaller, as well as to manage overall pilot costs. Similar to qualifying devices, the Company envisions developing a solution that would allow more thermostat manufacturers' devices to participate in demand response in the future, should the pilot transition to a full-scale DSM product.

To ensure accurate savings calculations and avoid the risk of double-counting energy savings or creating artificially high compensation by "doubling up" on participation in the Company's existing DSM products, the demand response portion of this pilot will be mutually exclusive to Saver's Switch participation. Current Saver's Switch customers who opt-in to the pilot will not be included in the Saver's Switch program for the duration of the pilot. Customers participating only in the energy-efficiency portion of the pilot will be able to maintain their Saver's Switch participation.

F. Stakeholder Involvement

The Company worked closely with a number of external stakeholders throughout the pilot design process in 2014 to inform the final design and implementation of the pilot via a Smart Thermostat Study Group, which included representatives from the following organizations:

- Energy Efficiency Business Coalition
- Southwest Energy Efficiency Project
- Western Cooling Efficiency Center
- Lawrence Berkeley National Laboratory
- Wisconsin Energy Conservation Corporation
- Nest Labs
- Honeywell
- EnergyHub
- ecobee
- Schneider Electric
- Landis+Gyr
- Tendril
- E Source
- Colorado Public Utilities Commission Staff

The pilot was initiated to comply with the 2014 DSM Plan (Docket No. 13A-0773EG) Stipulation and Settlement Agreement.⁸⁶

G. Rebates & Incentives

Rebates will be offered to customers who purchase and install qualifying products, as determined by Xcel Energy. Energy efficiency rebates will be paid to customers by Xcel Energy once an application form has been completed and submitted, and verification of installation has been received from the device manufacturer. Customers can receive a rebate regardless of whether they participate in the demand response portion of the pilot.

For the efficiency evaluation portion of the Smart Thermostat Pilot, eligible participants will receive a rebate upon purchase and installation of qualifying products. Public Service

⁸⁶ Paragraph 6, part (c), pages 9-10.

will test a \$50 per unit rebate as the pilot starting point to gauge participation levels at a rebate of approximately 25% of unit cost. Should the Company see slow participation uptake that limits our ability to adequately calculate energy savings, Public Service may consider raising the rebate level to \$100 per unit to encourage increased participation.

Demand response pilot participants will consist of rebate customers who also opt-in to the demand response pilot, as well as customers who do not receive an energy efficiency purchase rebate but meet demand response participation qualification criteria.

For demand response, participants will receive a rebate based on the number of events in which they participated. The Company will test two different event compensation levels—\$5.00 per event and \$2.50 per event—to determine the optimal approach to cost-effective savings and participation in events.

H. Evaluation, Measurement, & Verification

Public Service will contract with a third-party evaluator to collaboratively measure impacts. This third-party will be responsible for the analysis, impact estimation, and project management and reporting. Specifically, the third-party will measure and verify 1) the annual kWh and Dth reductions for all energy-efficiency participants, 2) the peak load kW reduction for all energy-efficiency participants and 3) the kW load reductions during events for a sample of the demand response participants. The following specifies in more detail the approach and tasks that will be performed as part of the impact estimation for the Smart Thermostat pilot:

Preliminary Evaluation

To determine the overall impact on consumption, a matched control group will be used. Once all pilot participants have been determined, a control group will be selected based on consumption data, geographic location and customer segmentation information so that each member of the control group is “matched” to a participant. Electric (kWh) and natural gas (Dth) usage data will be collected for each participant and control group member from billing data. This will be used to determine overall energy savings (kWh and Dth).

For analyzing peak load reductions (kW), data loggers will be deployed to a sample of both participant and control group participants. The difference of differences approach will be used again, this time measuring the difference of average peak loads between participants and the control group.

The preliminary evaluation will provide initial estimates for the impact of the Smart Thermostat Pilot based on the first year of the Pilot, to the extent possible based on the number of installed devices, using a difference of differences approach. This task consists of the following subtasks:

- The third-party evaluator will collect load data from the data loggers. Public Service will securely transfer survey data to the third-party evaluator, which will

include any available survey or demographic information, the date that participants installed their device, billing data for all participants and control group members. The third-party evaluator will then verify that data are available for all customers in the pilot (both control group and participants), and that the data are present for all hours and are internally consistent. As part of this subtask, the evaluator will also tie the data from different sources together to ensure consistency and enable the analysis for the remainder of the project.

- The third-party evaluator will estimate impacts using a difference of differences approach. This approach estimates the impact of the Pilot as the difference between the average load shape of the participant group and the control group, corrected for any pre-pilot differences between the two groups.

For analyzing event day demand reduction, data loggers will be deployed to a sample of demand response participants. To analyze event day participation, the thermostat manufacturer(s) will provide data to Public Service showing which customers opted-out of events and which customers chose to participate.

Final Evaluation

Using data from both 2015 and 2016, the evaluator will refine the estimates for summer 2015 from the preliminary evaluation, and will estimate the impacts for fall/winter 2015 and summer 2016. This task consists of the following subtasks:

- Estimate impacts using a difference of differences approach for the entire time period. The evaluator will calculate impacts for winter 2015/2016 and the summers of 2015 and 2016 to check consistency between the summers. The evaluator will calculate both the impacts and the related confidence intervals.
- Estimate impacts using a regression approach for the entire time period. A regression approach accounts for the specific characteristics and appliances of each customer, includes the information about the specific weather on each day, and quantifies how these factors interact to influence the load impact of the pilot. Using a regression model to estimate the impacts will allow Public Service to define the range of impacts that they will see across different customer types and different weather.

The third-party evaluator will prepare a final report with comprehensive results for fall/winter 2015/2016, and the summers of 2015 and 2016. The evaluator will provide the final results and descriptions of the methods used for inclusion in the preliminary evaluation report that they will deliver to Public Service.

The Company does not anticipate having statistically significant participation levels by early 2015 to be able to measure full-year savings in time to claim savings in the 2015 status report, and will likely claim savings for all pilot results as part of the 2016 status report. Xcel Energy will report on pilot findings and claim pilot savings in the 2016 status report—if the pilot is cost-effective.

Demand Response Program

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.

Generally speaking, 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* – Programs that would fall into this category include capacity bidding, demand bidding, and other aggregator offers, as well as programs that are non-dispatchable, or those that are directly controlled by customers, such as pricing structures. The Smart Thermostats Pilots are 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

Public Service’s program consists of several existing DR products (created through several different regulatory filings),⁸⁷ as well as new DR pilots that the Company is deploying, as part of this Plan, as potential future load management options. The

⁸⁷ Products created outside of the DSM Plan are not eligible for inclusion in calculation of the Company’s financial incentive.

originating filing and customer targets for each product / pilot are identified in the table below.

Table 15: PSCo's Demand Response Program

Product / Pilot	Customers	Filing Source
Building Optimization DR Pilot	Commercial/Industrial	DSM Plan
ISOC	Commercial/Industrial	07S-521E
Third-Party Demand Response	Commercial	Docket No. 07A-469E
Saver's Switch	Residential	DSM Plan
Small Business Smart Thermostat Pilot	Commercial	DSM Plan
Smart Thermostat Pilot ⁸⁸	Residential	DSM Plan

DR products and pilots will contribute to both energy and demand savings. Demand savings will count towards total controllable load goals.

The intent of these products and pilots is to (1) minimize increased load adjustments until such time as there is an identified resource need and (2) pilot new approaches so that they could be in place as a need is realized. Pilot products in 2015 and 2016 are aimed to define the magnitude of potential peak capacity available during specific intervals.

B. Targets, Participants & Budgets

Targets and Participants

DR targets are forecasted differently than energy efficiency, as such, the tables below represent the incremental demand reduction estimates for the years 2015 and 2016. Table 2a summarizes the total controllable load expected from ISOC and Third-Party Demand Response. Table 2b, summarizes DSM products and pilots that will contribute to demand reduction, as shown in the Plan's Executive Summary.

Table 16a: 2015 Demand Response Incremental Load for Non-DSM Programs

2015	Marketing & Admin. Budget	Net Gen. MW
ISOC	\$520,592	1.5
Third-Party Demand Response	\$2,292,752	0
Total	\$2,813,344	1.5

Table 16b: 2016 Demand Response Incremental Load for Non-DSM Programs

2016	Marketing & Admin. Budget	Net Gen. MW
ISOC	\$520,592	0.5
Third-Party Demand Response	\$2,292,752	0
Total	\$2,813,344	0.5

⁸⁸ Smart Thermostat Pilot is also included in the energy efficiency portion of the Plan given that it includes both an energy efficiency and demand response component; the write-up in the energy efficiency section of this Plan includes discussion of both its energy efficiency and DR components.

Table 17a: 2015 Demand Response Incremental Load for DSM Products & Pilots

2015	Electric Budget	Net Generator kW	Net Generator kWh	Electric MTRC Test Ratio
Demand Response Program				
Saver's Switch	\$12,801,015	13,390	174,412	1.92
Smart Thermostat Pilot - DR	\$373,850	638	8,310	0.35
Small Business Smart Thermostat Pilot	\$374,226	624	17,726	2.12
Building Optimization DR Pilot	\$182,894	834	26,698	0.53
DR PORTFOLIO TOTAL	\$13,731,985	15,486	227,146	1.80

Table 17b: 2016 Demand Response Incremental Load for DSM Products & Pilots

2016	Electric Budget	Net Generator kW	Net Generator kWh	Electric MTRC Test Ratio
Demand Response Program				
Saver's Switch	\$13,166,015	13,390	174,412	1.93
Smart Thermostat Pilot - DR	\$0	0	0	
Small Business Smart Thermostat Pilot	\$187,750	0	0	
Building Optimization DR Pilot	\$146,661	0	0	
DR PORTFOLIO TOTAL	\$13,500,426	13,390	174,412	1.88

The Commission-approved demand response goals⁸⁹ are cumulative (total controllable load) demonstrating the total peak capacity the Company could make available during a control event (as shown in the Table 18). The Commission-approved demand response goals will be used to inform the Company's next Electric Resource Plan. However, the Company's demand response targets for the 2015/2016 DSM Plan do not align. The deficit is due to changes since the Company filed these suggested goals in early 2013.

Table 18: Demand Response Targets & Goals – Total System Controllable Load

	MW		
	2014*	2015	2016
2015/2016 DSM Plan, DR Targets	471	503	516
Commission-approved Goals	511	528	537

*2014 is being displayed for comparison purposes only.

The deficit is primarily due to what the Company terms as “load loss pool.” A “load loss pool” refers to a reduction in load from current availability due to a variety of factors, including:

- *Load Loss:* Within DR programs there are factors we define as a “load loss pool”. This pool includes customers who choose to completely drop service as well as those who adjust their commitment to a lower load. Over the last two years, we have lost a variety of customer loads for a variety of reasons including regulation.

⁸⁹ DR goals were established by the Commission in Decision No. C14-0731 (Proceeding No. 13A-0686EG), Paragraph 60.

- *Regulation:* EPA rules, historically, can have an impact to the program. Recently, their back-up generator “BUG” rules resulted in a large drop of load from our Third-Party Demand Response program.
- *Savings Estimates:* Our Saver’s Switch product assumes an estimated kW reduction per switch. The Company validates this reduction by monitoring a statistically valid sample of switches in the field. This field verification indicates savings are dropping due to cooler summers, increased air conditioner efficiencies, and increased conservation efforts. We assume a decrease in savings for the current installed population; however, it will be difficult to make up the savings within the same group of customers once it is realized.

But given the low need for additional resources until 2019,⁹⁰ the Company will focus on growing demand response but balancing the cost of doing so with the need. The result is slower growth of existing products as well as testing new products in the near-term, followed by ramping up overall load reductions to be in line with future targets when the need arises. Demand response resources take time to build within the market so pilots will be testing segments and technologies prior to full launch and substantial growth of demand response. The Company will work with key stakeholders in 2015 and 2016 to discuss opportunities for expanding demand response.

Budgets

Budgets for demand response efforts fall outside of our energy efficiency budget cap. 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 2015/2016, DR budgets were developed using the same well-defined process as all other energy efficiency products. Budgets are based on incremental program load, with the exception of Saver’s Switch, which includes monthly rebates for all installed switches.

C. Application Process

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

D. Marketing Objectives & Strategies

In the spring of 2013, the Company completed a market potential study⁹¹ to determine the overall opportunity for demand response. The study concluded:

- Incremental potential exists within our service territory
- Mass market dynamic pricing is currently not cost-effective, although could provide additional load to the portfolio as metering technologies are adjusted

⁹⁰ Docket No. 11A-869E

⁹¹ *Estimating Xcel Energy’s Public Service Company of Colorado Territory Demand Response Market Potential*, July 2013, available here:

https://www.dora.state.co.us/pls/efi/efi.show_document?p_dms_document_id=210750&p_session_id=

- Most of the potential remains with dispatchable programs within residential and small to medium business customers

As a result of this analysis, Public Service's plan shows us strengthening our presence within segments that have significant potential: residential and small to medium sized businesses. Pilots such as the Smart Thermostat pilots and Building Optimization Pilots are intended to not only review the opportunity for potential within these segments but also help reduce our shortfall from Target to Goal.

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 Roundtable when filed originally within the DSM Plan.⁹² DR efforts are also discussed with stakeholders during other proceedings such as our Energy Resource Plan. Beyond the DSM Roundtable and various proceedings, program 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.

H. Evaluation, Measurement, & Verification

The impacts from the Company's Demand Response programs 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 programs. This analysis includes all program participants still active in each program. For the Saver's Switch program the team hires a consultant—that specializes in load research—to conduct the data gathering and most of the analysis on a sample of program participants. For the ISOC program, 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.

⁹² The Third-Party Demand Response and ISOC programs were originally filed outside of the DSM Plan, and therefore will not be included in the DSM Roundtable process.

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 programs there are factors we define as a “load loss pool.” This pool includes customers who choose to discontinue participation as well as those who adjust their commitment to a lower load reduction in the ISOC program.
- *Regulation:* EPA rules, historically, can have an impact on the participation within the ISOC program. Recently, their BUG rules resulted in a significant drop of load from this program.
- *Savings Estimates:* Our Saver’s Switch program 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.
- *Third-Party Programs:* Any third-party demand response programs are included in the evaluation and may be subject to the reasons listed above for total system controllable load varying each year.

The results of the annual analysis of the impacts from the Company’s Demand Response programs is combined with a forecast of the future participation in each DR program to produce a forecast of the total controllable system load expected in the future, referred to as the Load Management Forecast. The company proposes to use this annual analysis, combined with the actual participation in each DR program, to determine the achievement of total system controllable load goals in annual Status Reports.

Pilot programs include their own M&V procedures and are discussed in detail within the individual pilot write-ups.

➤ Building Optimization DR Pilot

A. Description

The Building Optimization DR Pilot (“Optimization Pilot”) is designed to evaluate the use of building optimization software to obtain reliable DR load relief from commercial business customers.

Building managers use a variety of systems to manage their energy use. A growing trend in managing these resources is to utilize building energy management systems with “optimization” software to better manage building’s heating, ventilation, and air-conditioning (HVAC) systems. Through the use of cloud-based data collection and energy modeling, a building’s control system can be continuously adjusted to optimize performance. These systems promise to not only maintain occupant comfort level but reduce HVAC usage. Of key interest to Public Service is these systems’ promised ability to reduce building loads in response to utility initiated Demand Response (DR) control events. Current Company forecasts indicate that existing DR programs alone will not be sufficient in meeting the Company’s DR targets, therefore requiring an expansion of demand response offerings for a variety of segments. One customer segment believed to have potential is commercial office buildings. Traditionally building operators have been reluctant to participate in DR programs as they fear demand reduction measures would be difficult to implement and would adversely impact tenant comfort. The objective of the Optimization Pilot will be to: (1) evaluate how effective optimization software is in delivering promised demand reduction and (2) determine how unobtrusive these changes are deemed to be by building operators.

Vendors currently offer building optimization software through “software as a service” (SaaS) models. For the Optimization Pilot, the Company plans on subsidizing a portion of the subscription cost for participants. A condition of receiving the software services will be the customers’ release of their building operating parameters for the purpose of studying how the software is used by customers. The load reductions and energy savings will be verified through analysis of the buildings interval meter data and using a third-party measurement and verification (M&V) evaluator to validate the software’s energy savings calculations.

The pilot aims to address the following questions:

Demand Response:

- What level of DR does this technology deliver (kW/square-foot)?
- Can this demand response be reliably and repeatedly deployed?
- Can this resource be used for short notice events (< 10 minutes)?

Energy Efficiency:

- What level of energy savings can be attributed to optimization software?
- Is the value of energy savings sufficient for customers to subscribe to the software?

Demand Response

The Company plans to test the demand response capabilities of building optimization software. Demand response events will be initiated through a utility-controlled demand response portal provided by the selected software provider. The optimization software will respond to this control signal by adjusting HVAC set points within the buildings control system. Through the use of pre-cooling, adjusting space temperatures, fine tuning duct static pressure and similar techniques the buildings load will be reduced. Load reductions will be verified through analysis of interval data collected from the buildings' main electric meter.

A potential draw-back of this technology in regards to demand response is the ability for customers to "opt-out" of DR events. This pilot looks to understand what the customer's propensity to opt-out is, especially when multiple DR events are scheduled in close succession. Additionally the pilot will attempt to determine if there is a reduction in the level of DR achieved when events are initiated with minimal advanced warning as compared to events scheduled 12-24 hours ahead of time.

Energy Efficiency

The primary motivation for customers to subscribe to building optimization software services is the promise of overall energy savings and the associated bill reductions. For agreeing to participate in DR events, the pilot participants will receive the software services at a subsidized rate. This pilot will attempt to verify vendor's claims of the energy savings attainable and whether the associated bill savings are significant enough to persuade customers to subscribe to the service and participate in DR events.

B. Targets, Participants & Budgets

Targets and Participants

The target market for this pilot offering is customers with mid- to large-sized class A and class B office space. Qualifying buildings must have an existing BMS/EMS system compatible with the optimization software selected for the pilot, a 15-minute interval data recording electric meter, and a minimum of 300 kW peak summer load. A maximum of 10 participants will be recruited.

Budgets

The total budget for the pilot will be approximately \$465,000, from launch through 2016. Based on avoided revenue requirements approximately 70% of expenses will be allocated to demand response, while 30% will be attributed to energy efficiency.

C. Application Process

Account Managers will engage customers matching the targeted criteria as potential pilot participants. The software vendor will provide technical sales support to help qualify customers and explain the features of the software service. To participate in the pilot the customer must complete a pilot participation agreement which will detail the terms of receiving the optimization software, expectations for participating in control events, and agreement to release data collected from the software for purposes of pilot evaluation.

D. Marketing Objectives & Strategies

Marketing will be limited to the Account Management team's efforts and associated support from the vendor. Pilot expenditures will be centered on design, research, and evaluation of the technology and pilot delivery techniques, with limited focus on marketing.

E. Product-Specific Policies

To qualify for this pilot, a customer must have buildings with an existing BMS/EMS system compatible with the optimization software selected for the pilot, a 15-minute interval data recording electric meter, and a minimum of 300 kW peak summer load. In addition, they will be required to agree to and sign a pilot participation agreement. By participating, customers will receive the building optimization software services at a subsidized rate for the duration of the pilot. In return the participant agrees to participate in demand response events initiated by the Company during the course of the pilot. Additionally, participants agree to share data collected by the software with Xcel Energy (in accordance with Colorado state data privacy rules⁹³ and Xcel Energy's Privacy Policy). The participants have the ability to opt-out of DR events. Should the participant opt-out of three or more consecutive events, the Company, at its discretion, can remove the customer from the pilot and discontinue the subscription service.

Xcel Energy will provide participants with a subscription to building optimization software for the duration of the pilot. The Company will select a vendor based on their ability to provide the following features:

- *Energy Modeling* capable of accurately modeling the buildings energy requirements.
- *Forecast Energy Usage* incorporating external data streams to forecast energy use.
- *Optimized BMS Management* that interfaces with the existing building management system to optimize operations based on current and predicted conditions.

⁹³ CCR 723-3-3026 et seq., available: <http://www.dora.state.co.us/puc/rules/723-3.pdf>.

- *Maintain or Improve Tenant Comfort*, ensuring conditions conform ASHRAE 55 standards.
- *System Monitoring and Support* that reviews HVAC system performance with participant's building engineering staff.
- *Performance Assessments* provided to participants on a monthly basis, resulting from review of energy modeling and HVAC performance.

The vendor will be responsible for providing and installing all equipment necessary to collect data from, and communicate with, the existing building automation system(s).

F. Stakeholder Involvement

Pilot updates and results will be shared with stakeholders through the quarterly DSM Roundtable Meetings. If pilot results show promise of transitioning this concept to a full product, the development team will seek input from stakeholders on final product design.

G. Rebates & Incentives

An objective of this pilot is to determine whether receiving the benefits provided by the software service (energy savings) at a reduced subscription price provides sufficient motivation for customers to participate in DR events. Because the software is provided through an on-going subscription fee, the rebate for this program will be different than the Company's typical incentive structure. The Company will subsidize approximately 50% of the annual cost of subscription fees, with the remainder being the responsibility of the participant. As this type of service is new to the market it may be necessary to subsidize 100% of the subscription fees for the first year until the value proposition has been proven to participants.

H. Evaluation, Measurement, & Verification

Building optimization software is unique in that measurement and verification is an intrinsic part of the system. The process which is used to gather data, create a baseline model, and compare baseline consumption with actual meter data to calculate energy savings is consistent with International Performance Measurement and Verification Protocols (IPMVP). To assess the validity of the software's calculations, Public Service will contract with a third-party evaluator to confirm impacts. The third-party will use the same data sets available to the vendor to model the energy savings of select participants and verify they align with what is reported by the optimization software. Verification of demand response event participation and load reduction will be achieved by an analysis of the buildings interval meter data during the event days as compared to baseline consumption on similar days.

The third-party evaluator will prepare a final report with comprehensive results for the summers of 2015 and 2016. The evaluator will provide the final results and descriptions

of the methods used for inclusion in the evaluation report that they will deliver to Public Service.

Xcel Energy will report on demand reductions in the 2015 Annual DSM Status Report—if the pilot is cost-effective. The Company will not enroll additional participants in 2016; therefore no incremental DR load will be claimed after 2015. Annual energy savings associated with the pilot will not be verified until the fall of 2016, and thus, will be claimed in the 2016 Annual DSM Status Report—if the pilot is cost-effective.

➤ **Interruptible Service Option Credit (ISOC)**

A. Description

The Interruptible Service Option Credit (ISOC) program offers significant savings opportunities for PSCo's Colorado 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 program, ISOC customers help reduce the amount of electricity needed, which helps Xcel Energy meet electric system requirements at critical times.

The program is a tariff rate approved by the Colorado Public Utilities Commission,⁹⁴ and is available to commercial customers in PSCo's Colorado service territory. To qualify, customers must have an interruptible demand of at least 300 kilowatts (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 1-hour integrated demands, which occurred between noon and 8 p.m. on Monday through Friday (excluding weekends and 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 Xcel Energy 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 their advance-notice requirement. Customers can use electricity as usual until Xcel Energy notifies them of a control period. The Company will give advanced 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 program agreement.

Customers choose the amount of interruption appropriate for their facility. The credit they receive is tied to the number of hours they contract to be interrupted each year and their advance notice option.

Interruption periods 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. Currently, all interruptions (events) last a minimum of 4 hours, unless the customer has chosen to waive the 4-hour minimum interruption timeframe.

⁹⁴ Docket No. 07S-521E.

Unless customers choose the *Within-10-Minute Notice* option, the Company does not reduce the amount of electricity available to the customer's facility; it's up to the customer to take steps to reduce their load during control periods. If customers do not meet their agreed-upon load reduction, they will be charged penalties.

B. Targets, Participants & Budgets

ISOC is available to all customers that qualify for the tariff. From a total demand credit budget perspective, dollars allocated for this initiative are based on the number of hours they contract to be controlled each year, the amount of controllable load they have available, and their advance notice option.

In 2014, there were 85 Colorado customers participating in the ISOC program. The Company anticipates these same business customers will continue to participate in the program in 2015. Based on the contracted interruptible load of these ISOC customers, the budget for customer credits is \$32,714,024. These credits paid are an actual monthly credit to the customer's energy bill so the above is the projection in 2015.

Other ISOC budget items include the development of marketing materials, such as customer ISOC System Guides (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 program. Total program administrative costs including marketing, labor, incentives, and system O&M is forecasted to be \$520,592 in 2015 and 2016.

C. Application Process

Account Managers play a vital role in communicating the benefits of this program 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 program, and that all program information is understood. When customers decide to join the program, 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 must be reduced by any Contract Firm Demand the customer chooses.

Contract Term:

The initial contract term shall be 24 months followed by an annual term that is automatically renewed each year.

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). A six-month written notice is required from the customer in order to cancel their participation. If the customer chooses to cancel their agreement in the first year they can do so by returning all credits paid. Subsequently, Xcel Energy 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.

Contract Authorization:

Once it is determined that the customer will qualify for the ISOC, an Interruptible Service Option Agreement will be executed. The Agreement must be approved by the customer and by an authorized representative of PSCo prior to May 31 for the customer to receive credits in that year.

D. Marketing Objectives & Strategies

A critical part of the ISOC program's success is the Company's ability to locate potentially eligible customers, assist them in becoming a part of the program, and provide service according to the tariff. That process begins by running a query on our customer information system to locate business customers in Colorado that meet eligibility requirements for the ISOC program.

Potential customers that meet program 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 program options, and discuss program 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 program. These marketing materials include:

- The Colorado "Interruptible Service Option Credit (ISOC) System Guide" – Provided to customers on an annual basis and is a valuable reference to navigating the ISOC tracking system.
- Electric Rate Savings Feature Sheet – Summarizes the program features and benefits, and helps potential customers determine their qualification status.
- Electric Rate Savings Credit Sheet – Outlines various control options and assists customers in understanding the savings they could realize by participating.
- ISOC Website – Extensive program information is also included on the Xcel Energy website for current and potential customers, here:
[http://www.xcelenergy.com/Save Money & Energy/Rebates/Interruptible Service Option Credit \(ISOC\) - CO](http://www.xcelenergy.com/Save_Money_&_Energy/Rebates/Interruptible_Service_Option_Credit_(ISOC)_-_CO). 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 in this program 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 program to meet the program goals and objectives. This goal 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 program of this nature, it is not only important to promote the program up-front, but customers also need ongoing support and communication. It should also be noted that we view marketing as 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 program in order to retain these customers, and ongoing communication/education about how the program 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 particular customer's interpretation of the program and provide materials and support necessary to ensure consistent and positive customer experience.

Marketing encompasses both solicitation communications and education, and also ongoing program communication, including training to retain participant customers in support of achieving the capacity deferral benefit potential of the program, as captured in the Company's ISOC forecast.

E. Product-Specific Policies

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 Xcel Energy a six-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 Xcel Energy, 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 Xcel Energy 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 program. 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 program 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

There are both ISOC MW and ISOC credit dollar budget goals in place. The Company conducts M&V by monitoring progress toward these goals on a monthly basis to ensure alignment with the budget forecast. In addition to this on-going monitoring, the Company will have periodic meetings throughout the year with key ISOC players to evaluate the program strategy, and to measure and verify progress. Adjustments will be made in the marketing approach at that time, if warranted.

➤ Third-Party Demand Response Program

A. Description

The Third-Party Demand Response Program managed by EnerNOC was developed as a result of Decision No. C08-0369 (Docket No. 07A-469E). The program was designed to be price capacity at below the levelized avoided cost of a combustion turbine. This means that on purely a capacity basis, the program should always yield positive net benefits. The EnerNOC contract runs through 2016 and has a 40 MW demand response minimum. The Program was branded “Peak Savings” to align with EnerNOC’s other load reduction programs offered by Xcel Energy.

Event Management

The Third-Party Demand Response resource appears as one large resource to System Operators, and is dispatched similarly to ISOC.

Results

EnerNOC has experienced some challenges in the build-out of the program and in reaching target capacity goals set by the contract. The first goal, 20 MW of Committed Load Reduction by June 2009 was met in October 2009. The second goal of 40 MW of Committed Load Reduction by June 2010 was met in July 2011. EnerNOC was penalized under the contract for meeting the goals later than specified; the penalties were taken as a reduction to their monthly contract payment. Since then, EnerNOC has reached the 44 MW contract maximum and they are contractually obligated to maintain the minimum Committed Load Reduction of 40 MW for the remainder of the contract term. However, since May 2014, EnerNOC has not been meeting their 40 MW commitment due to losing several customers who elected not to retrofit their back-up generators as required by the new EPA emissions standards. EnerNOC is attempting to backfill the loss with new business and have regained approximately 5 MW with a total committed load of 37 MW at generator as of the date of this filing.

B. Goals, Participants & Budgets

Targets and Participants

EnerNOC is responsible for meeting the following targets for the Third-Party Demand Response Program:

- 40 to 44 MW from June 1, 2010 thru December 31, 2016 (end of term)

Failure to meet the minimum target (40 MW) results in financial penalties identified in the contract.

Peak Saving’s participants range in size from >1 MW to <100 kW. EnerNOC seeks a diverse portfolio in order to meet the 40 MW year-round commitment required under the contract.

Budgets

All administrative costs and customer credits are included in the annual budget. The Third-Party Demand Response Program costs are recovered through the DSMCA.

C. Application Process

EnerNOC is responsible for providing turn-key fulfillment of the Third-Party Demand Response Program offering. This includes the application process.

D. Marketing Objectives, Goals, & Strategy

All sales and marketing activities are the responsibility of EnerNOC. EnerNOC has made investments in labor to attract, identify, qualify, and sign-up participants. EnerNOC has also made investments in their PowerTrak system which is used to monitor customer loads and events.

E. Product-Specific Policies

Participation in EnerNOC is limited to PSCo's firm rate Commercial and Industrial customers who are not currently under an existing interruptible contract (ISOC), or on a Standby Tariff. Although no minimum or maximum customer size is identified, EnerNOC specializes in aggregating smaller loads from customers who do not qualify for the ISOC tariff.

F. Stakeholder Involvement

The primary stakeholders are Xcel Energy and EnerNOC. Xcel Energy uses this load to insure system reliability and to reduce system costs when the costs of additional generation or power purchases exceed the program costs.

G. Rebate (Credit) Levels

Terms and the rates identified in the third-party contract are confidential.

H. Evaluation, Measurement, & Verification Plan

Third-Party Demand Response Program customers have monitoring equipment installed as part of their enrollment. This data is accessible by the customer through EnerNOC's PowerTrak web-based monitoring system. 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.

➤ Saver's Switch

A. Description

Saver's Switch® is a demand response product that offers residential participants a \$40 annual bill credit as an incentive for allowing Public Service to control operation of their central air conditioners on days when the system is approaching its peak. This product is generally utilized on hot summer days when Public Service's load is expected to reach near-peak capacity. Since the launch of Saver's Switch in 2000, Public Service has declared an average of eight control days per year. Saver's Switch helps reduce the impact of escalating demand and price for peak electricity.

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. The product deploys switches with varying load control strategies:

- Switches installed prior to 2004 are cycled 15 minutes out of every 30 minutes (a 50% cycling strategy) during the control period.
- Switches installed after 2004 have utilized an “adaptive algorithm” cycling strategy. This strategy allows the switches to “learn” how a customer’s air conditioning is being operated in order to achieve a 50% reduction in load. The newer switches generally provide greater load reduction per unit. Approximately 96% of the 176,000 switches in the field (as of December 31, 2013) use the adaptive algorithm strategy.

Customers may have their air conditioning controlled for up to four hours on a control day. The time period can be either 2:00 p.m. to 6:00 p.m., or 3:00 p.m. to 7:00 p.m. Controlling over two different time periods provides Public Service the flexibility to better manage peak demands on the system.

B. Targets, Participants & Budgets

Targets and Participants

Prior to 2009, the annual participant target for the Saver's Switch product had been 13,000 new switches installed per year. For the years 2009 through 2013 that target was increased to 19,500 new switches per year. The increase was a result of the Fort St. Vrain Decision No. C08-0369 (Docket No. 07A-469E). In that proceeding, the Commission ordered Public Service to expand its demand response efforts to meet a resource need. Having promoted the program very heavily since 2009, Public Service believes that the program penetration rate among eligible customer now exceeds 50%. At this point, the Company is seeing diminishing response rates to promotional activities. Therefore, the target for 2014 was reduced to 12,000 new switches. In 2015 and 2016, Saver's Switch target remains 12,000 new switches per year.

Budgets

The primary costs in operating the Saver's Switch product are: the cost of switches, switch installation, rebates for participating customers, and promotional expenses for recruiting participants.

C. Application Process

Customers may sign up for the product via a mail-in form, phone, or the Xcel Energy website. Applications are generally processed and switches installed within six to eight weeks. Due to variations in air conditioner age, code compliance, and where the A/C unit is located (next to the house), the installer will make the final onsite determination as to whether the customer qualifies for the product.

D. Marketing Objectives & Strategies

Saver's Switch is promoted to residential customers using a variety of channels including bill inserts, company newsletters, print and radio advertising, direct mail and telemarketing.

Based on an analysis of customer energy usage during the summer months, Public Service estimates that approximately 300,000-350,000 residential electric customers in Colorado have central air conditioning. Of those, nearly 168,000 were signed up for the product at the end of 2013. Where possible (i.e. in direct mail and telemarketing), the Company directs its promotional efforts to customers identified as likely to have central air conditioning.

In 2015 and 2016, Public Service expects to continue an intense promotional effort with activities including:

- Direct mail, including up-front incentives to new participants
- Outbound telemarketing
- E-mail marketing
- Bill inserts
- Radio advertising
- 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 very 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 or not a switch can be successfully deployed, depending on the age of the A/C unit, code violations, etc.

F. Stakeholder Involvement

Public Service recognizes that the HVAC community and homebuilders are in a position to 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

Product participants will receive a \$40 discount on their October energy bills following participation in the preceding summer control season.

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 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 Saver's Switch operations during the cooling season. The results are used to document the extent of load relief achieved during a control day.

➤ Small Business Smart Thermostat DR Pilot

A. Description

The Small Business Smart Thermostat DR Pilot (“SB Thermostat Pilot”) is designed to evaluate if Wi-Fi connected communicating, “smart” thermostats (see Section E for qualifying device criteria) can be used to obtain reliable Demand Response (DR) load relief from small business customers.

Smart thermostats have garnered a great deal of media attention recently. Smart thermostats offer convenience and comfort benefits to customers, and their ability to be controlled remotely has been leveraged by other utilities to provide a demand response resource. The SB Thermostat Pilot will attempt to determine if smart thermostats can be used to provide demand response, in collaboration with small businesses, given the climate and equipment attributes seen in Public Service’s Colorado service territory.

The SB Thermostat Pilot will leverage the same smart thermostat technology being deployed in the Company’s residential Smart Thermostat Pilot; focusing on the demand response capabilities this technology provides small businesses.⁹⁵ In order to test the capabilities, customer acceptance, and load relief performance associated with these devices the Company will purchase and install smart thermostat(s) at no cost to pilot participants’ businesses. A condition of receiving a smart thermostat and participating in the pilot will be the customers’ release of their thermostat data. This data will be used to study how smart thermostats are used by customers (use of automated temperature setback programs, choice of temperature set points, and enablement of “smart” capabilities inherent with the thermostat). The load reductions will be verified through the monitoring of controlled loads by a third-party M&V evaluator. The smart thermostats will remain the property of the participant at the end of the pilot.

The pilot aims to address the following questions:

- For the cooling loads typically seen for this customer segment in this climate, what level of demand response does this technology deliver (kw/ton);
 - When using a cycling strategy?
 - When enabling pre-cooling and temperature set-up strategy?
- Will customers consistently participate in DR events;
 - Without an incentive beyond the value of the smart thermostat?
 - With a pay-for-performance compensation structure?
- Are small business customers interested in this type of program?
- Can a direct install deployment method be cost-effectively administered?
- Could smart thermostats be effectively delivered within the Lighting – Small Business product’s direct install approach (see below for further discussion)?

⁹⁵ While the SB Thermostat Pilot will collect data that may provide an indication of whether or not increased energy efficiency in businesses is achieved, the focus of the pilot is on demand response.

Pilot Design

The Company plans to test the demand response capabilities of smart thermostats among small businesses. The Company will initiate demand response events through a utility-controlled demand response portal provided by a selected pilot partner—a thermostat manufacturer. The manufacturer's smart thermostat(s) deployed to pilot participants will respond to a control signal under one of two control scenarios:

- *Duty-Cycling*: running a 50% duty cycle program for the duration of the event, or
- *Pre-Cooling*: pre-cooling for 1-2 hours prior to the event, followed by a 2-4 degree temperature offset.

Approximately one half of pilot participants will be controlled through duty cycling and the other half will be controlled using the pre-cooling scenario. Load reductions will be determined through monitoring of the controlled cooling equipment. Data loggers will be deployed on roughly one half of the units from each control scenario; and data will be collected through the duration of the pilot.

SB Thermostat Pilot Design		
	Duty Cycling Cohort	Pre-Cooling Cohort
Technology Incentive Only	Participants = 25 Thermostats ~ 75 Load Monitoring = 50% Thermostat Monitoring = 100%	Participants = 25 Thermostats ~ 75 Load Monitoring = 50% Thermostat Monitoring = 100%
Technology Incentive w/ Pay-for-Performance Incentive	Participants = 25 Thermostats ~ 75 Load Monitoring = 50% Thermostat Monitoring = 100%	Participants = 25 Thermostats ~ 75 Load Monitoring = 50% Thermostat Monitoring = 100%

Customers are anticipated to have three thermostats per participating premise; customers may enroll multiple premises in the pilot.

A potential draw-back of smart thermostat technology in regards to demand response is the ability for customers to “opt-out” of DR events, meaning they actively choose not to participate, disabling Xcel Energy from controlling their thermostat during specific DR events. Through the In-Home Smart Device Pilot, the Company determined that residential customers “opted-out” over 30% of the time when they were asked to voluntarily participate in demand response events. Participation declined further over time. This pilot looks to research whether access to smart thermostat technology alone is incentive enough to maintain pilot participation among this customer class, or if a pay-for-performance incentive structure could influence higher participation levels during control events. Customers will be given notification prior to an event and will have the option to participate or to opt-out during the pilot control events.

Market Barriers

Smart thermostats are gaining popularity and market share among residential customers. Their adoption in commercial environments lags behind the residential market, even

though the functionality and convenience these devices offer may benefit small business customers as much or more than residential customers. The Company will gain an understanding of the obstacles which must be overcome to gain customer acceptance of this technology through this pilot.

Installation of smart thermostats may also prove to be a challenge. Through the Saver's Switch program the Company has a great deal of experience with the installation of load control devices on cooling equipment; smart thermostat installation could pose the following similar challenges:

- Installation requires access to the interior of the customer's facility;
- The smart thermostat must be connected to the customer's Wi-Fi network;
- The features and functions of smart thermostats must be explained to customers, introducing a training component to the installation process (and customer service needs thereafter).

To address these challenges, the Company believes the Lighting – Small Business product's direct install approach may be a potential deployment pathway. While onsite for the lighting assessment the third-party implementer could perform free installation of the smart thermostat(s)—providing the level of customer contact believed to be needed to overcome these installation hurdles. The Company aims to learn whether this approach can be used cost-effectively during this pilot.

B. Targets, Participants & Budgets

Targets and Participants

The target market for this pilot offering is small business customers whose annual peak demand is 100 kW or less. Pilot participants will be limited to 100 customers, corresponding to approximately 300 smart thermostats being deployed across those customers' different premises. To qualify for participation customers must have summer, weekday cooling loads; no more than five thermostats at one premise; and a Wi-Fi network within their facility.

Budgets

The total pilot budget is estimated to be approximately \$0.5 million from launch in 2015 through 2016, with approximately 50% of the budget supporting administration and program delivery—largely a function of costs associated with hardware (smart thermostats), installation, control software, and project management; 18% to M&V; 16% to rebates and incentives; and the remaining 14% to pilot planning.

C. Application Process

Potential customers will be made aware of the pilot through interaction with the Company's Lighting – Small Business third-party implementer. To participate in the pilot the customer must complete a pilot application agreement which will detail the terms of receiving the smart thermostat, expectations for participating in demand response events, and agreement to release data collected from the smart thermostats for purposes of pilot evaluation. The third-party implementer will assist customers in applying for this pilot by qualifying the customer and their equipment, and reviewing the completed applications while on site.

D. Marketing Objectives & Strategies

Marketing techniques will be limited to the Lighting – Small Business third-party implementer's efforts in conjunction with the direct install approach. Pilot expenditures will be centered on design, research, and evaluation of the technology and pilot delivery techniques, with limited focus on marketing.

E. Product-Specific Policies

Customers interested in participation will be required to agree to and sign a participation agreement. By participating, customers agree to share their thermostat usage data with Xcel Energy (in accordance with Colorado state data privacy rules⁹⁶ and Xcel Energy's Privacy Policy). Participants will also agree to the terms of the pay-for-performance model, which states that they will receive no compensation for any event they opt-out of.

To be eligible for the SB Thermostat Pilot, participants must be Xcel Energy electric customers with central cooling systems.

Xcel Energy will provide participating customers with smart thermostats for this pilot. The Company will select the thermostat based on certain qualifying product criteria including:

- Wi-Fi connectivity;
- a mobile app and online portal for customers;
- capable of being deployed for DR with the ability to;
 - cycle loads during DR events
 - allow for pre-cooling followed by temperature set-up during DR events
- a utility facing portal for scheduling and dispatching DR events
- ability to collect and report on thermostat data including:
 - run time,
 - schedules and set points, and
 - override of DR events.

⁹⁶ CCR 723-3-3026 et seq., available: <http://www.dora.state.co.us/puc/rules/723-3.pdf>.

The thermostat manufacturer must also sign an agreement with the Company agreeing to provide this data.

The thermostat manufacturer for this pilot will be the manufacturer selected for the residential Smart Thermostat Pilot. By using the same manufacturer, the pilot will realize some economies of scale, particularly in obtaining a single demand response portal for both the residential and business pilots.

F. Stakeholder Involvement

In designing this pilot the Company leveraged what was learned from a number of external stakeholders via the Smart Thermostat Study Group convened in 2014, which included representatives from the following organizations:

- Energy Efficiency Business Coalition (EEBC)
- Southwest Energy Efficiency Project (SWEEP)
- Western Cooling Efficiency Center (WCEC)
- Lawrence Berkeley National Laboratory (LBNL)
- Wisconsin Energy Conservation Corporation (WECC)
- Nest Labs
- Honeywell
- EnergyHub
- ecobee
- Schneider Electric
- Landis+Gyr
- Tendril
- E Source
- Colorado Public Utilities Commission Staff

Pilot updates and results will be shared with stakeholders through quarterly DSM Roundtable Meetings. If pilot results show promise of transitioning this concept to a full product, the development team will seek input from stakeholders on final product design.

G. Rebates & Incentives

An objective of this pilot is to determine whether incentives beyond being provided with the smart thermostat itself are required to maintain business customer participation in demand response events. To determine the difference in participation rates, one half the participants will receive compensation for each event they participate in while the other half will receive no additional compensation. The compensation level will be \$2.00 per ton of controlled cooling load per event. This equates to approximately \$15.50 per event per thermostat, based on an average controlled cooling load per thermostat of 7.75 tons. Customers will be randomly assigned to one of the incentive groups.

H. Evaluation, Measurement, & Verification

Public Service will contract with a third-party evaluator to measure impacts. The third-party will be responsible for analysis, impact estimation, and project management and reporting. Specifically, the third-party will measure the kW load reductions during events and associated energy reduction. Two methods will be used for determining DR event response:

- *Method 1* calculates load reduction based on the controlled load and thermostat data. During installation, equipment specifications will be collected for each piece of cooling equipment being controlled by a smart thermostat. Data obtained from the thermostat manufacturer will include cooling temperature set points, equipment run time, and event participation/opt-out rates. Using standard engineering calculations the expected load reduction for each thermostat can be calculated.
- *Method 2* will use direct load monitoring. Data loggers will be deployed on one half of the controlled cooling loads. The load reduction during demand response events will be determined by comparing actual load during the events to baseline consumption. The baseline will be calculated by averaging actual load data from days similar to event days. Combining this monitoring data with information collected from the smart thermostats can be used to calibrate the results determined through Method 1.

The third-party evaluator will prepare a final report with comprehensive results for the summers of 2015 and 2016. The evaluator will provide the final results and descriptions of the methods used for inclusion in the evaluation report that they will deliver to Public Service.

Xcel Energy intends to report on pilot findings and claim pilot savings in the 2015 Annual DSM Status Report—if the pilot is cost-effective. The Company will not deploy additional devices in 2016; therefore no incremental savings are expected to be claimed after 2015.

Cost-Benefit Analyses

The cost-benefit analyses (CBAs) resulting from the DSM portfolio described herein are displayed on the following pages, with the 2015 electric and gas CBAs, followed by the 2016 electric and gas CBAs.

PORTFOLIO TOTAL					2015	ELECTRIC	GOAL
2015 Net Present Cost Benefit Summary Analysis For All Participants							
	Participant Test (\$Total)	Utility Test (\$Total)	Rate Impact Test (\$Total)	Modified TRC Test (\$Total)	Input Summary and Totals	Program Inputs per Customer kW	
Benefits					Lifetime (Weighted on Generator kWh)	A	15 years
Avoided Revenue Requirements					Annual Hours	B	8760
Generation Capacity	N/A	\$92,069,276	\$92,069,276	\$92,069,276	Gross Customer kW	C	1 kW
Distribution Capacity	N/A	\$0	\$0	\$0	Generator Peak Coincidence Factor	D	33.48%
Marginal Energy	N/A	\$171,477,173	\$171,477,173	\$171,477,173	Gross Load Factor at Customer	E	16.92%
Avoided Emissions (CO2)	N/A	N/A	N/A	\$0	Net-to-Gross (Energy)	F	85.6%
Subtotal				\$263,546,449	Net-to-Gross (Demand)	G	87.4%
Non-Energy Benefits Adder (10.2%)				\$26,895,271	Transmission Loss Factor (Energy)	H	6.901%
Subtotal	N/A	\$263,546,449	\$263,546,449	\$290,441,720	Transmission Loss Factor (Demand)	I	7.403%
Other Benefits					Installation Rate (Energy)	J	98.6%
Bill Reduction - Electric	\$348,513,226	N/A	N/A	N/A	Installation Rate (Demand)	K	99.2%
Incentives	\$54,832,166	N/A	N/A	\$54,832,166	MTRC Net Benefit (Cost)	L	\$482
Incremental Capital Savings	\$0	N/A	N/A	\$0	MTRC Non-Energy Benefit Adder	M	\$89
Incremental O&M Savings	\$2,378,908	N/A	N/A	\$1,902,434	Net coincident kW Saved at Generator	(G x C x K) x D / (1 - I)	0.3136 kW
Subtotal	\$405,724,300	N/A	N/A	\$56,734,600	Gross Annual kWh Saved at Customer	(B x E x C)	1,482 kWh
Total Benefits	\$405,724,300	\$263,546,449	\$263,546,449	\$347,176,319	Net Annual kWh Saved at Customer	(F x (B x E x C x J))	1,251 kWh
Costs					Net Annual kWh Saved at Generator	(F x (B x E x C x J)) / (1 - H)	1,344 kWh
Utility Project Costs					Program Summary All Participants		
Program Planning & Design	N/A	\$691,950	\$691,950	\$691,950	Total Budget	N	\$95,327,684
Administration & Program Deliv	N/A	\$29,178,962	\$29,178,962	\$29,178,962	Gross kW Saved at Customer	O	302,726 kW
Advertising/Promotion/Custon:	N/A	\$8,131,319	\$8,131,319	\$8,131,319	Net coincident kW Saved at Generator	(G x O x K) x D / (1 - I)	94,936 kW
Participant Rebates and Incentiv	N/A	\$54,832,166	\$54,832,166	\$54,832,166	Gross Annual kWh Saved at Customer	(B x E x O)	448,671,118 kWh
Equipment & Installation	N/A	\$234,022	\$234,022	\$234,022	Gross Installed Annual kWh Saved at Custome	(B x E x O x J)	442,601,514 kWh
Measurement and Verification	N/A	\$2,259,265	\$2,259,265	\$2,259,265	Net Annual kWh Saved at Customer	(F x (B x E x O x J))	378,821,352 kWh
Subtotal	N/A	\$95,327,684	\$95,327,684	\$95,327,684	Net Annual kWh Saved at Generator	(F x (B x E x O x J)) / (1 - H)	406,903,766 kWh
Utility Revenue Reduction					TRC Net Benefits with Adder	(O x L)	\$145,994,586
Revenue Reduction - Electric	N/A	N/A	\$287,853,707	N/A	TRC Net Benefits without Adder	(O x (L - M))	\$119,099,315
Subtotal	N/A	N/A	\$287,853,707	N/A	Utility Program Cost per kWh Lifetime		
Participant Costs					Utility Program Cost per kWh at Gen		\$0.0155
Incremental Capital Costs	\$115,172,643	N/A	N/A	\$105,854,050			\$1,004
Incremental O&M Costs	\$0	N/A	N/A	\$0			
Subtotal	\$115,172,643	N/A	N/A	\$105,854,050			
Total Costs	\$115,172,643	\$95,327,684	\$383,181,390	\$201,181,733			
Net Benefit (Cost)	\$290,551,657	\$168,218,765	(\$119,634,942)	\$145,994,586			
Benefit/Cost Ratio	3.52	2.76	0.69	1.73			

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

BUSINESS PROGRAM TOTAL					2015	ELECTRIC	GOAL
2015 Net Present Cost Benefit Summary Analysis For All Participants							
	Participant Test (\$Total)	Utility Test (\$Total)	Rate Impact Test (\$Total)	Modified TRC Test (\$Total)	Input Summary and Totals	Program Inputs per Customer kW	
Benefits					Lifetime (Weighted on Generator kWh)	A	16 years
Avoided Revenue Requirements					Annual Hours	B	8760
Generation Capacity	N/A	\$46,847,123	\$46,847,123	\$46,847,123	Gross Customer kW	C	1 kW
Distribution Capacity	N/A	\$0	\$0	\$0	Generator Peak Coincidence Factor	D	70.06%
Marginal Energy	N/A	\$117,294,544	\$117,294,544	\$117,294,544	Gross Load Factor at Customer	E	51.33%
Avoided Emissions (CO2)	N/A	N/A	N/A	\$0	Net-to-Gross (Energy)	F	88.1%
Subtotal				\$164,141,667	Net-to-Gross (Demand)	G	88.0%
Non-Energy Benefits Adder (10%)				\$16,414,167	Transmission Loss Factor (Energy)	H	6.510%
Subtotal	N/A	\$164,141,667	\$164,141,667	\$180,555,834	Transmission Loss Factor (Demand)	I	6.510%
Other Benefits					Installation Rate (Energy)	J	99.9%
Bill Reduction - Electric	\$139,696,967	N/A	N/A	N/A	Installation Rate (Demand)	K	99.5%
Incentives	\$28,871,432	N/A	N/A	\$28,871,432	MTRC Net Benefit (Cost)	L	\$1,309
Incremental Capital Savings	\$0	N/A	N/A	\$0	MTRC Non-Energy Benefit Adder	M	\$266
Incremental O&M Savings	\$1,240,282	N/A	N/A	\$1,417,256	Net coincident kW Saved at Generator	(G x C x K) x D / (1 - I)	0.6560 kW
Subtotal	\$169,808,681	N/A	N/A	\$30,288,688	Gross Annual kWh Saved at Customer	(B x E x C)	4,497 kWh
Total Benefits	\$169,808,681	\$164,141,667	\$164,141,667	\$210,844,522	Net Annual kWh Saved at Customer	(F x (B x E x C x J))	3,958 kWh
Costs					Net Annual kWh Saved at Generator	(F x (B x E x C x J)) / (1 - H)	4,234 kWh
Utility Project Costs					Program Summary All Participants		
Program Planning & Design	N/A	\$68,955	\$68,955	\$68,955	Total Budget	N	\$47,022,790
Administration & Program Deliv	N/A	\$14,371,219	\$14,371,219	\$14,371,219	Gross kW Saved at Customer	O	61,624 kW
Advertising/Promotion/Custon:	N/A	\$2,794,544	\$2,794,544	\$2,794,544	Net coincident kW Saved at Generator	(G x O x K) x D / (1 - I)	40,424 kW
Participant Rebates and Incentiv	N/A	\$28,871,432	\$28,871,432	\$28,871,432	Gross Annual kWh Saved at Customer	(B x E x O)	277,113,934 kWh
Equipment & Installation	N/A	\$0	\$0	\$0	Gross Installed Annual kWh Saved at Custome	(B x E x O x J)	276,885,949 kWh
Measurement and Verification	N/A	\$916,640	\$916,640	\$916,640	Net Annual kWh Saved at Customer	(F x (B x E x O x J))	243,909,221 kWh
Subtotal	N/A	\$47,022,790	\$47,022,790	\$47,022,790	Net Annual kWh Saved at Generator	(F x (B x E x O x J)) / (1 - H)	260,893,380 kWh
Utility Revenue Reduction					TRC Net Benefits with Adder	(O x L)	\$80,637,861
Revenue Reduction - Electric	N/A	N/A	\$122,819,409	N/A	TRC Net Benefits without Adder	(O x (L - M))	\$64,223,695
Subtotal	N/A	N/A	\$122,819,409	N/A	Utility Program Cost per kWh Lifetime		
Participant Costs					Utility Program Cost per kWh at Gen		\$0.0109
Incremental Capital Costs	\$94,293,437	N/A	N/A	\$83,183,871			\$1,163
Incremental O&M Costs	\$0	N/A	N/A	\$0			
Subtotal	\$94,293,437	N/A	N/A	\$83,183,871			
Total Costs	\$94,293,437	\$47,022,790	\$169,842,199	\$130,206,660			
Net Benefit (Cost)	\$75,515,244	\$117,118,878	(\$5,700,532)	\$80,637,861			
Benefit/Cost Ratio	1.80	3.49	0.97	1.62			

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

RESIDENTIAL PROGRAM TOTAL					2015	ELECTRIC	GOAL
2015 Net Present Cost Benefit Summary Analysis For All Participants							
	Participant	Utility	Rate	Modified		Input Summary and Totals	
	Test	Test	Impact	TRC		Program Inputs per Customer kW	
	(\$Total)	(\$Total)	Test	Test		Lifetime (Weighted on Generator kWh)	A 13 years
			(\$Total)	(\$Total)		Annual Hours	B 8760
						Gross Customer kW	C 1 kW
Benefits						Generator Peak Coincidence Factor	D 22.48%
Avoided Revenue Requirements							
Generation Capacity	N/A	\$27,772,040	\$27,772,040	\$27,772,040		Gross Load Factor at Customer	E 9.58%
Distribution Capacity	N/A	\$0	\$0	\$0		Net-to-Gross (Energy)	F 80.4%
Marginal Energy	N/A	\$50,789,039	\$50,789,039	\$50,789,039		Net-to-Gross (Demand)	G 82.4%
Avoided Emissions (CO2)	N/A	N/A	N/A	\$0		Transmission Loss Factor (Energy)	H 7.534%
Subtotal				\$78,561,079		Transmission Loss Factor (Demand)	I 7.637%
Non-Energy Benefits Adder (10%)				\$7,856,108		Installation Rate (Energy)	J 96.8%
Subtotal	N/A	\$78,561,079	\$78,561,079	\$86,417,187		Installation Rate (Demand)	K 98.9%
Other Benefits						MTRC Net Benefit (Cost)	L \$300
Bill Reduction - Electric	\$197,849,963	N/A	N/A	N/A		MTRC Non-Energy Benefit Adder	M \$41
Incentives	\$15,754,568	N/A	N/A	\$15,754,568		Net coincident kW Saved at Generator	(G x C x K) x D / (1 - I) 0.1983 kW
Incremental Capital Savings	\$0	N/A	N/A	\$0		Gross Annual kWh Saved at Customer	(B x E x C) 839 kWh
Incremental O&M Savings	\$909,340	N/A	N/A	\$315,747		Net Annual kWh Saved at Customer	(F x (B x E x C x J)) 653 kWh
Subtotal	\$214,513,871	N/A	N/A	\$16,070,315		Net Annual kWh Saved at Generator	(F x (B x E x C x J)) / (1 - H) 706 kWh
Total Benefits	\$214,513,871	\$78,561,079	\$78,561,079	\$102,487,502		Program Summary All Participants	
Costs						Total Budget	N \$25,626,281
Utility Project Costs							
Program Planning & Design	N/A	\$31,893	\$31,893	\$31,893		Gross kW Saved at Customer	O 191,952 kW
Administration & Program Deliv	N/A	\$7,083,025	\$7,083,025	\$7,083,025		Net coincident kW Saved at Generator	(G x O x K) x D / (1 - I) 38,062 kW
Advertising/Promotion/Custon:	N/A	\$2,288,705	\$2,288,705	\$2,288,705		Gross Annual kWh Saved at Customer	(B x E x O) 161,038,588 kWh
Participant Rebates and Incentiv	N/A	\$15,754,568	\$15,754,568	\$15,754,568		Gross Installed Annual kWh Saved at Custome	(B x E x O x J) 155,963,140 kWh
Equipment & Installation	N/A	\$151,296	\$151,296	\$151,296		Net Annual kWh Saved at Customer	(F x (B x E x O x J)) 125,385,127 kWh
Measurement and Verification	N/A	\$316,794	\$316,794	\$316,794		Net Annual kWh Saved at Generator	(F x (B x E x O x J)) / (1 - H) 135,601,572 kWh
Subtotal	N/A	\$25,626,281	\$25,626,281	\$25,626,281		TRC Net Benefits with Adder	(O x L) \$57,528,213
						TRC Net Benefits without Adder	(O x (L - M)) \$49,672,105
Utility Revenue Reduction							
Revenue Reduction - Electric	N/A	N/A	\$155,210,074	N/A		Utility Program Cost per kWh Lifetime	\$0.0146
Subtotal	N/A	N/A	\$155,210,074	N/A		Utility Program Cost per kW at Gen	\$673
Participant Costs							
Incremental Capital Costs	\$17,542,036	N/A	N/A	\$19,333,008			
Incremental O&M Costs	\$0	N/A	N/A	\$0			
Subtotal	\$17,542,036	N/A	N/A	\$19,333,008			
Total Costs	\$17,542,036	\$25,626,281	\$180,836,355	\$44,959,289			
Net Benefit (Cost)	\$196,971,835	\$52,934,798	(\$102,275,276)	\$57,528,213			
Benefit/Cost Ratio	12.23	3.07	0.43	2.28			

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

LOW-INCOME PROGRAM TOTAL					2015	ELECTRIC	GOAL
2015 Net Present Cost Benefit Summary Analysis For All Participants							
	Participant Test (\$Total)	Utility Test (\$Total)	Rate Impact Test (\$Total)	Modified TRC Test (\$Total)	Input Summary and Totals	Program Inputs per Customer kW	
Benefits					Lifetime (Weighted on Generator kWh)	A	14 years
Avoided Revenue Requirements					Annual Hours	B	8760
Generation Capacity	N/A	\$772,224	\$772,224	\$772,224	Gross Customer kW	C	1 kW
Distribution Capacity	N/A	\$0	\$0	\$0	Generator Peak Coincidence Factor	D	14.89%
Marginal Energy	N/A	\$2,831,949	\$2,831,949	\$2,831,949	Gross Load Factor at Customer	E	15.20%
Avoided Emissions (CO2)	N/A	N/A	N/A	\$0	Net-to-Gross (Energy)	F	100.0%
Subtotal				\$3,604,173	Net-to-Gross (Demand)	G	100.0%
Non-Energy Benefits Adder (25%)				\$901,043	Transmission Loss Factor (Energy)	H	7.690%
Subtotal	N/A	\$3,604,173	\$3,604,173	\$4,505,216	Transmission Loss Factor (Demand)	I	7.690%
Other Benefits					Installation Rate (Energy)	J	88.2%
Bill Reduction - Electric	\$9,730,833	N/A	N/A	N/A	Installation Rate (Demand)	K	88.5%
Incentives	\$2,190,015	N/A	N/A	\$2,190,015	MTRC Net Benefit (Cost)	L	\$219
Incremental Capital Savings	\$0	N/A	N/A	\$0	MTRC Non-Energy Benefit Adder	M	\$161
Incremental O&M Savings	\$222,751	N/A	N/A	\$162,895	Net coincident kW Saved at Generator	(G x C x K) x D / (1 - I)	0.1428 kW
Subtotal	\$12,143,599	N/A	N/A	\$2,352,911	Gross Annual kWh Saved at Customer	(B x E x C)	1,332 kWh
Total Benefits	\$12,143,599	\$3,604,173	\$3,604,173	\$6,858,126	Net Annual kWh Saved at Customer	(F x (B x E x C x J))	1,175 kWh
Costs					Net Annual kWh Saved at Generator	(F x (B x E x C x J)) / (1 - H)	1,272 kWh
Utility Project Costs					Program Summary All Participants		
Program Planning & Design	N/A	\$0	\$0	\$0	Total Budget	N	\$3,027,493
Administration & Program Deliv	N/A	\$492,240	\$492,240	\$492,240	Gross kW Saved at Customer	O	5,592 kW
Advertising/Promotion/Custon:	N/A	\$245,863	\$245,863	\$245,863	Net coincident kW Saved at Generator	(G x O x K) x D / (1 - I)	799 kW
Participant Rebates and Incentiv	N/A	\$2,190,015	\$2,190,015	\$2,190,015	Gross Annual kWh Saved at Customer	(B x E x O)	7,446,731 kWh
Equipment & Installation	N/A	\$0	\$0	\$0	Gross Installed Annual kWh Saved at Custome	(B x E x O x J)	6,567,555 kWh
Measurement and Verification	N/A	\$99,375	\$99,375	\$99,375	Net Annual kWh Saved at Customer	(F x (B x E x O x J))	6,567,555 kWh
Subtotal	N/A	\$3,027,493	\$3,027,493	\$3,027,493	Net Annual kWh Saved at Generator	(F x (B x E x O x J)) / (1 - H)	7,114,674 kWh
Utility Revenue Reduction					TRC Net Benefits with Adder	(O x L)	\$1,225,615
Revenue Reduction - Electric	N/A	N/A	\$8,588,760	N/A	TRC Net Benefits without Adder	(O x (L - M))	\$324,572
Subtotal	N/A	N/A	\$8,588,760	N/A	Utility Program Cost per kWh Lifetime		
Participant Costs					Utility Program Cost per kWh at Gen		\$0.0311
Incremental Capital Costs	\$2,605,019	N/A	N/A	\$2,605,019			\$3,791
Incremental O&M Costs	\$0	N/A	N/A	\$0			
Subtotal	\$2,605,019	N/A	N/A	\$2,605,019			
Total Costs	\$2,605,019	\$3,027,493	\$11,616,253	\$5,632,512			
Net Benefit (Cost)	\$9,538,581	\$576,680	(\$8,012,081)	\$1,225,615			
Benefit/Cost Ratio	4.66	1.19	0.31	1.22			

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

PORTFOLIO TOTAL				2016	ELECTRIC	GOAL
2016 Net Present Cost Benefit Summary Analysis For All Participants						
	Participant	Utility	Rate	Modified		
	Test	Test	Impact	TRC		
	(STotal)	(STotal)	(STotal)	(STotal)		
Benefits						
Avoided Revenue Requirements						
Generation Capacity	N/A	\$89,573,528	\$89,573,528	\$89,573,528		
Transmission & Distribution	N/A	\$0	\$0	\$0		
Marginal Energy	N/A	\$174,089,234	\$174,089,234	\$174,089,234		
Avoided Emissions (CO2)	N/A	N/A	N/A	\$0		
Subtotal				\$263,662,762		
Non-Energy Benefits Adder (10.2%)				\$26,930,235		
Subtotal	N/A	\$263,662,762	\$263,662,762	\$290,592,997		
Other Benefits						
Bill Reduction - Electric	\$345,308,799	N/A	N/A	N/A		
Incentives	\$52,833,528	N/A	N/A	\$52,833,528		
Incremental Capital Savings	\$0	N/A	N/A	\$0		
Incremental O&M Savings	\$2,187,750	N/A	N/A	\$1,577,378		
Subtotal	\$400,330,077	N/A	N/A	\$54,410,906		
Total Benefits	\$400,330,077	\$263,662,762	\$263,662,762	\$345,003,903		
Costs						
Utility Project Costs						
Program Planning & Design	N/A	\$694,081	\$694,081	\$694,081		
Administration & Program Deliv	N/A	\$28,630,429	\$28,630,429	\$28,630,429		
Advertising/Promotion/Custon:	N/A	\$8,039,948	\$8,039,948	\$8,039,948		
Participant Rebates and Incentiv:	N/A	\$52,833,528	\$52,833,528	\$52,833,528		
Equipment & Installation	N/A	\$202,196	\$202,196	\$202,196		
Measurement and Verification	N/A	\$2,037,259	\$2,037,259	\$2,037,259		
Subtotal	N/A	\$92,437,441	\$92,437,441	\$92,437,441		
Utility Revenue Reduction						
Revenue Reduction - Electric	N/A	N/A	\$289,862,023	N/A		
Subtotal	N/A	N/A	\$289,862,023	N/A		
Participant Costs						
Incremental Capital Costs	\$110,923,325	N/A	N/A	\$102,466,244		
Incremental O&M Costs	\$0	N/A	N/A	\$0		
Subtotal	\$110,923,325	N/A	N/A	\$102,466,244		
Total Costs	\$110,923,325	\$92,437,441	\$382,299,464	\$194,903,685		
Net Benefit (Cost)	\$289,406,752	\$171,225,321	(\$118,636,702)	\$150,100,218		
Benefit/Cost Ratio	3.61	2.85	0.69	1.77		

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

BUSINESS PROGRAM TOTAL					2016	ELECTRIC	GOAL
2016 Net Present Cost Benefit Summary Analysis For All Participants							
	Participant	Utility	Rate	Modified			
	Test	Test	Impact	TRC			
	(\$Total)	(\$Total)	(\$Total)	(\$Total)			
Benefits							
Avoided Revenue Requirements							
Generation Capacity	N/A	\$44,349,335	\$44,349,335	\$44,349,335			
Transmission & Distribution	N/A	\$0	\$0	\$0			
Marginal Energy	N/A	\$118,580,983	\$118,580,983	\$118,580,983			
Avoided Emissions (CO2)	N/A	N/A	N/A	\$0			
Subtotal				\$162,930,318			
Non-Energy Benefits Adder (10%)				\$16,293,032			
Subtotal	N/A	\$162,930,318	\$162,930,318	\$179,223,350			
Other Benefits							
Bill Reduction - Electric	\$138,168,024	N/A	N/A	N/A			
Incentives	\$26,859,810	N/A	N/A	\$26,859,810			
Incremental Capital Savings	\$0	N/A	N/A	\$0			
Incremental O&M Savings	\$1,013,268	N/A	N/A	\$1,055,241			
Subtotal	\$166,041,103	N/A	N/A	\$27,915,051			
Total Benefits	\$166,041,103	\$162,930,318	\$162,930,318	\$207,138,401			
Costs							
Utility Project Costs							
Program Planning & Design	N/A	\$84,401	\$84,401	\$84,401			
Administration & Program Deliv	N/A	\$13,594,929	\$13,594,929	\$13,594,929			
Advertising/Promotion/Custon:	N/A	\$2,730,944	\$2,730,944	\$2,730,944			
Participant Rebates and Incentiv:	N/A	\$26,859,810	\$26,859,810	\$26,859,810			
Equipment & Installation	N/A	\$0	\$0	\$0			
Measurement and Verification	N/A	\$904,780	\$904,780	\$904,780			
Subtotal	N/A	\$44,174,864	\$44,174,864	\$44,174,864			
Utility Revenue Reduction							
Revenue Reduction - Electric	N/A	N/A	\$121,777,026	N/A			
Subtotal	N/A	N/A	\$121,777,026	N/A			
Participant Costs							
Incremental Capital Costs	\$89,992,477	N/A	N/A	\$79,504,191			
Incremental O&M Costs	\$0	N/A	N/A	\$0			
Subtotal	\$89,992,477	N/A	N/A	\$79,504,191			
Total Costs	\$89,992,477	\$44,174,864	\$165,951,890	\$123,679,055			
Net Benefit (Cost)	\$76,048,625	\$118,755,454	(\$3,021,572)	\$83,459,347			
Benefit/Cost Ratio	1.85	3.69	0.98	1.67			

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

RESIDENTIAL PROGRAM TOTAL					2016	ELECTRIC	GOAL
2016 Net Present Cost Benefit Summary Analysis For All Participants							
	Participant	Utility	Rate	Modified			
	Test	Test	Impact	TRC			
	(\$Total)	(\$Total)	(\$Total)	(\$Total)			
Benefits							
Avoided Revenue Requirements							
Generation Capacity	N/A	\$27,750,406	\$27,750,406	\$27,750,406			
Transmission & Distribution	N/A	\$0	\$0	\$0			
Marginal Energy	N/A	\$51,381,985	\$51,381,985	\$51,381,985			
Avoided Emissions (CO2)	N/A	N/A	N/A	\$0			
Subtotal				\$79,132,391			
Non-Energy Benefits Adder (10%)				\$7,913,239			
Subtotal	N/A	\$79,132,391	\$79,132,391	\$87,045,630			
Other Benefits							
Bill Reduction - Electric	\$193,415,389	N/A	N/A	N/A			
Incentives	\$15,290,305	N/A	N/A	\$15,290,305			
Incremental Capital Savings	\$0	N/A	N/A	\$0			
Incremental O&M Savings	\$949,553	N/A	N/A	\$357,063			
Subtotal	\$209,655,246	N/A	N/A	\$15,647,367			
Total Benefits	\$209,655,246	\$79,132,391	\$79,132,391	\$102,692,997			
Costs							
Utility Project Costs							
Program Planning & Design	N/A	\$31,193	\$31,193	\$31,193			
Administration & Program Deliv	N/A	\$6,977,647	\$6,977,647	\$6,977,647			
Advertising/Promotion/Custm:	N/A	\$2,307,460	\$2,307,460	\$2,307,460			
Participant Rebates and Incentiv	N/A	\$15,290,305	\$15,290,305	\$15,290,305			
Equipment & Installation	N/A	\$202,196	\$202,196	\$202,196			
Measurement and Verification	N/A	\$266,679	\$266,679	\$266,679			
Subtotal	N/A	\$25,075,480	\$25,075,480	\$25,075,480			
Utility Revenue Reduction							
Revenue Reduction - Electric	N/A	N/A	\$155,532,403	N/A			
Subtotal	N/A	N/A	\$155,532,403	N/A			
Participant Costs							
Incremental Capital Costs	\$17,106,556	N/A	N/A	\$19,137,761			
Incremental O&M Costs	\$0	N/A	N/A	\$0			
Subtotal	\$17,106,556	N/A	N/A	\$19,137,761			
Total Costs	\$17,106,556	\$25,075,480	\$180,607,883	\$44,213,241			
Net Benefit (Cost)	\$192,548,690	\$54,056,911	(\$101,475,492)	\$58,479,757			
Benefit/Cost Ratio	12.26	3.16	0.44	2.32			

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

LOW-INCOME PROGRAM TOTAL					2016	ELECTRIC	GOAL
2016 Net Present Cost Benefit Summary Analysis For All Participants							
	Participant	Utility	Rate	Modified			
	Test	Test	Impact	TRC			
	(\$Total)	(\$Total)	(\$Total)	(\$Total)			
Benefits							
Avoided Revenue Requirements							
Generation Capacity	N/A	\$792,491	\$792,491	\$792,491			
Transmission & Distribution	N/A	\$0	\$0	\$0			
Marginal Energy	N/A	\$2,967,236	\$2,967,236	\$2,967,236			
Avoided Emissions (CO2)	N/A	N/A	N/A	\$0			
Subtotal				\$3,759,727			
Non-Energy Benefits Adder (25%)				\$939,932			
Subtotal	N/A	\$3,759,727	\$3,759,727	\$4,699,658			
Other Benefits							
Bill Reduction - Electric	\$10,012,711	N/A	N/A	N/A			
Incentives	\$2,218,995	N/A	N/A	\$2,218,995			
Incremental Capital Savings	\$0	N/A	N/A	\$0			
Incremental O&M Savings	\$222,751	N/A	N/A	\$162,895			
Subtotal	\$12,454,456	N/A	N/A	\$2,381,891			
Total Benefits	\$12,454,456	\$3,759,727	\$3,759,727	\$7,081,549			
Costs							
Utility Project Costs							
Program Planning & Design	N/A	\$0	\$0	\$0			
Administration & Program Deliv	N/A	\$417,569	\$417,569	\$417,569			
Advertising/Promotion/Custon:	N/A	\$245,863	\$245,863	\$245,863			
Participant Rebates and Incentiv:	N/A	\$2,218,995	\$2,218,995	\$2,218,995			
Equipment & Installation	N/A	\$0	\$0	\$0			
Measurement and Verification	N/A	\$100,824	\$100,824	\$100,824			
Subtotal	N/A	\$2,983,251	\$2,983,251	\$2,983,251			
Utility Revenue Reduction							
Revenue Reduction - Electric	N/A	N/A	\$8,839,918	N/A			
Subtotal	N/A	N/A	\$8,839,918	N/A			
Participant Costs							
Incremental Capital Costs	\$2,633,999	N/A	N/A	\$2,633,999			
Incremental O&M Costs	\$0	N/A	N/A	\$0			
Subtotal	\$2,633,999	N/A	N/A	\$2,633,999			
Total Costs	\$2,633,999	\$2,983,251	\$11,823,169	\$5,617,250			
Net Benefit (Cost)	\$9,820,458	\$776,476	(\$8,063,442)	\$1,464,299			
Benefit/Cost Ratio	4.73	1.26	0.32	1.26			

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

PORTFOLIO TOTAL				2015 GAS	GOAL
2015 Net Present Cost Benefit Summary Analysis For All Participants					
Participant	Utility	Rate	Modified		
Test	Test	Impact	TRC		
(STotal)	(STotal)	(STotal)	(STotal)		
Benefits					
Avoided Revenue Requirements					
Commodity Cost Reduction	N/A	\$27,643,623	\$27,643,623		
Variable O&M Savings	N/A	\$182,009	\$182,009		
Demand Savings	N/A	\$3,109,315	\$3,109,315		
Subtotal			\$30,934,947		
Emissions Non-Energy Benefits Adder (6.9%)			\$2,140,212		
Subtotal	N/A	\$30,934,947	\$30,934,947	\$33,075,159	
Other Benefits					
Bill Reduction - Gas	\$42,713,801	N/A	N/A	N/A	
Incentives	\$7,275,292	N/A	N/A	\$7,275,292	
Incremental Capital Savings	\$0	N/A	N/A	\$0	
Incremental O&M Savings	\$21,580,714	N/A	N/A	\$8,966,839	
Subtotal	\$71,569,807	N/A	N/A	\$16,242,131	
Total Benefits	\$71,569,807	\$30,934,947	\$30,934,947	\$49,317,290	
Costs					
Utility Project Costs					
Program Planning & Design	N/A	\$155,916	\$155,916	\$155,916	
Administration & Program Delf	N/A	\$4,109,716	\$4,109,716	\$4,109,716	
Advertising/Promotion/Custon	N/A	\$817,772	\$817,772	\$817,772	
Participant Rebates and Incentiv	N/A	\$7,275,292	\$7,275,292	\$7,275,292	
Equipment & Installation	N/A	\$89,160	\$89,160	\$89,160	
Measurement and Verification	N/A	\$683,000	\$683,000	\$683,000	
Subtotal	N/A	\$13,130,856	\$13,130,856	\$13,130,856	
Utility Revenue Reduction					
Revenue Reduction - Gas	N/A	N/A	\$40,348,875	N/A	
Subtotal	N/A	N/A	\$40,348,875	N/A	
Participant Costs					
Incremental Capital Costs	\$22,452,107	N/A	N/A	\$21,246,856	
Incremental O&M Costs	\$0	N/A	N/A	\$0	
Subtotal	\$22,452,107	N/A	N/A	\$21,246,856	
Total Costs	\$22,452,107	\$13,130,856	\$53,479,731	\$34,377,711	
Net Benefit (Cost)	\$49,117,700	\$17,804,091	(\$22,544,784)	\$14,939,579	
Benefit/Cost Ratio	3.19	2.36	0.58	1.43	

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

BUSINESS PROGRAM TOTAL					2015	GAS	GOAL
2015 Net Present Cost Benefit Summary Analysis For All Participants							
Participant	Utility	Rate	Modified		Input Summary and Totals		
Test	Test	Impact	TRC		Program Assumptions:		
(\$Total)	(\$Total)	(\$Total)	(\$Total)		Lifetime (Weighted on Dth)	A	18.95 years
Benefits					Net-to-Gross (Weighted on Dth)	B	97.15%
Avoided Revenue Requirements					Install Rate (Weighted on Dth)	C	100.0%
Commodity Cost Reduction	N/A	\$10,336,779	\$10,336,779	\$10,336,779			
Variable O&M Savings	N/A	\$66,327	\$66,327	\$66,327			
Demand Savings	N/A	\$1,133,090	\$1,133,090	\$1,133,090			
Subtotal				\$11,536,197			
Emissions Non-Energy Benefits Adder (5%)				\$576,810			
Subtotal	N/A	\$11,536,197	\$11,536,197	\$12,113,007			
Other Benefits					Program Totals:		
Bill Reduction - Gas	\$15,539,698	N/A	N/A	N/A	Total Dth/Yr Saved	D	187,082
Incentives	\$944,530	N/A	N/A	\$944,530	Utility Costs per Net Dth/Yr	E	\$10.76
Incremental Capital Savings	\$0	N/A	N/A	\$0	Net Benefit (Cost) per Gross Dth/Yr	F	\$17.51
Incremental O&M Savings	\$522,933	N/A	N/A	\$511,270	Non-Energy Benefits Adder per Gross Dth/Yr	G	\$3.08
Subtotal	\$17,007,161	N/A	N/A	\$1,455,800	Annual Dth/\$M	(\$1M / E)	92,923
Total Benefits	\$17,007,161	\$11,536,197	\$11,536,197	\$13,568,807	Total Utility Budget	(E x D)	\$2,013,309
Costs					Total MTRC Net Benefits with Adder	(D x F)	\$3,274,933
Utility Project Costs					Total MTRC Net Benefits without Adder	(F - G) x D	\$2,698,123
Program Planning & Design	N/A	\$10,000	\$10,000	\$10,000	Utility Program Cost per Net Dth Lifetime	(E / A)	\$0.57
Administration & Program Delt	N/A	\$943,944	\$943,944	\$943,944			
Advertising/Promotion/Custon	N/A	\$5,400	\$5,400	\$5,400			
Participant Rebates and Incentiv	N/A	\$944,530	\$944,530	\$944,530			
Equipment & Installation	N/A	\$0	\$0	\$0			
Measurement and Verification	N/A	\$109,435	\$109,435	\$109,435			
Subtotal	N/A	\$2,013,309	\$2,013,309	\$2,013,309			
Utility Revenue Reduction							
Revenue Reduction - Gas	N/A	N/A	\$15,087,362	N/A			
Subtotal	N/A	N/A	\$15,087,362	N/A			
Participant Costs							
Incremental Capital Costs	\$8,486,295	N/A	N/A	\$8,280,565			
Incremental O&M Costs	\$0	N/A	N/A	\$0			
Subtotal	\$8,486,295	N/A	N/A	\$8,280,565			
Total Costs	\$8,486,295	\$2,013,309	\$17,100,671	\$10,293,874			
Net Benefit (Cost)	\$8,520,866	\$9,522,887	(\$5,564,474)	\$3,274,933			
Benefit/Cost Ratio	2.00	5.73	0.67	1.32			

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

RESIDENTIAL PROGRAM TOTAL					2015	GAS	GOAL
2015 Net Present Cost Benefit Summary Analysis For All Participants							
Participant	Utility	Rate	Modified		Input Summary and Totals		
Test	Test	Impact	TRC		Program Assumptions:		
(\$Total)	(\$Total)	(\$Total)	(\$Total)		Lifetime (Weighted on Dth)	A	14.44 years
Benefits					Net-to-Gross (Weighted on Dth)	B	92.98%
					Install Rate (Weighted on Dth)	C	79.2%
Avoided Revenue Requirements							
Commodity Cost Reduction	N/A	\$14,396,748	\$14,396,748	\$14,396,748			
Variable O&M Savings	N/A	\$95,989	\$95,989	\$95,989			
Demand Savings	N/A	\$1,639,813	\$1,639,813	\$1,639,813			
Subtotal				\$16,132,550			
Emissions Non-Energy Benefits Adder (5%)				\$806,628			
Subtotal	N/A	\$16,132,550	\$16,132,550	\$16,939,178			
Other Benefits							
Bill Reduction - Gas	\$22,926,411	N/A	N/A	N/A			
Incentives	\$3,378,373	N/A	N/A	\$3,378,373			
Incremental Capital Savings	\$0	N/A	N/A	\$0			
Incremental O&M Savings	\$18,672,088	N/A	N/A	\$7,134,463			
Subtotal	\$44,976,872	N/A	N/A	\$10,512,835			
Total Benefits	\$44,976,872	\$16,132,550	\$16,132,550	\$27,452,013			
Costs							
Utility Project Costs							
Program Planning & Design	N/A	\$3,858	\$3,858	\$3,858			
Administration & Program Delf	N/A	\$1,790,833	\$1,790,833	\$1,790,833			
Advertising/Promotion/Custon	N/A	\$301,914	\$301,914	\$301,914			
Participant Rebates and Incentiv	N/A	\$3,378,373	\$3,378,373	\$3,378,373			
Equipment & Installation	N/A	\$89,160	\$89,160	\$89,160			
Measurement and Verification	N/A	\$314,108	\$314,108	\$314,108			
Subtotal	N/A	\$5,878,246	\$5,878,246	\$5,878,246			
Utility Revenue Reduction							
Revenue Reduction - Gas	N/A	N/A	\$21,013,821	N/A			
Subtotal	N/A	N/A	\$21,013,821	N/A			
Participant Costs							
Incremental Capital Costs	\$11,106,991	N/A	N/A	\$10,107,470			
Incremental O&M Costs	\$0	N/A	N/A	\$0			
Subtotal	\$11,106,991	N/A	N/A	\$10,107,470			
Total Costs	\$11,106,991	\$5,878,246	\$26,892,067	\$15,985,716			
Net Benefit (Cost)	\$33,869,881	\$10,254,304	(\$10,759,517)	\$11,466,297			
Benefit/Cost Ratio	4.05	2.74	0.60	1.72			

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

LOW-INCOME PROGRAM TOTAL					2015	GAS	GOAL
2015 Net Present Cost Benefit Summary Analysis For All Participants							
Participant	Utility	Rate	Modified		Input Summary and Totals		
Test	Test	Impact	TRC		Program Assumptions:		
(STotal)	(STotal)	(STotal)	(STotal)		Lifetime (Weighted on Dth)	A	15.41 years
Benefits					Net-to-Gross (Weighted on Dth)	B	100.00%
					Install Rate (Weighted on Dth)	C	88.2%
Avoided Revenue Requirements							
Commodity Cost Reduction	N/A	\$2,647,588	\$2,647,588	\$2,647,588			
Variable O&M Savings	N/A	\$17,681	\$17,681	\$17,681			
Demand Savings	N/A	\$302,054	\$302,054	\$302,054			
Subtotal				\$2,967,324			
Emissions Non-Energy Benefits Adder (25%)				\$741,831			
Subtotal	N/A	\$2,967,324	\$2,967,324	\$3,709,155			
Other Benefits							
Bill Reduction - Gas	\$3,864,542	N/A	N/A	N/A			
Incentives	\$2,645,640	N/A	N/A	\$2,645,640			
Incremental Capital Savings	\$0	N/A	N/A	\$0			
Incremental O&M Savings	\$2,275,495	N/A	N/A	\$1,210,909			
Subtotal	\$8,785,677	N/A	N/A	\$3,856,549			
Total Benefits	\$8,785,677	\$2,967,324	\$2,967,324	\$7,565,704			
Costs							
Utility Project Costs							
Program Planning & Design	N/A	\$0	\$0	\$0			
Administration & Program Delf	N/A	\$438,622	\$438,622	\$438,622			
Advertising/Promotion/Custon	N/A	\$192,770	\$192,770	\$192,770			
Participant Rebates and Incentiv	N/A	\$2,645,640	\$2,645,640	\$2,645,640			
Equipment & Installation	N/A	\$0	\$0	\$0			
Measurement and Verification	N/A	\$122,226	\$122,226	\$122,226			
Subtotal	N/A	\$3,399,258	\$3,399,258	\$3,399,258			
Utility Revenue Reduction							
Revenue Reduction - Gas	N/A	N/A	\$3,864,542	N/A			
Subtotal	N/A	N/A	\$3,864,542	N/A			
Participant Costs							
Incremental Capital Costs	\$2,805,484	N/A	N/A	\$2,805,484			
Incremental O&M Costs	\$0	N/A	N/A	\$0			
Subtotal	\$2,805,484	N/A	N/A	\$2,805,484			
Total Costs	\$2,805,484	\$3,399,258	\$7,263,800	\$6,204,742			
Net Benefit (Cost)	\$5,980,193	(\$431,935)	(\$4,296,476)	\$1,360,962			
Benefit/Cost Ratio	3.13	0.87	0.41	1.22			

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

PORTFOLIO TOTAL					2016	GAS	GOAL
2016 Net Present Cost Benefit Summary Analysis For All Participants							
	Participant	Utility	Rate	Modified			
	Test	Test	Impact	TRC			
	(\$Total)	(\$Total)	(\$Total)	(\$Total)			
Benefits							
Avoided Revenue Requirements							
Commodity Cost Reduction	N/A	\$28,673,559	\$28,673,559	\$28,673,559			
Variable O&M Savings	N/A	\$216,778	\$216,778	\$216,778			
Demand Savings	N/A	\$3,131,459	\$3,131,459	\$3,131,459			
Subtotal				\$32,021,796			
Emissions Non-Energy Benefits Adder (7%)				\$2,229,075			
Subtotal	N/A	\$32,021,796	\$32,021,796	\$34,250,872			
Other Benefits							
Bill Reduction - Gas	\$44,202,507	N/A	N/A	N/A			
Incentives	\$7,440,057	N/A	N/A	\$7,440,057			
Incremental Capital Savings	\$0	N/A	N/A	\$0			
Incremental O&M Savings	\$21,578,490	N/A	N/A	\$8,964,076			
Subtotal	\$73,221,055	N/A	N/A	\$16,404,133			
Total Benefits	\$73,221,055	\$32,021,796	\$32,021,796	\$50,655,005			
Costs							
Utility Project Costs							
Program Planning & Design	N/A	\$148,088	\$148,088	\$148,088			
Administration & Program Deliv	N/A	\$4,121,970	\$4,121,970	\$4,121,970			
Advertising/Promotion/Custon	N/A	\$845,191	\$845,191	\$845,191			
Participant Rebates and Incentiv	N/A	\$7,440,057	\$7,440,057	\$7,440,057			
Equipment & Installation	N/A	\$118,896	\$118,896	\$118,896			
Measurement and Verification	N/A	\$1,045,704	\$1,045,704	\$1,045,704			
Subtotal	N/A	\$13,719,906	\$13,719,906	\$13,719,906			
Utility Revenue Reduction							
Revenue Reduction - Gas	N/A	N/A	\$41,852,497	N/A			
Subtotal	N/A	N/A	\$41,852,497	N/A			
Participant Costs							
Incremental Capital Costs	\$22,008,064	N/A	N/A	\$20,795,683			
Incremental O&M Costs	\$0	N/A	N/A	\$0			
Subtotal	\$22,008,064	N/A	N/A	\$20,795,683			
Total Costs	\$22,008,064	\$13,719,906	\$55,572,403	\$34,515,589			
Net Benefit (Cost)	\$51,212,991	\$18,301,890	(\$23,550,607)	\$16,139,415			
Benefit/Cost Ratio	3.33	2.33	0.58	1.47			

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

BUSINESS PROGRAM TOTAL					2016	GAS	GOAL
2016 Net Present Cost Benefit Summary Analysis For All Participants							
	Participant Test (\$Total)	Utility Test (\$Total)	Rate Impact (\$Total)	Modified TRC Test (\$Total)	Input Summary and Totals		
Benefits					Program Assumptions:		
Avoided Revenue Requirements							
Commodity Cost Reduction	N/A	\$9,862,370	\$9,862,370	\$9,862,370	Lifetime (Weighted on Dth)	A	17.27 years
Variable O&M Savings	N/A	\$61,658	\$61,658	\$61,658	Net-to-Gross (Weighted on Dth)	B	96.85%
Demand Savings	N/A	\$1,053,316	\$1,053,316	\$1,053,316	Install Rate (Weighted on Dth)	C	100.0%
Subtotal				\$10,977,344			
Emissions Non-Energy Benefits Adder (5%)				\$548,867			
Subtotal	N/A	\$10,977,344	\$10,977,344	\$11,526,211			
Other Benefits							
Bill Reduction - Gas	\$14,870,683	N/A	N/A	N/A	Program Totals:		
Incentives	\$876,011	N/A	N/A	\$876,011	Total Dth/Yr Saved	D	187,961
Incremental Capital Savings	\$0	N/A	N/A	\$0	Utility Costs per Net Dth/Yr	E	\$9.61
Incremental O&M Savings	\$543,674	N/A	N/A	\$532,011	Net Benefit (Cost) per Gross Dth/Yr	F	\$21.66
Subtotal	\$16,290,368	N/A	N/A	\$1,408,022	Non-Energy Benefits Adder per Gross Dth/Yr	G	\$2.92
Total Benefits	\$16,290,368	\$10,977,344	\$10,977,344	\$12,934,233	Annual Dth/\$M	(\$1M / E)	104,045
Costs					Total Utility Budget	(E x D)	\$1,806,540
Utility Project Costs					Total MTRC Net Benefits with Adder	(D x F)	\$4,070,718
Program Planning & Design	N/A	\$7,554	\$7,554	\$7,554	Total MTRC Net Benefits without Adder	(F - G) x D	\$3,521,851
Administration & Program Deliv	N/A	\$808,740	\$808,740	\$808,740			
Advertising/Promotion/Custon	N/A	\$5,300	\$5,300	\$5,300			
Participant Rebates and Incentiv	N/A	\$876,011	\$876,011	\$876,011			
Equipment & Installation	N/A	\$0	\$0	\$0			
Measurement and Verification	N/A	\$108,935	\$108,935	\$108,935			
Subtotal	N/A	\$1,806,540	\$1,806,540	\$1,806,540			
Utility Revenue Reduction							
Revenue Reduction - Gas	N/A	N/A	\$14,394,954	N/A	Utility Program Cost per Net Dth Lifetime	(E / A)	\$0.56
Subtotal	N/A	N/A	\$14,394,954	N/A			
Participant Costs							
Incremental Capital Costs	\$7,257,406	N/A	N/A	\$7,056,975			
Incremental O&M Costs	\$0	N/A	N/A	\$0			
Subtotal	\$7,257,406	N/A	N/A	\$7,056,975			
Total Costs	\$7,257,406	\$1,806,540	\$16,201,494	\$8,863,515			
Net Benefit (Cost)	\$9,032,962	\$9,170,804	(\$5,224,150)	\$4,070,718			
Benefit/Cost Ratio	2.24	6.08	0.68	1.46			

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

RESIDENTIAL PROGRAM TOTAL					2016	GAS	GOAL
2016 Net Present Cost Benefit Summary Analysis For All Participants							
	Participant Test (\$Total)	Utility Test (\$Total)	Rate Impact (\$Total)	Modified TRC Test (\$Total)	Input Summary and Totals		
Benefits					Program Assumptions:		
Avoided Revenue Requirements					Lifetime (Weighted on Dth) A 13.68 years		
Commodity Cost Reduction	N/A	\$15,217,527	\$15,217,527	\$15,217,527	Net-to-Gross (Weighted on Dth) B 93.39%		
Variable O&M Savings	N/A	\$129,108	\$129,108	\$129,108	Install Rate (Weighted on Dth) C 79.5%		
Demand Savings	N/A	\$1,682,651	\$1,682,651	\$1,682,651			
Subtotal				\$17,029,286			
Emissions Non-Energy Benefits Adder (5%)				\$851,464			
Subtotal	N/A	\$17,029,286	\$17,029,286	\$17,880,750			
Other Benefits					Program Totals:		
Bill Reduction - Gas	\$24,086,380	N/A	N/A	N/A	Total Dth/Yr Saved D 353,188		
Incentives	\$3,492,375	N/A	N/A	\$3,492,375	Utility Costs per Net Dth/Yr E \$17.58		
Incremental Capital Savings	\$0	N/A	N/A	\$0	Net Benefit (Cost) per Gross Dth/Yr F \$34.12		
Incremental O&M Savings	\$18,722,588	N/A	N/A	\$7,184,423	Non-Energy Benefits Adder per Gross Dth/Yr G \$2.41		
Subtotal	\$46,301,343	N/A	N/A	\$10,676,798	Annual Dth/\$M (\$1M / E) 56,880		
Total Benefits	\$46,301,343	\$17,029,286	\$17,029,286	\$28,557,548	Total Utility Budget (E x D) \$6,209,312		
Costs					Total MTRC Net Benefits with Adder (D x F) \$12,050,914		
Utility Project Costs					Total MTRC Net Benefits without Adder (F - G) x D \$11,199,449		
Program Planning & Design	N/A	\$3,858	\$3,858	\$3,858			
Administration & Program Deliv	N/A	\$1,873,092	\$1,873,092	\$1,873,092			
Advertising/Promotion/Custon	N/A	\$333,407	\$333,407	\$333,407			
Participant Rebates and Incentiv	N/A	\$3,492,375	\$3,492,375	\$3,492,375			
Equipment & Installation	N/A	\$118,896	\$118,896	\$118,896			
Measurement and Verification	N/A	\$387,684	\$387,684	\$387,684			
Subtotal	N/A	\$6,209,312	\$6,209,312	\$6,209,312			
Utility Revenue Reduction					Utility Program Cost per Net Dth Lifetime (E / A) \$1.29		
Revenue Reduction - Gas	N/A	N/A	\$22,212,098	N/A			
Subtotal	N/A	N/A	\$22,212,098	N/A			
Participant Costs							
Incremental Capital Costs	\$11,309,272	N/A	N/A	\$10,297,323			
Incremental O&M Costs	\$0	N/A	N/A	\$0			
Subtotal	\$11,309,272	N/A	N/A	\$10,297,323			
Total Costs	\$11,309,272	\$6,209,312	\$28,421,410	\$16,506,634			
Net Benefit (Cost)	\$34,992,071	\$10,819,974	(\$11,392,124)	\$12,050,914			
Benefit/Cost Ratio	4.09	2.74	0.60	1.73			

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

LOW-INCOME PROGRAM TOTAL					2016	GAS	GOAL
2016 Net Present Cost Benefit Summary Analysis For All Participants							
	Participant	Utility	Rate	Modified			
	Test	Test	Impact	TRC			
	(\$Total)	(\$Total)	(\$Total)	(\$Total)			
Benefits							
Avoided Revenue Requirements							
Commodity Cost Reduction	N/A	\$2,810,175	\$2,810,175	\$2,810,175			
Variable O&M Savings	N/A	\$20,939	\$20,939	\$20,939			
Demand Savings	N/A	\$308,813	\$308,813	\$308,813			
Subtotal				\$3,139,927			
Emissions Non-Energy Benefits Adder (25%)				\$784,982			
Subtotal	N/A	\$3,139,927	\$3,139,927	\$3,924,909			
Other Benefits							
Bill Reduction - Gas	\$4,101,827	N/A	N/A	N/A			
Incentives	\$2,700,865	N/A	N/A	\$2,700,865			
Incremental Capital Savings	\$0	N/A	N/A	\$0			
Incremental O&M Savings	\$2,275,495	N/A	N/A	\$1,210,909			
Subtotal	\$9,078,187	N/A	N/A	\$3,911,774			
Total Benefits	\$9,078,187	\$3,139,927	\$3,139,927	\$7,836,683			
Costs							
Utility Project Costs							
Program Planning & Design	N/A	\$0	\$0	\$0			
Administration & Program Deliv	N/A	\$361,435	\$361,435	\$361,435			
Advertising/Promotion/Custon	N/A	\$197,770	\$197,770	\$197,770			
Participant Rebates and Incentiv	N/A	\$2,700,865	\$2,700,865	\$2,700,865			
Equipment & Installation	N/A	\$0	\$0	\$0			
Measurement and Verification	N/A	\$124,890	\$124,890	\$124,890			
Subtotal	N/A	\$3,384,960	\$3,384,960	\$3,384,960			
Utility Revenue Reduction							
Revenue Reduction - Gas	N/A	N/A	\$4,101,827	N/A			
Subtotal	N/A	N/A	\$4,101,827	N/A			
Participant Costs							
Incremental Capital Costs	\$2,860,709	N/A	N/A	\$2,860,709			
Incremental O&M Costs	\$0	N/A	N/A	\$0			
Subtotal	\$2,860,709	N/A	N/A	\$2,860,709			
Total Costs	\$2,860,709	\$3,384,960	\$7,486,788	\$6,245,669			
Net Benefit (Cost)	\$6,217,479	(\$245,033)	(\$4,346,861)	\$1,591,014			
Benefit/Cost Ratio	3.17	0.93	0.42	1.25			

Note: Dollar values represent present value of impacts accumulated over the lifetime of the measures.

Appendix A – List of Acronyms

Acronym	Meaning
ACEEE	American Council for an Energy Efficient Economy
AFUE	Annual Fuel Utilization Efficiency
ASHRAE	American Society of Heating Refrigeration & Air Conditioning Engineers
BOMA	Building Owners and Managers Association
BSC	Business Solutions Center
CEE (Minnesota)	Center for Energy and the Environment
CEE (Boston)	Consortium for Energy Efficiency
CEO	Colorado Energy Office
CFL	Compact Fluorescent Light Bulb
CFM	Cubic Feet Per Minute
CoPUC	Colorado Public Utilities Commission
DOE	U.S. Department of Energy
DSM	Demand-Side Management
DSMCA	Demand-Side Management Cost Adjustment
EEBC	Energy Efficiency Business Coalition
EER	Energy Efficiency Ratio
EF	Energy Factor
EIA	Energy Information Administration
EMS	Energy Management System
EM&V	Evaluation, Measurement & Verification
EOC	Energy Outreach Colorado
EPA	U.S. Environmental Protection Agency
ESCO	Energy Services Company
GAMA	Gas Appliance Manufacturer's Association
GPM	Gallons per Minute
HERS	Home Energy Rating System
HVAC	Heating, Ventilation, and Air Conditioning
IPMVP	International Performance Measurement and Verification Protocol
LIHEAP	Low-Income Home Energy Assistance Program
M&V	Measurement and Verification
NAIOP	National Association of Industrial and Office Properties
NEMA	National Electrical Manufacturers Association
NTG	Net-to-Gross
O&M	Operations and Maintenance
RAP	Resource Action Programs
RESNET	Residential Energy Services Network
RR	Realization Rate
SEER	Seasonal Energy Efficiency Ratio
TRC	Total Resource Cost test
VC	Verification Contractor
VFD	Variable Frequency Drive

Appendix B – Key Terms

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 targets. 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.

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.

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, Commercial Refrigeration Efficiency and Lighting Efficiency are individual products within the Business Program under the electric energy efficiency portfolio.

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.”

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.

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. 13A-0686EG for years 2015 through 2020.

Targets – The Company refers to “targets” as the Company’s estimated achievements for a given year for our portfolio, programs, and products.

Appendix C – Product Rankings

DSM 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, Docket No. 07R-371G. The table below shows the product rankings.

2015/2016	Rank
Home Lighting & Recycling	1
Energy Feedback Residential	2
Lighting Efficiency	3
School Education Kits	4
Efficient Showerheads	5
Computer Efficiency	6
Evaporative Cooling	7
Small Business -- Lighting	8
Motor & Drive Efficiency	9
Cooling	10
Commercial Refrigeration Efficiency	11
Energy Savings Kit	12
Process Efficiency	13
ENERGY STAR New Homes	14
Data Center Efficiency	15
New Construction	16
Refrigerator & Freezer Recycling	17
Energy Management Systems	18
Residential Heating	19
Home Energy Squad	20
Custom Efficiency	21
Recommissioning	22
Compressed Air Efficiency	23
Self Direct	24
Single-Family Weatherization	25
Heating Efficiency	26
High Efficiency Air Conditioning	27
Non-Profit	28
Insulation & Air Sealing	29
Home Performance with ENERGY STAR	30
Multi-Family Weatherization	31
Water Heating	32
LED Street Lights	33

➤ Appendix D – Budget Categories

The Company uses the following six budget categories to track and report its annual expenditures for DSM 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 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 2015 and 2016 achievements.

Electric Programs

In order to determine the cost-effectiveness of its electric energy efficiency and load management programs, Public Service must first calculate the avoided generation, transmission, distribution, and marginal energy costs these programs avoid. Below are tables showing the avoided cost assumptions used in this plan.

1. Estimated Annual Avoided Generation Capacity Costs (*Source: Public Service Resource Planning*)

Capacity costs reflect current generic capacity cost estimates used in Phase II of the Public Service Company of Colorado's 2011 Electric Resource Plan (Docket No. 11A-869E) for a gas-fired combustion turbine (CT) referred to as a "Resource Acquisition Period (RAP) CT" in compliance with paragraph 96 in Decision C14-0731 (Docket No. 13A-0686EG). These values exclude the ancillary services adjustments per paragraph 97 in this same decision.

Year	CT	Year	CT
	Gen Capacity \$/kW-mo		Gen Capacity \$/kW-mo
2015	\$8.19	2026	\$10.53
2016	\$8.38	2027	\$10.77
2017	\$8.57	2028	\$11.02
2018	\$8.77	2029	\$11.27
2019	\$8.97	2030	\$11.53
2020	\$9.18	2031	\$11.80
2021	\$9.39	2032	\$12.07
2022	\$9.61	2033	\$12.35
2023	\$9.83	2034	\$12.64
2024	\$10.06	2035	\$12.93
2025	\$10.29		

2. Estimated Annual Avoided Transmission and Distribution (T&D) Capacity Costs (*Source: Public Service Resource Planning*)

Paragraph 97 in Decision C14-0731 (Docket 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."

For avoided transmission capacity costs, the assumed avoided generation plant is a Combustion Turbine (CT) plant, which can be located within the Company's footprint and generally does not require any transmission investment. Therefore

avoidance of this generation capacity does not entail any avoidance of transmission; the avoided transmission capacity cost should be set to \$0/kW-yr.

Public Service plans the distribution system for existing system upgrades and also develops plans for new developments using standard design practices. In order for Public Service to size its distribution system differently, the specific DSM locations and types of DSM measures would need to be known and guaranteed during the initial engineering and design phase. However, the installation of energy efficiency measures is a customer choice that occurs after the distribution system is designed and constructed. Therefore, sizing the system differently after it is constructed is not feasible. Given this, the Company has set the avoided distribution value to \$0/kW-yr.

Thus, the Company utilized a zero value for avoidance of T&D capacity costs attributable to energy efficiency and demand response achievements in this Plan.

3. Estimated Annual Avoided Energy Costs (*Source: Public Service Resource Planning Analytics*)

Avoided marginal energy costs reflect a May 2014 run of the expected hourly system

In order to determine avoided energy costs, the Company's Resource Planning Analytics group produced two Strategist runs, one with and one without the level of DSM that is expected to be acquired from January 1, 2015 through 2020. These runs simulated the economic dispatch of the Company's generation fleet using assumptions regarding must-run plants, must-take resources, minimum and maximum generator output capability, unit heat rates, and unit fuel prices consistent with what the Company had used in the Prosym model runs that had been used by the Company to determine the avoided energy costs as initially proposed in this Proceeding. Consistent with the method proposed by the Company in Proceeding No. 13A-0686EG, the avoided energy costs attributable to future DSM were determined using a comparison of the annual total system variable costs (with and without future DSM), to the annual total energy served (MWh) with and without future DSM.

Simple-Average Hourly DSM Avoided Energy			
Year	\$/MWh	Year	\$/MWh
2015	\$33.73	2026	\$57.47
2016	\$32.98	2027	\$57.21
2017	\$35.22	2028	\$58.14
2018	\$40.66	2029	\$59.97
2019	\$43.11	2030	\$61.94
2020	\$47.19	2031	\$63.72
2021	\$51.13	2032	\$62.06
2022	\$51.80	2033	\$65.32
2023	\$54.38	2034	\$64.86
2024	\$56.59	2035	\$66.19
2025	\$55.31		

4. Estimated Annual Avoided Emissions Costs (includes CO₂) (*Source:* Public Service Resource Planning)

In the Public Services Company of Colorado's 2012 Renewable Energy Standard Compliance Plan (Docket No. 11A-418E), the base-case assumed zero cost for CO₂ emissions. For this reason, this value is set to \$0 for all future years.

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 tables showing the avoided cost assumptions used in this Plan.

1. Estimated Commodity Cost of Gas (*Source:* Public Service Gas Resource Planning)

The following table outlines the current gas price forecast as of August 2014 using a market snapshot for short-term prices and a quantitative average of projections from well-known forecasting services for the long-term forecast prices.

Year	\$/Dth	Year	\$/Dth
2015	\$3.87	2026	\$6.02
2016	\$3.93	2027	\$6.17
2017	\$4.10	2028	\$6.28
2018	\$4.31	2029	\$6.51
2019	\$4.50	2030	\$6.69
2020	\$4.71	2031	\$6.86
2021	\$4.94	2032	\$6.98
2022	\$5.13	2033	\$7.17
2023	\$5.37	2034	\$7.39
2024	\$5.70	2035	\$7.52
2025	\$5.83		

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
2015-2035	\$0.05

**3. Estimated Annual Avoided Reservation Costs (used to estimate 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
2015-2035	\$50.37

Appendix F – Natural Gas DSM \$/Therm and ALR Methodology

The Company proposes the following dollar per therm values applicable to natural gas DSM programs provided to its residential and non-residential customers, respectively:

Proposed Dollar per Therm Values for the DSMCA factors to be effective January 1, 2015:

$$\begin{aligned} \text{DTVR} &= \$0.08401 \\ \text{DTVNR} &= \$0.10238 \end{aligned}$$

The dollar per therm values proposed have been used to calculate the lost revenues sought to be recovered through the Gas-Demand Side Management Cost Adjustment (G-DSMCA) filed on July 1, 2014 to be effective January 1, 2015. Updated values for recovery will be filed on July 1, 2015 to be effective January 1, 2016.

The methodology for calculating the dollar per therm values set forth above is as follows:

The following methodology is proposed for calculation of the Dollar per Therm Values (DTV) that is required to calculate the Acknowledgement of Lost Revenue (ALR) value in accordance with Public Service gas Demand-Side Management Cost Adjustment (DSMCA). Two dollar per therm values are required, one for residence service, which is herein labeled “DTVR”, and one for non residence service, which is herein labeled “DTVNR”.

Calculation of the Residence Service Dollar per Therm Value (DTVR):

Calculation Components:

1. Residential Base Rate per Therm (RBR)
2. Variable Cost per Therm (VCT)

Formula: $\text{DTVR} = \text{RBR} - \text{VCT}$

Calculation of the Non Residence Service Dollar per Therm Value (DTVNR):

Calculation Components:

1. Commercial Small Gas Service Base Rate per Therm (CSGBR)
2. Commercial Large Gas Service Base Rate per Therm (CLGBR)
3. Interruptible Industrial Gas Service Base Rate per Therm (IGBR)
4. CSG Sales (CSGS)
5. CLG Sales (CLGS)
6. IG Sales (IGS)
7. Total of CSG + CLG + IG Sales (TS)
8. VCT

Formula: $\text{DTVNR} = \{[\text{CSGBR} \times (\text{CSGS}/\text{TS})] + [\text{CLGBR} \times (\text{CLGS}/\text{TS})] + [\text{IGBR} \times (\text{IGS}/\text{TS})]\} - \text{VCT}$

Calculation of the VCT

[Note: the VCT is the same for both the DTVR and DTVNR formula]:

Calculation Components:

1. Total Variable Costs (VC)
2. Weather Normalized throughput in Therms (WNT)

Formula: $VCT = VC/WNT$

Proposed VCT to be effective January 1, 2015:

VCT = \$0.000391

As stipulated in Service Company's gas tariff, these Dollar per Therm Values are applied to the gas DSMCA factor calculations as follows:

“The RDSM ALR Value is the sum of multiplying the dollar per therm value, as approved by the Commission for residential service, (DTVR) times the annual number of therms lost from all residential programs executed during the program year under consideration.

“The NDSMCA ALR Value is the sum of multiplying the dollar per therm value, as approved by the Commission for non-residential services (DTVNR), times the annualized number of therms lost from all non-residential programs executed during the program year under consideration.”

Appendix G – 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 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:

$$\begin{aligned}
 \text{Electrical Energy Savings (Gross Generator kWh)} &= \text{Customer kWh} / (1-\text{TDLF}) \\
 \text{Electrical Demand Savings (Gross Generator kW)} &= \text{Customer kW} \times \text{CF} / (1-\text{TDLF}) \\
 \text{Electrical Energy Savings (Net Generator kWh)} &= \text{Gross Generator kWh} \times \text{NTG} \\
 \text{Electrical Demand Savings (Net Generator kW)} &= \text{Gross Generator kW} \times \text{NTG} \\
 \text{Net Dth} &= \text{Gross Dth} \times \text{NTG}
 \end{aligned}$$

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:

$$\begin{aligned}
 \text{Business TDLF} &= 6.51\% \\
 \text{Residential TDLF} &= 7.69\%
 \end{aligned}$$

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.

Product: Commercial Refrigeration**Description:**

Prescriptive rebates will be offered for the installation of reach-in cases with doors, evaporator fan motor controls, night curtains on refrigerator and freezer cases, EC Motors for Refrigeration Evaporators, Anti-Sweat Heater Controls and/or replacement of standard refrigeration case doors with No Heat Case Doors, and replacement lighting equipment.

Algorithms:

Enclosed Reach-In Cases	
Enclosed Reach-in Case Electrical Demand	= [(Btuh_base x LF x 1/COP)-(Btuh_ee x LF x 1/COP)] / 3412
Enclosed Reach-in Case Electrical Energy	= [(Btuh_base x LF x 1/COP)-(Btuh_ee x LF x 1/COP)] / 3412 x Hrs
Evaporative Fan Motor Controls	
Evaporator Fan Motor Control Electrical	= Baseline Fan Watts x (1-ESF) x LF
Evaporator Fan Motor Control Electrical	= Baseline Fan Watts x (1-ESF) x LF x Efficient Hours
Night Curtains	
Night Curtains Electrical Demand Savings	= (Btuh_base x LF x 1/COP) / 3412 - (Btuh_base x LF x 1/COP) / 3412 = 0
Night Curtains Electrical Energy Savings	= (Btuh_base x LF x 1/COP) / 3412 * Hrs * (Hours_base - Hours_ee)
CHW Pre-Rinse	
CHW Pre-Rinse Electric (Customer kWh)	= EnergyToHeatWater / EF_electric / ConversionFactor
CHW Pre-Rinse Electric (Customer kW)	= Unit kWh Savings per Year / 8,760 hours
EnergyToHeatWater	= SpecificHeat x Density x WaterSaved x (Tset - Tcold)
WaterSaved	= (Flow_base x Hours_base - Flow_eff x Hours_eff) x Days
EnergyToHeatWater	= SpecificHeat x Density x WaterSaved x (Tset - Tcold)
WaterSaved	= (Flow_base x Hours_base - Flow_eff x Hours_eff) x Days
CHW-Aerator-Electric	
CHW Aerator Electric (Customer kWh)	= EnergyToHeatWater / EF_electric / ConversionFactor
CHW Aerator Electric (Customer kW)	= Unit kWh Savings per Year / 8,760 hours
WaterSaved	= (Flow_base - Flow_eff) x TPD / 60 min/hr x Days
EnergyToHeatWater	= SpecificHeat x Density x WaterSaved x (Tfaucet - Tcold)
EPG	= Density x SpecificHeat x (Tfaucet - Tcold) / (ReEff x ConversionFactor)
Unit Dth Savings per Year	= EnergyToHeatWater / EF_gas / ConversionFactor
WaterSaved	= (Flow_base - Flow_eff) x TPD / 60 min/hr x Days
EnergyToHeatWater	= SpecificHeat x Density x WaterSaved x (Tfaucet - Tcold)
Algorithms:	
Anti-Sweat Heater Controls kW Savings (Customer kW)	= ASHC_kWh/ASHC_Hours
Anti-Sweat Heater Controls kWh Savings (Customer kWh)	= ASHC_kWh = ASHC_Baseline_kw x Refrigeration_Factor x ASHC_Hours x %_Off
Electronically Commutated Motor Electrical Demand Savings (Customer kW)	= (ECM_Baseline_Fan_Watts - ECM_Efficient_Fan_Watts) x Refrigeration_Factor
Electronically Commutated Motor Electrical Demand Savings (Customer kWh)	= (ECM_Baseline_Fan_Watts - ECM_Efficient_Fan_Watts) x Refrigeration_Factor x ECM_Hours
No Heat Case Doors (Customer kW, NHD_kw)	= (NHD_Baseline_kw - NHD_Efficient_kw) x Refrigeration_Factor
No Heat Case Doors (Customer kWh)	= NHD_kw x NHD_Hours
Refrigeration_Factor	= Multiplier to include interactive effects of refrigeration energy to remove heat from the motor. Reduction in motor energy results in a reduction in refrigeration energy. = 1 + R_H/COP (See assumptions for values)

Electrical Demand Savings (Customer kW)	= (kW_Base - kW_EE) x HVAC_cooling_kwSavings_factor
Electrical Energy Savings (Customer kWh/yr)	= (kW_Base - kW_EE) x Hrs x HVAC_cooling_kWhsavings_factor
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
Variables:	
Common	
3412	= Conversion 1kWh = 3412 BTU
COP	= Coefficient of performance of compressor in the cooler/freezer. COP = 2.28 for cooler, COP = 1.43 for freezer (Reference. 1)
SpecificHeat	= Specific Heat of Water; 1.0 btu / (lb x °F)
TDLF	Transmission-Distribution Loss Factor = 6.5%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2.
LF	= Load Factor of refrigeration system. Assumed to be 0.90 (Reference 2)
SpecificHeat	= Specific Heat of Water, 1.0 btu / (lb x °F)
EF_gas	= Efficiency of gas water heater, 0.75 (Reference 3)
ConversionFactor	= 1,000,000 Btu/Dth (gas water heater)
Enclosed Reach-In Cases	
Btuh_base	= Btuh load of the existing Referencrigerated case. 1,500 btuh/ft for open cases (Reference 3)
Btuh_ee	= Btuh load of the high efficiency Referencrigerated case. 267 btuh/ft for medium temp (Reference 5)
Incremental cost	= Incremental cost of efficient measures = \$906.27, Reference 21.
Evaporative Fan Motor Controls	
Speed Reduction	= new speed as a percent of full speed; 10% (Reference 15)
Measure Life	= 15 years (Reference 1)
ESF	=Energy Savings Factor = (Speed Reduction) ^{2.5} = 0.32%
Baseline Fan Watts	=Average input watts for shaded pole motor; 95.08 (Reference 15)
Control Time	=percent of time motor operates at reduced speed based on control setting; 30%
Efficient Hours	=Annual hours at reduced speed = baseline hours * control time
Incremental cost	= Incremental cost of efficient measures = \$119.75, Reference 1.
Night Curtains	
Btuh_base	= Btuh load of the existing Referencrigerated case. 1,500 btuh/ft for open cases (Reference 3)
C_inf	= Percentage of heat gain coming from infiltration. 69%. (Reference 1)
Hours_base	= Annual operating hours before the night curtains= 2920 (8 hr/day)
Hours_ee	= Annual operating hours after the night curtains = 1496
CF	= Coincidence Factor = 0
Measure Life	= 4 years (Reference 16)
Persistence Factor	= Percent of time the covers are used = 60%. (Reference 15)
O&M Savings	= (\$3.16) based on 60 seconds per 15 feet to install or remove curtains (.41 hrs/yr) at CO Minimum wage of \$7.78/hr
Incremental cost	= Incremental cost of efficient measures = \$37.54, Reference 21.
Anti-Sweat Heater Controls:	
ASHC_Baseline_kw	= Average anti-sweat heater kW per door without controls, Table 4 (Reference 23 and 24)
ASHC_Hours	= Hours per year for anti-sweat heaters, Table 4 (Reference 23)

CF	= Coincidence Factor, Table 4 (Reference 15)
%_Off	= Percent of time the anti-sweat heaters are turned off by the controller, Table 4 (Reference15)
Incremental cost	= Incremental cost of efficient measures; See Tables 4
EC Motors for Refrigeration Evaporators:	
ECM_Baseline_Fan_Watts	= Average input watts for shaded pole or permanent split capacitor motor, Table 3 (Reference 15)
ECM_Efficient_Fan_Watts	= Average input watts for efficient motor, Table 3 (Reference 15)
ECM_Hours	= Hours per year (freezer subtracts defrost time), Table 3 (Reference 15)
Incremental cost	= Incremental cost of efficient measures; See Table 3
No Heat Case Doors:	
NHD_Baseline_kw	= Average kW for a standard case door, Table 5 (Reference 23 and 24)
NHD_Efficient_kw	= Average kW for a no heat case door, Table 5 (Reference 2)
NHD_Hours	= Hours per year for no heat case doors, Table 5 (Reference 2)
NHD_kw	= No heat case doors kW savings
R_H	= Residual Heat fraction; estimated percentage of the heat produced by the heaters or motors that remains in the freezer or cooler case and must be removed by the refrigeration unit. = 100% for evaporator motors and 35% for anti-sweat heaters and no heat doors
Coincidence Factor	= Refer to Table 7
Measure Life	= Length of time the measure will be operational: 15 years for EC Motors, (Reference 17); 12 years for ASHC (Reference 21); 10 years for No Heat Case Doors (Reference 20).
NTG	Net-To-Gross = 100%
Incremental cost	= Incremental cost of efficient measures; See Table 5
Lighting:	Refer to the Lighting Efficiency Product Deemed savings for calculations and assumptions.

Required inputs from customer/contractor:**Evaporative Fan Motor Controls**

Capacity (tons) of Refrigeration Unit

CHW Pre-Rinse

Gas or electric water heater, customer ZIP code

CHW-Aerator

Gas or electric water heater, customer ZIP code

For Electronically Commutated

Size of motor

Verified during M&V:

Yes

Application of motor (Display Case or Walk-in)

Yes

Case or Walk-in temperature (Medium Temp or Low Temp)

Yes

For Walk-in's: Fan diameter (<= 15 inches or >15 inches)

Yes

Cost

For Anti-Sweat Heaters:

Number of doors controlled

Yes

Number of controllers

Yes

Cost

For No Heat Doors:

Number of doors replaced

Yes

Door kW

Yes

Cost

Yes

Lighting

Number of Fixtures

Yes

Lighting equipment type

Yes

Building type

Yes

Existence of air conditioning

Yes

Assumptions:**Enclosed Reach-In Cases**

Existing case must be either a freezer or cooler multi-deck case.

Existing specialty, self-contained, and island cases do not qualify.

This measure is for replacement of open cases with new cases that include a case door.

Replacement cases must have doors, be tied into a central refrigeration system, and be purchased new.

Night Curtains

Install night curtains on open refrigerated cases to reduce heat transfer and mixing of air inside and outside the case.

Applies to professionally-installed, "permanent", low emissivity (reflective) night curtain products only. (per linear foot)

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.

Lighting

- Each replacement lighting fixture is going in on a one-for-one basis for existing fixtures. New construction fixtures are put in on a one-for-one basis instead of lower efficiency options.

- In the Technical Assumptions, one will note that the Operating Hours does not appear, but rather a modified version. the methodology defines kW Savings on the basis of difference In kW with the HVAC Cooling Demand factor.

Table 1: Average Water Mains Temperatures (Ref. 6).

Location	Temperature (°F)
Denver, CO	57.6
Golden, CO	55.6
Grand Junction, CO	59.7

Table 2: Deemed Annual Hot Water Use by Building Type (Ref. 6)

Building Type	Days Per Year
Large Office	250
Fast Food Restaurant	365
Sit-Down Restaurant	365
Grocery	365
Elementary School	200
Jr. High/High School/College	200
Health	365
Hotel	365
Other Commercial	250
Average	304

The following building types were considered not to apply to this measure: Small Office, Retail, Warehouse and Motel.

Table 3: Baseline Watts, Efficient Watts, Operating Hours and Incremental Cost for EC Motors by Application (Reference 15 and 18)

Motor Application	ECM_Baseline_Fan_Watts	ECM_Efficient_Fan_Watts	ECM_Hours	ECM_Incremental_Cost
EC Motors - Medium Temp Display Case	71	24	8,672	\$ 88.00
EC Motors - Low Temp Display Case	81	27	8,672	\$ 88.00
EC Motors - Medium Temp Walk-in, Evap fan <= 15" Diameter	136	44	8,585	\$ 180.00
EC Motors - Low Temp Walk-in, Evap fan <= 15" Diameter	154	50	8,585	\$ 180.00
EC Motors - Medium Temp Walk-in, Evap fan > 15" Diameter	138	69	8,585	\$ 180.00
EC Motors - Low Temp Walk-in, Evap fan > 15" Diameter	156	78	8,585	\$ 180.00

Table 4: Baseline kW, % Off, Operating Hours and Incremental Cost for Anti-Sweat Heater Controls by Application (Reference 23 and 24)

Anti-Sweat Heater Controls	ASHC_Baseline_kW	%_Off	ASHC_Hours	Incremental Cost	CF
Medium Temp Display Case	0.105	97%	8,760	\$ 180.00	97%
Low Temp Display Case	0.191	97%	8,760	\$ 180.00	97%

Table 5: Baseline Watts, Efficient Watts, Operating Hours and Incremental Cost for No Heat Case Doors by Application (Reference 2, 23 and 24)

No Heat Case Doors	NHD_Baseline_kW	NHD_Efficient_kW	NHD_Hours	NHD_Incremental_Cost
Medium Temp Display Case	0.121	0.000	8,760	\$ 275.00
Low Temp Display Case	0.238	0.000	8,760	\$ 800.00

Table 6: HVAC Interactive Factors (Reference 29)

HVAC system	HVAC_cooling_kWhsavings_factor	HVAC_cooling_kWssavings_factor	Heating Penalty
Heating only	1.00	1.00	-0.00054027
Heating and cooling	1.11	1.33	-0.00054027
Cooler Door Retrofit to LED Secondary Benefits Factor	1.41	1.41	0.000000
Freezer Door Retrofit to LED Secondary Benefits Factor	1.59	1.59	0.000000

Table 7: Coincident Peak Demand Factors and Annual Operating Hours by Building Type (Reference 28 and 30)

Building Type	CF	Annual Operating Hours
24-Hour Facility	94%	8234
College	71%	5010
Cooler Door Retrofit to LED	94%	8760
Elemen./Second. School	73%	2080
Freezer Door Retrofit to LED	94%	8760
Grocery (All) / Big Box Retail (larger than 50,000 SF)	94%	5478
Health	84%	3392
Hospital	84%	4532
Hotel/Motel	51%	2697
Manufacturing	96%	5913
Night Time Exterior (LED Canopy/Soffit Lights Only)	0%	4380
Office	78%	3435
Other/Misc.	96%	2278
Restaurant	94%	4156
Retail	94%	3068
Safety or Code Required (Including Exit Signs)	100%	8760
Traffic Signals	50%	4380
Warehouse	96%	2388

Table 8: Measure Lifetimes in Years (Reference 31 and 15)

Measure	Lifetime in Years
LED Interior Lamps	12
LED Interior Fixtures	20
Low Wattage T8 Lamps	8
Ballasted CFLs	18
Integrated 25W Ceramic Metal Halide	7
T8 Lighting Systems	18
T5 Lighting Systems	18
Lighting Controls	18

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.

References (Cont'd)

5. Average of multiple vendor products
6. IMPACT AND PROCESS EVALUATION FINAL REPORT for CALIFORNIA URBAN WATER CONSERVATION COUNCIL 2004-5 PRE-RINSE SPRAY VALVE INSTALLATION PROGRAM (PHASE 2)
7. US DOE Building America Program. Building America Analysis Spreadsheet, Standard Benchmark DHW Schedules
http://www1.eere.energy.gov/buildings/building_america/analysis_spreadsheets.html
8. State of Illinois Energy Efficiency Technical Reference Manual, June 1st, 2012. Pages 109-113.
9. Title 10, Code of Federal Regulations, Part 431 - Energy Efficiency Program for Certain Commercial and Industrial Equipment, Subpart O - Commercial Prerinse Spray Valves. January 1, 2010.
10. Technology Data Characterizing Water Heating in Commercial Buildings: Application to End-Use Forecasting, Osman Sezgen and Jonathan G. Koomey, Lawrence Berkeley National Laboratory, December 1995.
11. 2008 Database for Energy-Efficient Resources, EUL/RUL (Effective/Remaining Useful Life) Values.
12. 2008 Database for Energy-Efficient Resources, Cost Values and Summary Documentation (updated 6/2/2008 - NR linear fluorescent labor costs typo)
<http://www.deeresources.com/deer2008exante/downloads/DEER%200607%20Measure%20Update%20Report.pdf>. Accessed
13. Franklin Energy Services, LLC Engineering Estimate (10 min) and US Department of Energy. Federal Energy Management Program. Energy Cost Calculator for Faucets and Showerheads. Typical use for commercial aerator = 30min. <http://www1.eere.energy.gov>
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
18. ECM incremental costs are from Southern California Edison Work Paper WPSCNRRN0011: Evaporator Fan Motors
19. New York Standard Approach for Estimating Energy Savings from Energy Efficiency Measures in Commercial and Industrial Programs, Sept 1, 2009.
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
21. DEER 2008
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
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

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Compressed Air - CO

Description:

Custom and prescriptive rebates will be offered under the compressed air product. Prescriptive rebates are available for Variable Frequency Drive Compressors that are less than 50 hp, installing a smaller VFD controlled air compressor than the current air compressor used, no air loss drain (NALD) valves, cycling refrigerated dryers, mist eliminator filters, and dewpoint demand control for heatless dessicant regenerative dryers. Other measures may receive rebates through the Custom Efficiency product. Each custom efficiency project will be analyzed individually by Xcel Energy. Engineering variables required for the analysis will be obtained from the customer or vendor. Analysis will be based on standard engineering methodologies. Funding is also available for compressed air system studies.

Equations:

VFD Compressors (Gross kW Saved at Customer/Unit)	= Horsepower x Service Factor x 0.746 x (Baseline_Load / Baseline_Efficiency - Proposed_Load / Proposed_Efficiency)
VFD Compressors (Gross Annual kWh Saved at Customer/Unit)	= Gross kW Saved at Customer/Unit x Hours_VFD
HP Reduction Baseline_%Flow	= HP Reduction Proposed_%Flow x Horsepower VFD Compressor / Horsepower Baseline Compressor
HP Reduction Baseline_%Load	= Baseline load is looked up on the "VFD Air Comp-REF" table using the baseline flow
HP Reduction (Gross kW Saved at Customer/Unit)	= Baseline Horsepower x Service Factor x 0.746 x (HP Reduction Baseline_%Load / Baseline_Efficiency) - Proposed Horsepower x Service Factor x 0.746 x (HP Reduction Proposed_%Load / Proposed_Efficiency)
HP Reduction (Gross Annual kWh Saved at Customer/Unit)	= Gross kW Saved at Customer/Unit x Hours_VFD
No Air Loss Drain (Gross Annual kWh Saved at Customer/Unit)	= Quantity_of_Drains x kW_per_Drain x Drain_Hours
No Air Loss Drain (Gross kW Saved at Customer/Unit)	= Quantity_of_Drains x kW_per_Drain
Cycling Dryer Electrical Energy Savings (Gross Annual kWh Saved at Customer/Unit)	=Historical system information gathered through four years of compressed air study data was utilized to estimate savings. Based on dryer size, an average connected system flowrate was determined. Savings due to the reduction in average operating kW for the cycling dryer are proportional to the average flowrate divided by the dryer rated flowrate. See Table 1 for savings results.
Cycling Dryer Electrical Demand Savings (Gross kW Saved at Customer/Unit)	=Historical system information gathered through four years of compressed air study data was utilized to estimate savings. Based on dryer size, an average connected system flowrate was determined. Savings due to the reduction in average operating kW for the cycling dryer are proportional to the average flowrate divided by the dryer rated flowrate. See Table 1 for savings results.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Mist Eliminator Filter Electrical Energy Savings (Gross Annual kWh Saved at Customer/Unit)	=Historical system information gathered through four years of compressed air study data was utilized to estimate savings. Based on filter size, an average connected system flowrate and compressor discharge pressure were determined. Savings are due to the reduction in compressor discharge pressure resulting from a smaller pressure drop across the dryer. See Table 2 for savings results.
Mist Eliminator Filter Electrical Demand Savings (Gross kW Saved at Customer/Unit)	=Historical system information gathered through four years of compressed air study data was utilized to estimate savings. Based on filter size, an average connected system flowrate and compressor discharge pressure were determined. Savings are due to the reduction in compressor discharge pressure resulting from a smaller pressure drop across the dryer. See Table 2 for savings results.
Dewpoint Demand Control Electrical Energy Savings (Gross Annual kWh Saved at Customer/Unit)	=Historical system information gathered through four years of compressed air study data was utilized to estimate savings. Based on dryer size, an average connected system flowrate was determined. Savings are due to the reduction in required purge air to regenerate the dessicant bed. See Table 3 for savings results.
Dewpoint Demand Control Electrical Demand Savings (Gross kW Saved at Customer/Unit)	=Historical system information gathered through four years of compressed air study data was utilized to estimate savings. Based on dryer size, an average connected system flowrate was determined. Savings are due to the reduction in required purge air to regenerate the dessicant bed. See Table 3 for savings results.

Variable ID	Value	Description
Horsepower VFD Compressor	Customer Input	Nominal horsepower of new compressor.
Horsepower Baseline Compressor	Customer Input	Nominal horsepower of baseline compressor.
Service_Factor	1.1	Service factor of the motor (Reference 1).
0.746	0.746	Standard conversion from HP to kW.
Baseline_Load	88.02%	Average percent loading for baseline compressor as calculated on VFD Air Comp Calcs tab.
Proposed_Load	61.05%	Average percent loading for proposed compressor as calculated on VFD Air Comp Calcs tab.
Baseline_Efficiency	see Table 4	Efficiency of existing compressor motor as determined by customer provided HP.
Proposed_Efficiency	see Table 4	Efficiency of proposed compressor motor as determined by customer provided HP.
HP Reduction Proposed_%Flow	70.00%	Average percent flow for proposed VFD compressor.
HP Reduction Proposed_%Load	73.68%	Average percent power for proposed VFD compressor at proposed flow
Hours_VFD	see Table 4	Operating hours of compressors.
Hours_Drain	6,996	Operating hours of compressed air systems. Based on an average of completed CO custom compressed air project hours.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Quantity_of_Drains	Customer Input	Number of drains replaced.
kW_per_Drain	0.517	kW savings per no air loss drain.
CF_VFD	88.80%	Small VFD Compressor Coincidence Factor - Probability that the measure peak demand reduction will occur at the same time as the grid peak demand. Based on historic small VFD compressor projects in MN and CO.
CF_NALD	69.1%	No Air Loss Drain Coincidence Factor - Probability that the measure peak demand reduction will occur at the same time as the grid peak demand. Based on historic custom compressed air projects in CO.
Incremental Cost of Efficient Equipment	see Table 1, 2, 3, & 5	Incremental cost of efficient measures compared to the do-nothing option.
NTG_Study&Custom	87.0%	Net-to-Gross for studies and custom projects (Reference 8).
NTG_Prescriptive	73.0%	Net-to-Gross for all prescriptive products (Reference 8).
Lifetime	see Table 6	Lifetimes for individual measures.

Inputs:**Provided by Customer:**

Quantity of No Air Loss Drains
 Compressor HP, Quantity
 Cycling Dryer CFM and Quantity
 Mist Eliminator CFM and Quantity
 Dew Point Demand Controls CFM and Quantity

Verified during M&V:

Yes
 Yes
 Yes
 Yes
 Yes

Assumptions:**VFD Compressors<50 hp**

Compressed air system in which VFD compressor is installed must have a nominal rating < 50hp.
 Existing compressor was a non-reciprocating load/no load type with 2 gallon of storage per cfm capacity or less, or modulation with or without unload.
 To qualify for a HP reduction rebate the combined HP of the system (including backups) must be lower after the installation of the new VFD unit.
 For HP reduction Baseline unit may greater than or equal to 50HP, but HP reduction cannot exceed 20HP.
 HP reduction rebate will require documented removal of a compressor.

No Air Loss Drains

2.74 SCFM loss from existing timed drain (Reference 3).
 Existing timed drain is open 15 seconds every 7.5 minute (Reference 3).

Cycling Dryer

Rated Flowrate of Dryer is equal to the connected system peak flowrate.
 Non-cycling dryer load factor of 100% (Reference 3).

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Mist Eliminator Filter

Rated Flowrate of filter is equal to the connected system peak flowrate.

Baseline filter pressure drop of 4 psig (Reference 3).

Efficient filter pressure drop of 0.75 psig (Reference 3).

Filter element life expectancy of 5 - 10 years.

Dewpoint Demand Control

Rated Flowrate of Dryer is equal to the connected system peak flowrate.

Uncontrolled dryer purge rate of 17% (Reference 3) for heatless dessicant dryers.

Heated or heated blower dessicant dryers are not eligible.

Hours

Hours for NALDs, cycling dryers, mist eliminators, and dew point demand controls are based on the equipment CFM and historical system information gathered through four years of compressed air study data. Variations in forecast hours between these measures is due to the anticipated quantity per CFM range of these products we will process.

Tables:

Table 1: Energy Savings and Costs For Cycling Dryers (Reference 4 & 7)

Dryer CFM	Customer kW	Customer kWh	Incremental Cost	Incremental O&M
75	0.193	1,311	\$554	\$0
100	0.380	2,582	\$580	\$0
125	0.450	3,060	\$461	\$0
150	0.564	3,839	\$637	\$0
200	0.514	3,517	\$1,203	\$0
250	0.848	5,827	\$860	\$0
300	1.011	6,981	\$1,047	\$0
400	1.386	9,690	\$1,187	\$0
500	1.462	10,380	\$1,095	\$0
600	1.719	12,415	\$629	\$0
700	2.214	16,306	\$883	\$0
800	2.167	16,319	\$2,080	\$0
1000	2.447	19,362	\$1,785	\$0
1200	2.215	18,533	\$2,536	\$0
1600	0.202	1,771	\$3,857	\$0
2000	0.449	3,931	\$5,811	\$0
2400	1.348	11,808	\$3,498	\$0

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 2: Energy Savings and Costs for Mist Eliminator Filters (Reference 4 & 7)

Filter CFM	Customer kW	Customer kWh	Incremental Cost	Incremental O&M
125	0.376	2,554	\$3,397	\$0
250	0.590	4,046	\$3,230	\$0
500	0.936	6,603	\$3,691	\$0
800	1.497	11,034	\$4,862	\$0
1100	2.059	15,927	\$5,307	\$0
1500	2.808	23,167	\$6,621	\$0
1900	3.556	31,073	\$8,568	\$0

Table 3: Energy Savings and Costs for Dewpoint Demand Control (Reference 4 & 7)

Dryer CFM	Customer kW	Customer kWh	Incremental Cost	Incremental O&M
90	2.807	19,046	\$3,148	\$0
120	3.579	24,324	\$3,176	\$0
160	4.469	30,449	\$3,210	\$0
200	5.285	36,120	\$3,515	\$0
250	6.092	41,810	\$3,286	\$0
300	6.834	47,120	\$3,335	\$0
400	8.201	57,168	\$3,375	\$0
500	9.857	69,549	\$3,438	\$0
600	11.820	84,539	\$3,438	\$0
800	15.787	116,331	\$3,473	\$0
1000	19.714	150,000	\$3,858	\$0
1250	24.662	195,517	\$3,678	\$0
1500	29.570	243,985	\$3,725	\$0
2000	39.427	345,381	\$3,861	\$0

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 4. Motor Efficiencies & Operating Hours

Compressor HP	Motor Description	New Unit Baseline Motor Efficiency	Upgrade Unit Existing Compressor Motor Efficiency	New and Upgrade Unit Proposed Motor Efficiency	Operating Hours
10	10 HP 1800 RPM ODP	89.5%	89.5%	89.5%	2,131
15	15 HP 1800 RPM ODP	91.0%	91.0%	91.0%	2,131
20	20 HP 1800 RPM ODP	91.0%	91.0%	91.0%	2,131
25	25 HP 1800 RPM ODP	91.7%	91.7%	91.7%	3,528
30	30 HP 1800 RPM ODP	92.4%	92.4%	92.4%	3,528
40	40 HP 1800 RPM ODP	93.0%	93.0%	93.0%	3,528
50	50 HP 1800 RPM ODP	n/a	93.0%	n/a	n/a
60	60 HP 1800 RPM ODP	n/a	93.6%	n/a	n/a

Upgrade Compressor Motor Efficiency and New Compressor Motor Efficiency values are from NEMA EPACT motors standards (Reference 5).

United States Industrial Electric Motor Systems Market Opportunities Assessment, EERE, US DOE, Dec 2002 - Source for operating hours for industrial motors and source for load factor (Reference 6).

Table 5. Incremental Costs for Efficient Measures

Measure	Upgrade & HP Reduction Units	New Unit
10 HP VFD Compressor	\$10,338	\$2,577
15 HP VFD Compressor	\$12,277	\$2,694
20 HP VFD Compressor	\$15,086	\$3,609
25 HP VFD Compressor	\$17,639	\$5,149
30 HP VFD Compressor	\$20,345	\$7,212
40 HP VFD Compressor	\$22,986	\$7,468
No Air Loss Drain	\$448	

Compressor prices are the average price from three retailers plus \$1500 for installation.

NALD price is average of nine retailers prices as calculated on Forecast NALD tab

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 6. Measure Lifetimes

Measure	Lifetime, Years
Compressed Air Efficiency Study	5
Custom Efficiency - Compressed Air	20
No Air Loss Drain	15
VFD Air Compressor New	20
VFD Air Compressor Upgrade	20
HP Reduction	20
Cycling Dryers	20
Dewpoint Controls	10
Mist Eliminators	15

References:

-
- (1) Service factor (1.1) 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 Compressed Air Study participants 2008 - 2011
 - (5) National Electric Manufacturers Association. Motor efficiency standards from Pre-EPAAct 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"

Changes from 2014 Filing

-
- Updated incremental costs for cycling dryers.
 - Updated hours for NALD.
 - Update lifetime for NALD.
 - Updated NTG for prescriptive measures
 - Added HP reduction product

DEEMED SAVINGS TECHNICAL ASSUMPTIONS**Product: Computer Efficiency****Description:**

Manufacturer incentives will be offered for desktop computers that are either Energy Star or 80 Plus labeled. Incentives are administered via Ecos Plug Load Solutions PLS. Prescriptive rebates offered for end-use customers for installing VDI (Virtual Desktop Infrastructure) devices, also known as "Thin Client" systems instead of new PCs. PC Power Management is a prescriptive measure for an office-type occupancy which will provide customers with rebates for installing centralized PC power management software.

Algorithms:**General:**

Gross Coincident kW Saved at Customer per Unit (kW)	= Customer kW x CF
---	--------------------

Upstream Manufacturer Incentives:

Gross kW Saved at Customer per Unit (kW)	= (Baseline Computer kW - Efficient PS Computer kW) * Cooling kW factor * Quantity
Gross Annual kWh Saved at Customer per Unit (kWh/yr)	= (Baseline Computer kWh - Efficient PS Computer kWh) * Cooling kWh factor * Quantity
UMI Energy O&M Savings	= Customer kWh * Heating Penalty Factor * Gas Cost * Quantity

Desktop PC Virtualization:

Gross kW Saved at Customer per Unit (kW)	= (Baseline Computer kW - Virtualized kW) * Cooling kW factor * Quantity
Gross Annual kWh Saved at Customer per Unit (kWh/yr)	= (Baseline Computer kWh - Virtualized kWh) * Cooling kWh factor * Quantity
VDI Energy O&M Savings	= (Customer kWh * Heating Penalty Factor * Gas Cost * Quantity) + (Quantity * (O&M - Hours Savings + O&M - License Cost))

Network PC Power Management:

Gross kW Saved at Customer per Unit (kW)	= (kW_Base - kW_EE) x Cooling kW factor * Quantity
Gross Annual kWh Saved at Customer per Unit (kWh/yr)	= (kW_Base - kW_EE) x Hours x Cooling kWh factor * Quantity
VDI Energy O&M Savings	= (Customer kWh * Heating Penalty Factor * Gas Cost * Quantity) + (Quantity * O&M - License Cost)

Variables:**General:**

Customer kW	Calculated	Per measure kW savings value.
CF	Table 8	Probability that the calculated 'customer kW' will coincide with the period of generator peak operation
Cooling kW factor	Table 7	Average annual demand of cooling system necessary to cool the heat gain from the equipment (Ref. 13).
Cooling kWh factor	Table 7	= Average annual energy of cooling system necessary to cool the heat gain from the equipment (Ref. 13).
Heating Penalty Factor (Dth/kWh)	Table 7	= Average annual energy of heating system necessary to compensate for the negative heat gain associated with the more efficient equipment (Reference 13).
Gas Cost	\$6.46	=Average Forecast Utility Cost (\$/Dth) of Commercial Gas

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Upstream Manufacturer Incentives:

Baseline Computer kW	Table 3	Average baseline computer energy demand (= Baseline Computer kWh / 8760 *Quantity)
Baseline Computer kWh	Table 3	Average baseline computer energy usage (= UEC * PC Frequency * Quantity)
PC Frequency	Table 2	PC Frequency of Operating Patterns = Assumed % of the population that enables power management software in one of four available configurations (power management enabled, computer turned off; power management not enabled, computer turned off; power management enabled, computer left on; power management not enabled, computer left on (Reference 4); this is used to estimate average kWh usage over the entire population.
UEC	Table 3	Unit Energy Consumption = Sum of the products of the wattages and the annual hours in the four states of operation (active, idle, sleep, off) = (Active Wattage *Active Annual Hours of Operation)+(Idle Wattage * Idle Annual Hours of Operation)+(Sleep Wattage * Sleep Annual Hours of Operation)+(Off Wattage*Off Annual Hours of Operation) = Wattages are shown in Table 1 and Hours in each state are shown in Table 2.
Efficient PS Computer kW	Table 3	Average wattage demand of High Efficiency Power Supply
Efficient PS Computer kWh	Table 3	Average energy usage of High Efficiency Power Supply
Quantity		# of computers with a more efficient power supply
Measure Life	5 years	Average life of desktop computers (Reference 1)
Incremental Cost	Table 1	Cost of high efficiency model over baseline model
Net-to-Gross	88%	Reference 21

Desktop PC Virtualization:

Baseline Computer kW	Table 5	Societal aggregate baseline computer energy demand (= Baseline Computer kWh / 8760 *Quantity)
Baseline Computer kWh	Table 5	Societal aggregate of baseline computer energy usage * Quantity
Incremental Server kW	0.00401	Average energy usage per virtualized server = 273W (per Server) / 68 Virtual Machines (per Server) - Ref.9
Hours	8760	Average 'on' hours for a virtualized server
Quantity		# of VDI (thin client) devices installed instead of a desktop PC computer
VDI kW		kW of VDI product (provided by the customer)
Measure Life	10 years	Average life of desktop computers (Reference 1)
Incremental Cost	\$117.00	Cost of high efficiency model over baseline model (Reference 6)
Net-to-Gross	88%	Calculated by applying a market penetration % of the efficient computer power supplies to the wattage and kilowatt-hour savings amount at five baseline levels. If our program was not in place, some of the customers that bought VDI boxes would have bought desktop computers at ESTAR 5 or higher.
O&M - Hours Savings	1/2	Hours Per Year per desktop @ \$85/hr
O&M - Licence Cost	\$12.00	Software License Fee per year per desktop

Network PC Power Management:

kW_Base	Table 5	Average weighted computer kW WITHOUT centralized power management.
kWh_Base	Table 5	Average weighted computer kWh WITHOUT centralized power management.
kW_EE	Table 5	Average weighted computer kW WITH centralized power management.
kWh_EE	Table 5	Average weighted computer kWh WITH centralized power management.
Hours	Table 6	Average PC hours broken out by operational state
Quantity		# of computers to be equipped with network power management control
Measure Life	6 Years	Length of time software will be utilized (Reference 19)
Baseline Cost	\$0.00	Cost of the baseline technology. (The baseline is to continue to operate the existing system.)
Incremental Efficiency Cost	\$15.00	Cost of the High Efficiency technology = average of various vendor products(Reference 15)
Net-to-Gross	88%	Aligns with the Computer Efficiency program as a whole
O&M - Licence Cost	\$2.74	Software License Fee per year per desktop

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Tables:**Table 1: Desktop Computer Wattages**

Desktop Computer	Avg Active Watts (W)	Idle (W)	Sleep (W)	Off /Standby (W)	Incremental Cost (reference 5)	Notes
Baseline Aggregate: ES 3.0	97.48	71.20	4.14	2.05		Reference 2
ES 5.0 or 80 Plus Qualified	97.48	46.20	2.45	1.47		Reference 5
ES 5.0 or 80 Plus Bronze Qualified	92.60	43.70	2.45	1.47	\$9.00	Reference 5
ES 5.0 or 80 Plus Silver Qualified	89.68	42.32	2.45	1.47	\$14.00	Reference 5
ES 5.0 or 80 Plus Gold Qualified	87.73	41.40	2.45	1.47	\$16.00	Reference 5
ES 5.0 or 80 Plus Platinum Qualified	85.78	40.48	2.45	1.47	\$22.00	Reference 5

Table 2: Annual Hours in each Operational State and Frequency of PC Operation Patterns (PC Frequency)

Computer State	Active (Hrs/year)	Idle (Hrs/year)	Sleep (Hrs/year)	Standby / Off (Hrs/year)	PC Frequency	Notes
Power managed (local), turned off	175	5,011	431	3,143	11.7%	Reference 3
Not power managed (local), turned off	175	5,422	0	3,143	66.3%	Reference 3
Power managed (local), left on	175	5,687	2,898	0	3.3%	Reference 3
Not power managed (local), left on	175	8,585	0	0	18.7%	Reference 3

Table 3: Energy and Demand Savings (Reference 1-5)

Desktop Computer	UEC	Computer Watts	Computer kWh/yr	Cooling Watts	Cooling Peak kWh	Customer kW Savings	Customer kWh Savings	Heating Dth Penalty
Baseline: ES 3.0	NA	51.3	449.0	16.91	58			
ES 4.0 or 80 Plus Qualified	1223	33.8	296.5	11.17	39	0.0232	172	
ES 5.0 or 80 Plus Bronze Qualified	1163	32.2	281.8	10.62	37	0.0254	189	-0.09
ES 5.0 or 80 Plus Silver Qualified	1127	31.2	273.1	10.29	35	0.0267	199	-0.10
ES 5.0 or 80 Plus Gold Qualified	1102	30.5	267.2	10.07	35	0.0276	205	-0.10
ES 5.0 or 80 Plus Platinum Qualified	1078	29.8	261.4	9.85	34	0.0285	212	-0.10

Table 4: Computer Annual kWh and Average kW (Reference 14, 18)

Desktop PC	No centralized PC Power Management		With centralized PC Power		% of Program Participation
	kWh_Base	kW_Base	kWh_EE	kW_EE	
ENERGY STAR 3.0 Aggregate Desktop PC	449.00	0.0513	155.16	0.0177	8.89%
ENERGY STAR 4.0 Desktop PC	322.07	0.0368	120.59	0.0138	19.11%
ENERGystar 5.0 Desktop PC	297.65	0.0340	106.26	0.0121	72.00%
Aggregate of Society	315.77	0.0360	113.35	0.0129	100.00%

Table 5: Hours of Operation (Reference 14, 16, 17 & Table 2 - for non-network aggregate operation.)

Desktop PC	Active	Idle	Sleep	Off	Total
Not network power managed, left on	175	8,150	435	0	8,760
Not network power managed, turned off	175	5,377	65	3,143	8,760
Network power managed, left on	175	1,631	6,954	0	8,760
Network power managed turned off	175	1,631	431	6,523	8,760

Table 6: Secondary Cooling/Heating Values

Location	kW	kWh	Dth/kWh	Notes
Front Range	1.33	1.13	-0.000504027	Reference 13
Western Slope	1.33	1.137	-0.000504027	Reference 13
Mountain	1.33	1.099	-0.000702273	Reference 13

DEEMED SAVINGS TECHNICAL ASSUMPTIONS**Table 7: Per Measure Coincidence Factors**

Upstream Manufacturer Incentives	100%
Desktop PC Virtualization	100%
PC Power Management	0%

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. Ecos Consulting information from manufacturers
6. Vendor data; see "Ref Cost-PC Virt" worksheet
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. Costhelper.com
9. Server Wattages from Custom Efficiency program participant; average wattage of 42 models. (Wattages last confirmed in 2014)
10. 10-year life for thin-client and zero-client based on conversation with MN vendor Nowmicro
11. Assumed server utilization rate of 80% of nameplate capacity based on custom efficiency projects in MN and CO 2008-2011
12. ECOVA - May 2013
13. Based upon Rundquist Method Calculation (Matches Colorado Commercial Lighting Program)
14. Ecos Consulting (now Ecova), 2009
15. Various Equipment Vendors
16. Measured Energy Savings and Performance of Power-Managed Personal Computers and Monitors, 1996, Lawrence Berkeley National Laboratory
17. PC and Monitor Night Status: Power Management Enabling and Manual Turn-off, 1998, Lawrence Berkeley National Laboratory
18. ENERGY STAR, 2012
19. Xcel Energy Custom Efficiency projects
20. https://www.efficiencyvermont.com/docs/about_efficiency_vermont/annual_reports/Efficiency-Vermont-2013-Gross-to-Net-Factors.pdf
21. 2014 Michaels Energy (independent 3rd party) NTG review.

Changes from Previous Filing:

1. Adjusted average societal baseline for PC Power Management and VDI Measures to increase shift to ES 5.0 computers. Refer to Table 5.
2. Revised the NTG to match the findings of the 2014 third-party review.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Cooling**Description:**

Prescriptive rebates will be offered for new cooling equipment. Rebates may be dependent on equipment size or load that is offset and on meeting minimum efficiency requirements. Additional rebates may be available for efficiencies better than the minimum qualifying efficiencies.

Prescriptive rebates will be offered for the installation of EC Motors for Refrigeration Evaporators and/or Anti-Sweat Heater Controls.

Custom rebates are available for cooling-related improvements that are not covered by the aforementioned prescriptive rebates. These would include such applications as heat recovery.

Program References:

Measure "ECM" in refrigerated cases	Refer to Program "CO - Refrigeration" to find formulas for (Customer kW, Customer kWh, Customer PkW, etc.) for the "ECM" measures in refrigerated cases.
Measure "Anti-Sweat Heater Controls"	Refer to Program "CO - Refrigeration" to find formulas for (Customer kW, Customer kWh, Customer PkW, etc.) for the "Anti-Sweat Heater Controls" measure.
Measure "ECM" in refrigerated cases	Refer to Program CO - Refrigeration to find references and tables for measure life, ECM_Baseline_Fan_Watts, ECM_Efficient_Fan_Watts, ECM_Hours, CF, Refrigeration Factor, and Incremental Cost values, etc..
Measure "Anti-Sweat Heater Controls"	Refer to Program CO - Refrigeration to find references and tables for measure life, ASHC_Baseline_kW, ASHC_Hours, CF, %_Off, Refrigeration Factor, and Incremental Cost values, etc..

Conversions:

Energy Efficiency Ratio	In cases where the EER is not known or provided it will be assumed equal to 85% of the SEER for all equipment except water-source heat pumps, for which the EER and SEER are equal. = Seasonal Energy Efficiency Ratio x 0.85
kW/ton	= 12 / Energy Efficiency Ratio
Energy Efficiency Ratio	= 3.412 x Coefficient of Performance

Algorithms:**For Rooftop Units, Water Source Heat Pumps, Split Systems, Condensing Units**

Gross Annual kWh Saved at Customer	= Size x EFLH x (12/SEER_Standard - 12/SEER_Eff)
Gross kW Saved at Customer	= Size x (12/EER_Standard - 12/EER_Eff)

For Chillers

Gross Annual kWh Saved at Customer	= Size x EFLH x (IPLV_Standard - IPLV_Eff)
Gross kW Saved at Customer	= Size x (FLV_Standard - FLV_Eff)
For Centrifugal Chillers	
FLV_standard	=FLV_ARI / (6.174722-0.303668*T_var+0.00629466*T_var^2-0.000045780*T_var^3)
IPLV_standard	=IPLV_ARI / (6.174722-0.303668*T_var+0.00629466*T_var^2-0.000045780*T_var^3)
Temperature Variable, T_var	=Chiller Lift + CWTD
CWTD	=Condenser Water Temperature Difference, degrees F. = (24 + (FLV_ARI x 6.83) / (Condenser Water Flow GPM / Cooling Full Load Capacity Tons)

For VFDs on Centrifugal Chillers

Gross Annual kWh Saved at Customer	= Size x EFLH x (IPLV_Baseline - IPLV_VFD_Eff)
Gross kW Saved at Customer	= Size x (FLV_Baseline - FLV_VFD_Eff)

For Plate and Frame Heat Exchangers

Gross Annual kWh Saved at Customer	=(Coeff_A * WB_Temp^2 + Coeff_B * DB_Temp^2 + Coeff_C * WB_Temp * DB_Temp + Coeff_D * WB_Temp + Coeff_E * DB_Temp + Coeff_F) * EFLH_Segment / Coeff_G_EFLH_Office * Chiller_IPLV / BaseCase_IPLV * HX_Tons / 100
Gross kW Saved at Customer	= Gross Annual kWh Saved at Customer / FPHX_EFLH

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Average Energy Cost	= [kWh savings * (\$/Annual kWh) + Max kW Savings * Equivalent Month of Demand Savings * (\$/ Annual kW)] / kWh Savings
FPHX_Slope	= (Chiller_Peak_Tons - Zero_Load) / (T_DB_Design - T_DB_Balance)
FPHX_Intercept	= Chiller_Peak_Tons - (FPHX_Slope * T_DB_Design)
FPHX_Tons	= Expected load in Tons that the FPHX will displace at Wet Bulb cut-over temperature. = FPHX_Slope * T_DB_Onset + FPHX_Intercept
FPHX_EFLH	= Gross Annual kWh Saved at Customer / Chiller_IPLV_Existing / FPHX_Tons Calculated FPHX Full load hours

For Direct Evaporative Pre-cooling for Air Cooled Condensers (DEPACC)

Gross Annual kWh Saved at Customer	= Tons x EFLH x EFLH_Factor x kW_per_ton_Eff_Avg
Gross kW Saved at Customer	= Tons x kW_per_ton_Eff_Peak
Incremental O&M Cost	= Incremental_O&M_Cost_Factor x EFLH x EFLH_Factor x Tons

Variables:**General Water & Air Cooling Variables:**

Size	= The equipment capacity in tons, provided by customer
EFLH	= Equivalent Full Load Hours. The equivalent number of hours that the equipment would be running at full load over the course of the year. Values are shown in Table 2 for different building types and locations, to be provided by the customer.
kW_per_ton_Eff	= Efficiency in kilowatts per ton for the evaporative cooler; kW provided by the customer, tons to be as calculated as defined within this worksheet.
SEER_Standard	= Seasonal Energy Efficiency Ratio in Btu/Wh of standard equipment, based upon the minimum acceptable efficiency defined by International Energy Conservation Code, 2009. Value determined from table 1 based on customer provided equipment type and size.
SEER_Eff	= Seasonal Energy Efficiency Ratio in Btu/Wh of High Efficiency equipment that the customer will install, provided by customer.
EER_Standard	= EER of standard equipment, based upon the minimum acceptable efficiency defined by the International Energy Conservation Code, 2009, for a specific type of equipment and size. Table 1.
EER_Eff	= EER of High Efficiency that the customer will install, provided by customer.
FLV_Standard	= Full load cooling efficiency in kW/ton of standard equipment, based upon the minimum acceptable efficiency defined by International Energy Conservation Code, 2009, Tables 503.2.3(8,9,10) for selected centrifugal chiller type, size, condensing and chilled water temperature, and condenser flow rate (provided by customer). Table 1, excerpt. NOTE: For non-centrifugal chillers, FLV_Standard is the value in IECC Table 503.2.3(7), without variation for condenser and chilled water temperatures and condenser water flow rate.
FLV_ARI (same as IPLV_ARI)	= IECC minimum acceptable FLV (or IPLV) at the ARI standard rated condition of 85 F condensing water temperature, 44 F chilled water temperature, and 3 gpm. The IECC has assigned the same values for FLV and IPLV for centrifugal chillers.
Chiller Lift	= The entering condensing water temperature minus the leaving chilled water temperature, supplied by the customer.
FLV_VFD_Baseline	= Full Load Value cooling efficiency in kW/ton, representing the efficiency of existing chiller with a VFD at 95% load, provided by customer.
FLV_VFD_Eff	= Full Load Value cooling efficiency in kW/ton, representing the efficiency of existing chiller without a VFD at 95% load, provided by customer.
IPLV_VFD_Baseline	= 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, provided by customer.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

IPLV_VFD_EFF	= Integrated Part Load Value (representing the average efficiency over a range of loaded states) cooling efficiency in kW/ton of existing chiller with VFD, provided by customer.
FLV_Eff	= Full Load Value cooling efficiency in kW/ton, representing the efficiency at design conditions, provided by customer.
IPLV_Standard	= 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, 2009 for chiller type and size (type and size provided by customer). Table 1
IPLV_Eff	= Integrated Part Load Value (representing the average efficiency over a range of loaded states) cooling efficiency in kW/ton of High Efficiency equipment, provided by customer.
CF	= Coincidence Factor, the probability that peak demand of the motor will coincide with peak utility system demand. 0.90 will be used for prescriptive rebates except VFD Chillers and Plate and Frame heat exchangers (Reference 1). For VFD Chillers we will use 0%. For Plate and Frame heat exchangers we will use 0% because this technology is used when temperatures are at or below 65 F.
Measure Life	Measure life is taken at 15 years for all prescriptive RTU and PTAC cooling equipment and 20 years for all other cooling equipment. (Reference 2). Custom measure lifetime derived from past projects.
NTG	Net-to-gross = We will use 89% for Air Cooled equipment (Reference 8), and 80% for the rest of the cooling projects (Reference 4), with the exception of 87% for custom cooling projects and 100% for Anti-Sweat Heater and ECM measures.
Incremental operation and maintenance cost	= \$0 for all cooling system types.
Baseline Cost of Equipment	The cost of equipment that would exactly meet code requirements.
Incremental Cost of Equipment	=The incremental cost of equipment above the code requirements, typically expressed on a dollar per ton basis.

For Direct Evaporative Pre-cooling for Air Cooled Condensers (DEPACC) (Reference 6)

kW_per_ton_Eff_Avg	= 258 kWh/ ton / 1574 DEPACC Operating hours = 0.164 kW/ton Efficiency improvement of incumbent air-cooled condensers in kW per ton resulting from installation of condenser evaporative pre-cooler averaged for annual cooling hours.
EFLH_Factor	= DEPACC_Operating_Hours_Office / EFLH for Front Range Office = 1.38875
DEPACC_Operating_Hours_Office	= 1574 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
kW_per_ton_Eff_Peak	= 0.328 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: 1% design temperatures @ DIA = 92°F DB and 60°F WB
Measure Life	Measure life is taken at 20 years for all prescriptive cooling equipment. (Reference 2). Custom measure lifetime derived from past projects.
Incremental_O&M_Cost_Factor	= (\$1.98 / Ton) / 1574 DEPACC Hours = \$0.0012579 / ton-hour Factor used to calculate Incremental annual non-energy Operations and Maintenance cost / ton-hr for water usage.
Baseline Cost of Equipment	= \$0 because the baseline option is to do nothing.
Incremental Cost of Equipment	= Tons x Incremental cost of DEPACC equipment from Table 3. Table 3 is expressed on a cost per ton basis.
Tons	Tons of cooling shown on the rated faceplate of the existing cooling equipment.
DEPACC_Baseline_RTU_kW/ton	1.17 kW/ton based on modeled unit at Denver design conditions.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

<u>For Plate and Frame Heat Exchangers</u>		
T_DB_Onset	Customer Input	Onset Dry Bulb Temperature provided by the customer. This is the dry bulb temperature at which the chiller will be turned off and the FPHX turned on to make chill water. This replaces the wet bulb temperature requested in the past.
T_DB_Balance	Customer Input	Building Balance Point Temperature, the outside air dry bulb temperature at which there is no cooling load. Not used to calculate Process and Data Center Market Segment loads which are assumed constant and independent of OSA DB temperature.
T_DB_Design	93.5°F	Design Temperature for Front Range cooling calculations.
	96.6°F	Design Temperature for Western Slope cooling calculations.
	84.2°F	Design Temperature for Mountain cooling calculations.
EFLH_Segment	See Table 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.
Chiller_Peak_Tons	Customer Input	Existing Chiller plant's maximum load in tons on a design summer day. If chiller nameplate tons are provided, clarification on quantity and manner of operation will also be required. For single chillers with only namplate data an 85% factor will be applied to account for oversizing.
Zero_Load	0	Chiller load when no call for cooling in building. Used in calculation of building chiller load profile.
FPHX_Coeff_A through FPHX_Coeff_G	See Table 4	= Values for the coefficients based on customer Market Segment. Coefficients resulted from a multivariable data regression analysis to estimate the energy savings based on Flat Plate HX Onset Wetbulb Temperature and the building balance point for a FPHX sized to offset 100 tons building load. The resulting savings are scaled based on market segment hours and customer provided HX tons as part of the overall FPHX formula above.
BaseCase_IPLV	0.61	kW/ton assumed in building the multivariable regression for Flat Plate Heat Exchanger kWh savings.
Chiller_IPLV_Existing	Customer Input	= Integrated Part Load Value (in kW/ton) for the existing chiller plant.
Added Tower kW/ton	0.1 kW/ton (Reference 5)	Average additional power use of the Cooling Tower due to the installation of the heat exchanger (tower fans will need to run more to bring down the water temperature to meet the cooling load directly as opposed to providing normal condenser water temps for the chiller). This is built into the regression analysis and part of the estimated kWh savings.

Inputs:

Information Provided by Customer:

Rooftop Units / Split Systems / Air Cooled

Chillers / PTAC / Water Source Heat

Pumps

Cooling equipment type

Verified during M&V:

County / Zone

Yes

Market segment

Yes

Cooling equipment size [tons]

Yes

Quantity of Cooling equipment by Size

Yes

Cooling equipment efficiency (SEER, EER, or FLV, IPLV in kW/ton, kW - dependent on the technology)

Yes

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Centrifugal Chillers:

County / Zone	Yes
Market segment	Yes
Chiller Size [tons]	Yes
Chiller FLV [kW/ton]	Yes
Chiller IPLV [kW/ton]	Yes
Chill water supply temperature [°F]	Yes
Condenser water entering temperature [°F]	Yes
Chilled water leaving temperature [°F]	Yes
Condenser water flow [gpm/ton]	Yes
VFDs on Centrifugal Chillers	Verified during M&V:
County / Zone	Yes
Chiller Size [tons]	Yes
Chiller IPLV [kW/ton]	Yes
Chiller FLV [kW/ton]	Yes
Chiller with VFD FLV [kW/ton]	Yes
Chiller with VFD FLV [kW/ton]	Yes
Quantity of same size Chillers with VFD Retrofit	Yes
Market segment	Yes

Provided by Customer For Plate & Frame

Heat Exchangers (in addition to above):	Verified during M&V:
County / Zone	Yes
Summer Design Day Chiller Plant Load [tons]	Yes
Chiller IPLV [kW/ton]	Yes
Quantity Flat Plate Heat Exchangers	Yes
Onset Dry-bulb Temperature for the Heat Exchanger [°F db]	Yes
Building balance point temperature [°F db]	Yes
Market segment	Yes

For DEPACC Provided by Customer:

Cooling equipment type	Verified during M&V:
Climate zone	Yes
Building type	Yes
Cooling equipment size (tons)	Yes
For Electronically Commutated Evaporator Fan Motors:	Verified during M&V:
Size of motor	Yes
Application of motor (Display Case or Walk-in)	Yes
Case or Walk-in temperature (Medium Temp or Low Temp)	Yes
For Walk-in's: Fan diameter (<= 15 inches or >15 inches)	Yes
Cost	

For Anti-Sweat Heaters:

Number of doors controlled	Yes
Number of controllers	Yes
Cost	

Assumptions:

- Each piece of cooling equipment is going in instead of a machine of the same size that only met minimum International Energy Conservation Code, 2009 requirements.
- Prescriptive rebates are not given for backup cooling equipment.
- Small units assumed to have electric strip heat in the units. See note c in IECC table 503.2.3(1)
- Condensing unit SEER comes from IECC Table 503.2.3(6), units >11.2 tons. Most condensing units are larger than 11.3 tons. IECC assumes the same values as Rooftop units (11.9) for smaller condensing units.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

- To convert equipment from a Seasonal Energy Efficiency Ratio (SEER) to an Energy Efficiency Ratio (EER), multiply SEER by 0.85. The conversion factor of 0.85 a generally accepted factor for converting from SEER to EER. Once EER is obtained, convert EER to kW/ton using the following equation: kW/ton = 12/EER. To convert kW/ton to kW, multiply by tons.

Flat Plate Heat Exchangers:

- No other airside or waterside economizers are in operation

- Projects will not have peak kW savings as wet bulb temp will be too high to provide a reasonable chill water supply temperature during peak summer periods.
- Heat exchanger is installed in parallel with the chiller and will use existing cooling towers when in operation.

DEPACC:

Minimum equipment size that DEPACC can be installed on is 10 ton.

Qualifying evaporative cooling units must have a minimum Media Saturation Effectiveness of 75% and above. The units must be installed with a remote thermostat, outside air temp sensor and a periodic purge water control if sump is used.

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.

Condenser fan energy costs due to DEPACC media are not expected to increase measurably due to media decreasing condensor fan cfm.

Denver Water 2013 estimated rates <http://www.denverwater.org/BillingRates/RatesCharges/2013ApprovedRates/> at \$4.50/1000 gal

DEPACC estimate of water consumed by the evaporative pre-condensing system .28 gallons per tonHr of cooling based on manufacturer's data.

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.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Tables:

Table 1. Deemed Baseline Efficiencies (IECC 2009)

EQUIPMENT MINIMUM BASELINE EFFICIENCIES REQUIRED BY CODE, AND INCREMENTAL COSTS ASSOCIATED WITH EXPECTED HIGHER						
Equipment	Equipment Class	SEER	EER	FLV (kW/ton)	IPLV (kW/ton)	Incremental Cost per Ton, \$/ton
Rooftop Units & Split Systems less than 5.4 tons	Standard Efficiency	13.00	11.05			
	High Efficiency					79
Rooftop Units Condensing Units & Split Systems 5.5-11.3 tons	Standard Efficiency	12.90	11.00			
	High Efficiency					79
Rooftop Units & Split Systems 11.4-19.9 tons & Condensing Units > 11.4 tons	Standard Efficiency	12.70	10.80			
	High Efficiency					79
Rooftop Units & Split Systems 20-63.3 tons	Standard Efficiency	9.50	9.80			
	High Efficiency					79
Rooftop Units greater than 63.3 tons	Standard Efficiency	9.20	9.50			
	High Efficiency					79
Water-source Heat Pumps	Standard Efficiency	12.00	12.00			
	High Efficiency					155
PTAC	Standard Efficiency	10.40	8.86			
	High Efficiency					211
scroll/screw chiller < 75 tons	Standard Efficiency			0.780	0.630	
	High Efficiency					128
scroll/screw chiller >=75 to < 150 tons	Standard Efficiency			0.775	0.615	
	High Efficiency					128
scroll/screw chiller >=150 to <300 tons	Standard Efficiency			0.680	0.580	
	High Efficiency					70
scroll/screw chiller >= 300 tons	Standard Efficiency			0.620	0.540	
	High Efficiency					70
Centrifugal Chillers < 150 tons	ARI rated Efficiency			0.634	0.596	
	High Efficiency					177
Centrifugal Chillers >= 150 to < 300 tons	ARI rated Efficiency			0.634	0.596	
	High Efficiency					177
Centrifugal Chillers >=300 tons to < 600 tons	ARI rated Efficiency			0.576	0.549	
	High Efficiency					177
Centrifugal Chillers >= 600 tons	ARI rated Efficiency			0.570	0.539	
	High Efficiency					177
Air-Cooled Chillers - < 150 tons	Standard Efficiency	12.500	9.562			
	High Efficiency					100
Air-Cooled Chillers - >= 150 tons	Standard Efficiency	12.750	9.562			
	High Efficiency					100
VFD's for Chillers	Existing Chiller Efficiency			Customer Provided	Customer Provided	
	Existing Chiller with VFD Efficiency			Customer Provided	Customer Provided	\$71.88/ton

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

NOTES

- * bold values indicates direct sourcing to IECC 2009, tables 503.2.3(x), otherwise estimated by multiplying SEER by 0.85 to get EER, or dividing EER by .85 to get SEER. For water-sourced heat pumps only, the EER is set equal to the SEER because the condenser is cooled by cooling towers in most cases, meaning that the heat pump EER is not dependent on dry bulb seasonal temperature.
- * High Efficiency SEER and EER values are supplied by Customer.
- * ARI rated efficiency is converted to Standard efficiency as per Tables 503.2.3(8, 9, or 10)
- * Values for Centrifugal Chillers assumed to be at ARI rating conditions of 85 degrees condensing temperature, 44 degrees chilled water temperature, and 3 gpm chilled water flow. Reference International Energy Conservation Code (IECC), 2009, Sec. 503.2.3
- * Values for PTAC from IECC 2009 formula, Table 503.2.3(3) for Cooling Mode, Replacements.
- * Chiller categories are now aligned with the IECC 2009.

Table 2. Equivalent Full Load Hours by Building Type

Building Type / Market Segment	Front Range EFLH	Front Range EFLH w/ Economizer	Western Slope EFLH w/ Economizer	Western Slope EFLH w/ Economizer	Mountain EFLH	Mountain EFLH w/ Economizer
Education - Community College	1,036	746	1,064	790	805	527
Education - Secondary School	652	469	669	497	507	332
Education - University	1,401	1,009	1,439	1,069	1,090	713
Health/Medical - Clinic	1,190	856	1,221	908	925	605
Health/Medical - Hospital	2,308	1,662	2,370	1,761	1,795	1,174
Lodging	1,937	1,395	1,989	1,478	1,506	986
Office	1,574	1,133	1,616	1,201	1,224	801
Retail	1,393	1,003	1,430	1,063	1,083	709
Data Centers	8,760	8,760	8,760	8,760	8,760	8,760
Process Loads	5,840	5,840	5,840	5,840	5,840	5,840

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 7) with Office value calculated for Denver and Grand Junction Typical Meteorological Year data. Distributions developed from CBECS data (Reference 3)

Table 3. DEPACC Incremental Cost (Ref 11)

System Tons	\$/ton
40	\$ 248.27
80	\$ 219.91
120	\$ 209.23
160	\$ 202.80
320	\$ 190.49

Notes:

Ref files: (Large computer files available for reference) (Ref 7)

Xcel DEPACC Notes 111312 R2.docx

EproModel 150ksf OfficeData Center 010313REV 7.xlsx

EnergyPro http://www.energyssoft.com/main/page_energypopro_ep_information.html

EnergyPRO User's Manual, EnergyPro Version 5 by EnergySoft, LLC July 2011 p. 120

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 4: Plate and Frame Savings Formula Coefficients

	FPHX_Coeff_A	FPHX_Coeff_B	FPHX_Coeff_C	FPHX_Coeff_D	FPHX_Coeff_E	FPHX_Coeff_F	FPHX_Coeff_G
Education - Community College	(5.34)	(12.60)	(7.26)	2,695.07	(330.98)	(36,466.54)	1,133
Education - Secondary School	(5.34)	(12.60)	(7.26)	2,695.07	(330.98)	(36,466.54)	1,133
Education - University	(5.34)	(12.60)	(7.26)	2,695.07	(330.98)	(36,466.54)	1,133
Health/Medical - Clinic	(5.34)	(12.60)	(7.26)	2,695.07	(330.98)	(36,466.54)	1,133
Health/Medical - Hospital	(5.34)	(12.60)	(7.26)	2,695.07	(330.98)	(36,466.54)	1,133
Lodging	(5.34)	(12.60)	(7.26)	2,695.07	(330.98)	(36,466.54)	1,133
Office	(5.34)	(12.60)	(7.26)	2,695.07	(330.98)	(36,466.54)	1,133
Retail	(5.34)	(12.60)	(7.26)	2,695.07	(330.98)	(36,466.54)	1,133
Process Cooling	(13.07)	-	-	6,719.51	-	(115,947.86)	5,840
Data Center	(19.61)	-	-	10,079.26	-	(173,921.79)	8,760

References:

1. NYSERDA (New York State Energy Research and Development Authority); NY Energy \$mart Programs Deemed Savings Database - Source for coincidence factor
2. ASHRAE, 2007, Applications Handbook, Ch. 36, table 4, Comparison of Service Life Estimates
3. CBECS (Commercial Buildings Energy Consumption Survey), 2003 - Total Floor space of Cooled Buildings by Principal Building Activity - source of market segment distributions
4. NTG factor from PA Consulting Group, 'Xcel Energy Process and Impact Evaluation for the Colorado Business Cooling Efficiency Program, FINAL REPORT, January 15, 2010'. NTG for custom cooling is historical and not changed.
5. Data from historic Xcel Energy Custom Efficiency cooling tower projects
6. Cypress, Ltd.
7. DEER 2011 Update Table ES-6: NTGR for Non-Residential Prescriptive Upstream Rebate programs

Changes from Recent Filing

Rooftop Units, Split Systems, Water Source Heat Pump, Air cooled chillers, and PTAC are now mid-stream rebate programs. Incremental cost is adjusted accordingly to reflect the distributor costs.

Equivalent Full Load Hours based on updated load profile and now provides choice between no Economizer and Economizer at 55 Fdb.

Flat Plate Heat Exchanger (Waterside Economizer) updated calculations and revised multivariable regression used for savings calculations.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Custom Efficiency

Description:

Customer may apply for rebate under the Custom Efficiency product for gas or electric projects not listed under prescriptive rebate products. 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.

Algorithms:

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 products where applicable.

Variables:

Operation and Maintenance Savings will be calculated for each specific project based on project details.

Measure lifetime will be calculated for each specific project based on project details.

Incremental equipment cost will be calculated for each specific project based on project details.

Inputs:

All variables for each project (equipment wattage, equipment efficiency, hours of operation, etc.) will be calculated for each specific project based on project details.

Assumptions:

A net-to-gross factor of 87% will be used for electric custom projects, referenced National Energy Efficiency Best Practices Report (<http://www.eebestpractices.com>)

Changes from Previous Filing

None

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Data Center Efficiency

Description:

Holistic: Customers may apply for rebates under the Data Center Efficiency product for measures not listed under prescriptive rebate products for this program.

Custom: Each Data Center 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.

Prescriptive: Commercial customers receive a rebate for installing electrically-commutated, backward-curved plug fans on computer room air conditioning units' (CRAC) supply fans in data centers instead of baseline forward-curved AC centrifugal fans in new or retrofit applications.

Program References:

Holistic Program Savings	Refer to the appropriate program to find all applicable formulas (Customer kW, Customer kWh, Customer PCkW, etc.) or assumptions (Hours, Runtime, etc.) for prescriptive measures savings claimed through the holistic data center product architecture.
Plate & Frame Heat Exchangers	Refer to Program "Cooling Efficiency" to find all applicable formulas and assumptions for (Customer kW, Customer kWh, Customer PCkW, etc.) for the "Plate & Frame Heat Exchangers" measure.

Algorithms:

Custom Calculations:	Non-prescriptive 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. Where prescriptive elements exist, the review will be in accordance with the calculation methodologies detailed in the prescriptive products.
Fan Power Reduction (kW)	= (Baseline Fan Power - Efficient Fan Power) * Typical % of CRAC Units in Use
Baseline Fan Power (kW)	= Fan HP * 0.7457 kW/HP
Efficient Fan Power (kW)	= Fan HP * 0.7457 kW/HP * Comparison Load Factor
Comparison Load Factor	= (Base Efficiency Adjustment Factor / Proposed Efficiency Adjustment Factor) - Underfloor Distribution Savings Factor (when applicable)
Base Efficiency Adjustment Factor	= Baseline Fan Efficiency * Baseline Belt Efficiency * Baseline Motor Efficiency
Proposed Efficiency Adjustment Factor	= Proposed Fan Efficiency * Proposed Drive Efficiency * Proposed Motor Efficiency
Cooling Interaction kW	= Fan Cooling Load (tons) * Cooling System kW/ton [per temperature bin]
Cooling Interaction kWh	= Cooling Interaction kW * Cooling System Hours [per temperature bin]
Fan Cooling Load (tons)	= Fan Power Reduction (kW) * 3413 / 12000
Gross kW Saved at Customer per Unit (kW)	= Fan Power Reduction + Cooling Interaction kW
Gross Coincident kW Saved at Customer per Unit(kW)	= Gross kW Saved at Customer per Unit * Coincidence Factor
Gross Annual kWh Saved at Customer per Unit (kWh/yr)	= (Fan Power Reduction * Fan Hours of Operation) + Cooling Interaction kWh

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Variables:	Value	Description
Custom Project - Operation and Maintenance Savings	#	Will be calculated for each specific project based on project details.
Custom Project - Measure Lifetime	#	Will be calculated for each specific project based on project details.
Custom Project - Incremental Cost	#	Will be calculated for each specific project based on project details.
Underfloor Distribution Savings Factor	13.30%	Additional Fan Energy Savings Caused by Mounting EC Fans Below the CRAC Unit For Underfloor Air Distribution (Derived from Results in Ref 2). This value is not used if the efficient fans will not be installed underfloor.
Baseline Fan Efficiency	53.81%	Efficiency of baseline forward-curved fans. Computed by taking the average of two values: the efficiency given by Ref 7 for the input motor size and the societal average value used in California given by Ref 8
Baseline Belt Efficiency	95%	Percentage of energy input into the belt drive from the baseline fan motor that passes to the impeller, averaged over the lifetime of the belt, since the belt's efficiency deteriorates over time (Ref 7)
Baseline Motor Efficiency	91.18%	Efficiency of baseline fan motor. This value is dependent on the motor size and is calculated by interpolating within the NEMA Premium Motor Efficiency Table and using the motor type (number of poles, open/closed) distribution assumption to find the average NEMA Premium efficiency for that motor size. (Ref 10)
Proposed Fan Efficiency	65.97%	Efficiency of proposed EC fan motor. This value is dependent on the motor size and is calculated by inputting the motor size into each of three motor efficiency cubic curve fits derived from curves in Ref 5 and applying the motor type (number of poles) distribution assumption below to find the average EC fan efficiency for that motor size. (Ref 11, 12)
Proposed Drive Efficiency	99.50%	Percentage of energy input into the motor drive from the EC fan motor that passes to the impeller, averaged over the lifetime of the drive, since the drive's efficiency deteriorates over time (Ref 7)
Proposed Motor Efficiency	88.96%	Efficiency of the EC fan motor. This value is dependent on the motor size and is calculated by inputting the motor size into each of three motor efficiency cubic curve fits derived from curves in Ref 5 and applying the motor type (number of poles) distribution assumption below to find the average EC motor efficiency for that motor size.
Coincidence Factor	100%	Assumed, based on the fact that most data centers operate 24/7
Existing CRAC Unit Age	10	Assumed age of existing CRAC unit that the fan(s) will be installed in, based on information in Ref 3. This value is used to determine the Retrofit measure lifetime value.
Typical % of CRAC Units In Use	83%	Assumed % of total CRAC units in the facility that will be operating simultaneously. Many data centers use redundancy for backup capacity, meaning some fans installed in CRAC units will be installed in units that do not operate regularly. To account for this in forecasting and for Net-to-Gross, a %-in-use value is used. This value was derived from a sample of custom rebate projects in Colorado involving CRAC units in data centers.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Variables (Continued):

	Value	Description
Average Cost per Fan, Retrofit	\$4,386.00	Estimated average cost of retrofitting an EC fan onto an existing CRAC unit. Derived from a sample of custom rebate projects in Colorado involving EC fan replacements.
Average Cost per Fan, New (Incremental)	\$1,700.00	Estimated average cost of selecting an EC fan option over a baseline fan option when purchasing a new CRAC unit. This comes from a Colorado custom rebate project.

Inputs:

	Default Value	Description
Custom Project	#	All variables for each project (equipment wattage, equipment efficiency, hours of operation, etc.) will be calculated for each specific project based on project details.
Number of Fans	#	Number of fans installed in this project, customer input
Fan Power (HP)	#	Rated/nominal baseline forward curved fan motor power, customer input
Distribution Type	In-unit or Below-Floor	Air distribution type/fan location, either in-unit or underfloor. Customer must indicate whether the new EC fans will be installed in unit or underfloor
HVAC System Type	Chilled Water	HVAC system type serving the data center/CRAC units where the fans will be installed. There are five options and the customer must indicate which option best matches their system. The options are shown in Table 1 below.

Assumptions:

	Value	Description
Study-Based 'Custom Project NTG	100%	A net-to-gross factor of 100% will be used for Data Center projects that follow the study path.
Custom Project NTG	87%	A net-to-gross factor of 87% will be used for custom measures implemented in data centers to be consistent with the Custom product.
Holistic Prescriptive NTG	Per Program	Prescriptive products not associated with the study track will utilize the net-to-gross value indicated in their end use.
Fan Hours of Operation	8,760	Hours of operation for the CRAC unit fans
Chiller Efficiency (COP)	5.55	(150-300 tons, centrif) page 34, Table 6.2.1L). Converted to kW/ton for use in the analysis.
DX Efficiency (EER)	9.5	Assumed efficiency of DX CRAC units (ASHRAE 90.1-2001 (\geq 240,000 BTU/h and $<$ 760,000 BTU/h, air cooled DX) page 27, Table 6.2.1A). Converted to kW/ton for use in the analysis
Glycol-Cooled DX Efficiency (EER)	11	Assumed efficiency of glycol (water) cooled DX CRAC units (ASHRAE 90.1-2001 (\geq 240,000 BTU/h, water cooled air conditioners) page 27, Table 6.2.1A). Converted to kW/ton for use in the analysis.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Assumptions (Continued):

Assumptions (Continued):	Value	Description
Cooling Tower Fan Energy (GPM/HP)	20	ASHRAE maximum cooling tower fan energy requirement (ASHRAE 90.1-2001 Centrif. Cooling Tower Fan Power, page 32, Table 6.2.1G) used to determine the cooling tower fan power/ton, along with the GPM/ton assumption.
Cooling Tower Sizing Factor (GPM/ton)	3	Standard cooling tower sizing rule of thumb (Ref 13,14,15)
Primary Chilled Water Pump Power (HP)	5	Assumed, based on assumed chiller size and typical primary pump size
Primary Chilled Water Pump Load	75%	Assumed, based on rule-of-thumb for pump load factor
Primary Chilled Water Pump Motor Efficiency	89.50%	Assumed, based on NEMA Premium motor efficiency for 5-hp motors
Chiller Size (tons)	150	Assumed, based on minimum chiller size within range used for chiller efficiency determination. This and the primary chilled water pump assumptions only affect the primary pump analysis and are only a very small portion of the total savings for this measure.
Measure Life (Retrofit)	10	Lifetime (in years) of the retrofit measure. This is based on subtracting the average CRAC unit age from the new construction lifetime.
Measure Life (New Construction)	20	Lifetime (in years) of the new construction measure. This is based on the primary cooling equipment lifetimes used in other Xcel Colorado programs, along with the California DEER 2013 lifetime for new chillers.
Desired Chilled Water Temperature (F)	45	Chilled water supply temperature. This is a typical value for most chilled water systems.
Cooling Tower Approach (F)	7	Cooling tower approach (difference between outdoor air wet bulb temperature and condensing temperature). Values can range from 4-12 F, but 7 is typical.
Cooling Tower Design Wet Bulb Temperature (F)	69	Assumed design wet bulb temperature for cooling towers installed in the relevant location (69 F used for CO), based on weather data.
Chiller Minimum Efficiency Dry Bulb Temperature (F)	93	Assumed design dry bulb temperature for chiller in the relevant location (93 F used for CO).
Chiller Maximum Efficiency Dry Bulb Temperature (F)	30	Assumed dry bulb temperature below which the chiller's efficiency will not decrease
Dry Cooler Dry Bulb Approach Temperature (F)	15	Dry cooler approach (difference between outdoor air dry bulb temperature and condensing temperature). 15 F is the most common value (Ref 7)
Cooling Equipment Temperature-based Efficiency Improvement (%/F)	0.50%	Assumed efficiency improvement for chiller and DX systems (and, for simplicity, cooling tower fans) based on outdoor dry bulb temperature decrease (due to lower condenser pressure). Standard Xcel Energy assumption for cooling interaction.
Distribution of AC Motors by Type	16.67%	Assumed distribution of the six AC motor types: TEFC with 2, 4, and 6 poles, and ODP with 2, 4, and 6 poles. For simplicity, it is assumed that all six occur with equal frequency.
Distribution of EC Motors by Type	33.33%	Assumed distribution of the three EC motor types: 2, 4, and 6-poles. For simplicity, it is assumed that all three occur with equal frequency.
Existing Motor Load Factor	75.00%	Assumed load factor on existing CRAC/CRAH fan. This value is consistent with our other prescriptive programs for constant speed fans.
Deemed Baseline Motor BHP for New Construction	11.55	Assumed baseline motor HP for new construction applications.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 1: Cooling System Efficiencies

HVAC System Type	Rated Efficiency kW/ton	Notes
Chilled Water	5.55 COP	0.634 kW/ton is the rated efficiency
DX	9.5 EER	1.263 kW/ton is the rated efficiency
Glycol-Cooled DX	11 EER	1.091 kW/ton is the rated efficiency
Glycol-Cooled DX with Waterside Economizer	N/A	0.756 kW/ton is calculated from weather data and includes free cooling
Chilled Water with Waterside Economizer	N/A	0.407 kW/ton is calculated from weather data and includes free cooling

Table 2: Cooling Efficiency Table (kW/Ton)

Temperature	Chilled Water	DX	Water-Cooled DX	Water-Cooled DX w/ WS Economizer	Chilled Water w/WS Economizer
Determinate Temperature: (dB/wB)	Wet Bulb	Dry Bulb	Dry Bulb	Dry Bulb	Wet Bulb
-3	0.4584	0.8653	0.8316	0.1231	0.0036
-1	0.4584	0.8653	0.8316	0.1231	0.0036
1	0.4584	0.8653	0.8316	0.1231	0.0036
3	0.4584	0.8653	0.8316	0.1231	0.0036
5	0.4584	0.8653	0.8316	0.1231	0.0036
7	0.4584	0.8653	0.8316	0.1231	0.0036
9	0.4584	0.8653	0.8316	0.1231	0.0043
11	0.4584	0.8653	0.8316	0.1231	0.0052
13	0.4584	0.8653	0.8316	0.1231	0.0065
15	0.4584	0.8653	0.8316	0.1231	0.0083
17	0.4584	0.8653	0.8316	0.1231	0.0108
19	0.4591	0.8653	0.8316	0.1231	0.0145
21	0.4601	0.8653	0.8316	0.1231	0.0202
23	0.4613	0.8653	0.8316	0.1231	0.0297
25	0.4645	0.8653	0.8316	0.1231	0.0468
27	0.4766	0.8653	0.8316	0.1231	0.0817
29	0.4903	0.8653	0.8316	0.1231	0.1141
31	0.4993	0.8716	0.8377	0.2252	0.1141
33	0.5202	0.8842	0.8498	0.3307	0.1141
35	0.5468	0.8968	0.8619	0.4397	0.1141
37	0.5924	0.9095	0.8741	0.5522	0.1141
39	0.6314	0.9221	0.8862	0.6682	0.6314
41	0.6385	0.9347	0.8984	0.7876	0.6385
43	0.6492	0.9474	0.9105	0.9105	0.6492
45	0.6514	0.9600	0.9226	0.9226	0.6514
47	0.6587	0.9726	0.9348	0.9348	0.6587
49	0.6735	0.9853	0.9469	0.9469	0.6735

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 2: Cooling Efficiency Table (kW/Ton) (Continued)

Temperature	Chilled Water	DX	Water-Cooled DX	Water-Cooled DX w/ WS Economizer	Chilled Water w/WS Economizer
Determinate Temperature: (dB/wB)	Wet Bulb	Dry Bulb	Dry Bulb	Dry Bulb	Wet Bulb
51	0.6808	0.9979	0.9591	0.9591	0.6808
53	0.6871	1.0105	0.9712	0.9712	0.6871
55	0.6971	1.0232	0.9833	0.9833	0.6971
57	0.7086	1.0358	0.9955	0.9955	0.7086
59	0.7167	1.0484	1.0076	1.0076	0.7167
61	0.7172	1.0611	1.0198	1.0198	0.7172
63	0.7284	1.0737	1.0319	1.0319	0.7284
65	0.7303	1.0863	1.0440	1.0440	0.7303
67	0.7302	1.0989	1.0562	1.0562	0.7302
69	0.7512	1.1116	1.0683	1.0683	0.7512
71	N/A	1.1242	1.0805	1.0805	N/A
73	N/A	1.1368	1.0926	1.0926	N/A
75	N/A	1.1495	1.1047	1.1047	N/A
77	N/A	1.1621	1.1169	1.1169	N/A
79	N/A	1.1747	1.1290	1.1290	N/A
81	N/A	1.1874	1.1412	1.1412	N/A
83	N/A	1.2000	1.1533	1.1533	N/A
85	N/A	1.2126	1.1654	1.1654	N/A
87	N/A	1.2253	1.1776	1.1776	N/A
89	N/A	1.2379	1.1897	1.1897	N/A
91	N/A	1.2505	1.2019	1.2019	N/A
93	N/A	1.2632	1.2140	1.2140	N/A
95	N/A	1.2632	1.2140	1.2140	N/A
97	N/A	1.2632	1.2140	1.2140	N/A
99	N/A	1.2632	1.2140	1.2140	N/A
101	N/A	1.2632	1.2140	1.2140	N/A
103	N/A	1.2632	1.2140	1.2140	N/A

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

References:

1. Lawrence Berkeley Laboratory Study: Demonstration of Intelligent Control and Fan Improvements in Computer Room Air Handlers (http://hightech.lbl.gov/documents/data_centers/lbnl-6007e.pdf)
2. Technical Note: Using EC Plug Fans to Improve Energy Efficiency of Chilled Water Cooling Systems in Large Data Centers, by Emerson Power Network (http://shared.liebert.com/SharedDocuments/White%20Papers/PlugFan_Low060608.pdf)
3. Bick Group Website FAQ (<http://www.bickgroup.com/data-center-ec-fans-for-data-centers.asp?w=1>)
4. "Energy Conservation and the Electronically Communicated Fan" from Rocky Mountain Utility Efficiency Exchange (<http://www.utilityexchange.org/rmeee/2013/ppt/Hegwood%20revised%20102513.pdf>)
5. EBM-Papst ASHRAE Presentation for Connecticut Chapter on 12/9/2010 (http://ctashrae.org/downloads/ashrae_2010_12_09_1.pdf)
6. Energy Tips: Replace V-Belts with Cogged or Synchronous Belt Drives (<http://www.nrel.gov/docs/fy00osti/27833.pdf>)
7. Energy Efficiency Baselines for Data Centers, Pacific Gas & Electric, March 1, 2013 (http://www.pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/incentivesbyindustry/hightech/data_center_baseline.pdf)
8. Measure Information Template Data Centers 2013 California Building Energy Efficiency Standards, by Taylor Engineering (http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/2011-04-11_workshop/presentations/4_Data_Centers.pdf, http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Nonresidential/HVAC/Data_Center_Final_Report.pdf)
9. York VDCF Direct-Drive Remote Air-Cooled Fluid Coolers Product Specifications (<https://cgproducts.johnsoncontrols.com/YorkDoc/195.29-EG2.pdf>)
10. Energy Savings Potential and Opportunities for High-Efficiency Electric Motors in Residential and Commercial Equipment, December 2013, US DOE (<http://energy.gov/sites/prod/files/2014/02/f8/Motor%20Energy%20Savings%20Potential%20Report%202013-12-4.pdf>)
11. Ziehl Abegg Fan Selection Tool (fanselect.net)
12. EBM-Papst Fan Selection Tool
13. Clg Plant Optimization (<http://academic.udayton.edu/kissock/http/EEB/LecturesAndHomework/23-CoolingPlantOptimization/CoolingPlantOptimization.docx>)
14. Georgia Tech Student Thesis (<http://www-old.me.gatech.edu/energy/students/liuthesis.pdf>)
15. 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)

Changes from Recent Filing

-
1. Added Plate and Frame Heat Exchanger prescriptive measure
 2. Added EC Fan prescriptive measure

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Energy Feedback Pilot - Business**Description:**

Pilot will employ energy use feedback to customer groups and measure the difference in energy use between participants that receive Business Energy Reports and a similarly sized control group that does not. The pilot will include small business customers with both gas and electric service from Xcel Energy.

Algorithms:

Monthly Electrical Energy Savings (Gross_Treatment_Monthly_kWh)	The development of the savings by each variable group (Print, Email, Online) follow this basic formula: = (Control_kWh_post_treatment - Group_Rebate_Product_Participation) - (Treatment_kWh_usage_post_treatment - Group_Rebate_Product_Participation)
Electrical Energy Savings (Gross_Annual_kWh)	= sum of each month of Monthly Electrical Energy Savings
Electrical Demand Savings (Gross_Coincident_kw)	= Gross_kw * CF
Electrical Demand Savings (Gross_kw)	= Customer_kw_Max
Coincidence Factor (CF)	= Customer_kw_Peak_Month / Customer_kw_Max
Monthly Natural Gas Energy Savings (Gross_Treatment_Monthly_Dth)	The development of the savings by each variable group (Print, Email, Online) follow this basic formula: = (Control_Dth_usage_post_treatment - Group_Rebate_Product_Participation) - (Treatment_Dth_usage_post_treatment - Group_Rebate_Product_Participation)
Natural Gas Energy Savings (Gross_Annual_Dth)	= Sum of each month of the Monthly Natural Gas Energy Savings
Behavioral Adjustment	= -2/3 * Gross_kw; This adjustment is applied to reduce the first year savings to 1/3 of the actual savings in compliance with ordered treatment.

Variables:

Treatment_Group	= Group of participating gas & electric customers receiving periodic paper reports of feedback on their energy use.	
Control_Group	= Uninformed random sample of gas & electric customers receiving no specific information or treatment from this program of similar size to treatment group.	
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_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 savings that will be included in the regression analysis and deducted from the EFP results if statistically significant.	
Gross_Treatment_Monthly_kWh_Saved	Provided by Vendor	= monthly MWh savings provided by the vendor for all homes in the treatment group.
Customer_kw_Peak_Month	Provided by Vendor	= Average electrical demand savings per household achieved in the month, day, and hour that contained the peak demand on Xcel Energy's system. Actual value calculated each year.
Customer_kw_Max	Provided by Vendor	= The maximum of the peak electrical demand savings per household achieved in the summer months: June, July, August, and September. Actual value calculated each year. Formula for each monthly Customer_kw = Customer_Daily_kw * Treatment_Percent_Savings * Peak_Factor * Daily_Usage_at_Peak
Gross_Treatment_Monthly_Dth_Saved	Provided by Vendor	= monthly therm savings provided by the vendor for all homes in the treatment group.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Peak_Factor	Provided by Vendor	= The ratio of energy usage in peak hour to average hourly energy use. Actual value calculated each year.
Daily_Usage_at_Peak	Provided by Vendor	= Percentage of energy usage in peak hour to daily total energy use. Actual value calculated each year.
Measure Life		= Assumed to be 1.0 year since there is no equipment purchase - just behavior changes.
Measure Life (Behavioral Adjustment)		= is set to zero in order to not affect the lifetime net benefits
Incremental Cost		= Assumed to be zero since the program induces behavior change which has no capital cost.
Operation & Maintenance (O&M) Savings		= Assumed to be zero.
Net-to-Gross Factor (NTG)		= 100%

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Energy Management Systems

This is a custom product including both gas and electric measures. Customer may apply for rebate under the EMS product. Each EMS 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 good engineering practices and standards.

Calculations:

Electrical and gas 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. Where prescriptive elements exist, the review will be in accordance with the calculation methodologies detailed in the prescriptive products.

Assumptions:

A net-to-gross factor of 87% will be used for electric measures and a net-to-gross factor of 90% will be used for gas EMS projects.
A net-to-gross factor of 100% will be used for EIS measures, as they are new to the product.

Operation and Maintenance Savings will be calculated for each specific project based on project details.

Product life for automatically controlled measures is 15 years.

Lifetime for recommissioning measures is 7 years.

Lifetime for manual adjustments will be verified through on-site metering and will not exceed the term of the customer's enrollment in the program.

Changes from 2015

Addition of Energy Information Systems to the product measure list

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Heating Efficiency
Description:

Prescriptive rebates will be offered for Hot Water Boilers (Condensing and non-condensing), Commercial Water Heaters and various heating system improvements.

Algorithms:

BTUH_upgraded	= Input BTUH for the upgraded boiler or water heater to generate the same output as existing boiler or water heater that is being retrofitted = BTUH_existing x EFFb/EFFh
BTUH_base	= Input BTUH for the baseline boiler or water heater to generate the same output as the new high efficient boiler or water heater = BTUH_new x EFFh/EFFb
New Boiler Savings (Dth)	= (BTUH_base - BTUH_new) x Hrs / 1,000,000
Furnace Savings (Gross Dth)	= Alt x ((BTUH_new x EFFh/EFFb) - BTUH_new) x Hrs / 1,000,000
Boiler Tune Up savings (Gross Dth)	= ((BTUH x EFFh/EFFb) - BTUH) x Hrs / 1,000,000
Outdoor Air Reset savings (Gross Dth)	= (BTUH - (BTUH x EFFb/EFFh)) x Hrs / 1,000,000
Stack Dampers savings (Gross Dth)	= (BTUH - (BTUH x EFFb/EFFh)) x Hrs / 1,000,000
Modulating Burner Controls savings (Gross Dth)	= (BTUH - (BTUH x EFFb/EFFh)) x Hrs / 1,000,000
O2 Trim Control savings (Gross Dth)	= (BTUH - (BTUH x EFFb/EFFh)) x Hrs / 1,000,000
Steam Traps savings (Gross Dth)	= Leak_Rate x Leak_Hours x BTU_per_Pound / EFFb/1,000,000
New Water Heater Savings (Dth)	= BTUH_New x Eff_Rating_High)/(BTUH_Input x Eff_Rating_High + Other_Water_Heater_BTUH_Input x Eff_Rating_Standard) x {density x C_p x Volume_Daily_SqFt_Usage x Days_Year x SqFt_Served x (T_setpoint - T_supply) x (1 / Eff_Rating_Standard - 1 / Eff_Rating_High) + [(SL_base - SL_new) x 8760 hours]} x (1 MMBTU / 1,000,000 BTU)
Pipe Insulation Savings (Dth)	= LF x Hrs x (BTU_per_foot_U - BTU_per_foot_I) x Existing / EFFb
DeltaT	= (Tfluid - Tambient)
BTU_per_Foot	= [Coef0 + (Coef1 x DeltaT) + (Coef2 x DeltaT^2) + (Coef3 x DeltaT^3)] / EFFb The U or I designation after the name indicates Uninsulated or Insulated.
Custom Boiler savings (Dth)	Gas energy savings and any associated savings or increase in electrical energy 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 products where applicable.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Variables:

BTUH_new	= Rated boiler or water heater Input BTUH nameplate data for the new boiler or water heater.
BTUH_existing	= Rated boiler or water heater Input BTUH nameplate data for the existing boiler or water heater that is being replaced or retrofitted with OA Reset dampers, Modulating Burner Controls, Tabulators or O2 Trim Controls.
Eff_Rating_High	= The rated efficiency of the new water heater, provided by the customer
Eff_Rating_Standard	= The minimum water heater thermal efficiency allowed by the federal standard = 80%
Volume_Daily_SqFt_Usage	=The daily usage of hot water by market segment per sq. ft. (Table 9)
Days_Year	= Days per year of hot water usage by market segment (Table 9)
T_setpoint	= Water heater setpoint = 140 deg F (Reference 11)
T_supply	= Cold water temperature = 58 deg F (Reference 11)
Other_Water_Heater_BTUH_Input	=The total input in btu/hr of all existing water heater that will remain in service
Hrs	= 659 hrs/yr for space heating only boilers = 2,190 hrs/yr for domestic hot water only boilers = 1,443 hrs/yr for space heating & domestic hot water boilers Pipe insulation hours are given in Table 2. = 950 hrs/yr for commercial furnaces
Alt	= Altitude Adjustment factor to adjust the sea level manufacturer's rated input for altitude effects = 0.891
SL_Hrs	= Standby loss hours for commercial water heaters = 8,760 hrs/yr
EFFb	= Efficiency of Baseline equipment. Refer Table 1 below
EFFh	= Efficiency for higher efficiency equipment. Refer Table 1 below.
SL_base	= Standby Losses for baseline storage water heater = 13.21 BTUH per gallon of storage (Ref 13)
SL_new	= Standby Losses for efficient water heater = 8.90 BTUH per gallon of storage (ref 13)
Leak_Hours	= Annual hours boiler lines are pressurized = 6000 hours
Leak_Rate	=Leakage rate, pounds of steam per hour. High Pressure = 11, Low Pressure = 5 (Reference 5)

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

BTU_Per_Pound	<u>Low Pressure Applications:</u> = 1164 BTU per pound for lost to atmosphere, 964 BTU per pound lost to condensate. Assume 50/50 mix = 1064 BTU per pound. (Reference 5) <u>High Pressure Applications:</u> = 1181 BTU per pound for lost to atmosphere, 981 BTU per pound lost to condensate. Assume 50/50 mix = 1081 BTU per pound. (Reference 5)
LF	= Linear feet of insulation installed, provided by the customer.
Coef	= Heat loss polynomial equation coefficient. The number represents the power to which DeltaT is raised. Values for insulation/pipe combinations allowed in the product are listed in Table 7. Coefficients will be selected based on the pipe diameter, R (or k) value and insulation thickness provided by the customer.
k	= Thermal conductivity, btu-in/hr-ft ² -F
R-Value	= Thermal Resistance, (1/k)*thickness(inches)
T _{fluid}	= Average temperature of the fluid in the pipe receiving insulation in degrees F, provided by the customer.
T _{ambient}	= Average temperature of the space surrounding the pipe. We will ask the customer if the pipe is in a conditioned space or outside. We will use 70 degrees for conditioned spaces and 51 degrees for outside domestic hot water (full year average) and 44 degrees for outside space heating (average excluding June-September) which are the average TMY3 temperatures for Colorado.
Existing	= Pipe insulation savings multiplier to determine credit if existing deteriorated insulation is being replaced. We will use 1 if no existing insulation is present and 0.25 if existing insulation is being replaced.
1,000,000	= Conversion from BTU to Dth
Measure Life	= Length of time the boiler equipment will be operational = See table 8.
Incremental Cost	= Refer to Tables 3 to 6
NTG	Net-to-gross = 86% Per 2011 Cadmus Program Evaluation and Michaels Energy Review.

Needed from Customer/Vendor/Administrator for Calculations:

For boilers:

Boiler size rated at sea level (BTUH)

New boiler type (Non-Condensing or Condensing)

Boiler Use (Space heating and/or water heating)

For steam traps:

High or low pressure

Incremental cost

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

For all but boilers, steam traps, and pipe insulation:

Boiler size (BTUH)

Implemented measure

Incremental cost

For Insulation:

Linear feet of insulation added

Nominal diameter of pipe

Thickness of insulation

Insulation R-Value or thermal conductivity (k)

Average fluid temperature

Pipe location (conditioned space or not)

Pipe use (Space heating and/or water heating)

Was existing insulation replaced

Incremental cost

For Water Heaters:

Building type

Square footage served by water heater

Storage capacity (gallons); 0 if tankless

BTUH input

Other Water Heater BTUH Input

Thermal efficiency rating

For Furnaces:

New furnace size (BTUH)

New furnace efficiency

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Assumptions:

- Each boiler is replaced with the same size on a 1 for 1 basis.
- Only boilers used for space and/or domestic water heating can receive prescriptive rebates; other boilers must go through Custom Efficiency.
- Climate zone assumed to be Denver for all boilers and water heaters
- Thermal Efficiency as defined in ASHRAE 90.1-2007 indicates the total efficiency of the boiler equal to 100% fuel energy minus all losses.
- The full load efficiency of condensing boiler is assumed to be 92%. For savings calculations, part load efficiency of 96.2% was used.
- Standby losses are from the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) database based on a 100 gallon tank.
- Standby losses are equal for the baseline and efficient storage type water heaters and cancel out.
- Each furnace is replaced with the same size on a 1 for 1 basis.
- Prescriptive rebates are only given for furnaces put into service, rebates are not given for backup furnaces.
- Service life of typical furnace is 20 years (per FEMP), 15 years used in the calculations. Reference 10
- Furnaces must have a minimum efficiency of 92% AFUE for a rebate, and 94% AFUE or higher efficiency will receive a larger rebate.
- The baseline efficiency for the furnace is based on 2009 IECC, minimum of 78%.
- Efficiency of all furnaces is Annual Fuel Utilization Efficiency ("AFUE")
- For 175,000 Btu/h hot water boilers: 100% of capacity used for space heating. For 500,000-4,000,000 Btu/h boilers: 50% of capacity used for space heating, 50% of capacity used for hot water.

*Condensing boiler efficiencies at part loads were taken from AERCO International Inc Thermal Efficiency curve for condensing boilers.

- Prescriptive rebates are only given for boilers put into service, rebates are not given for backup boilers. Even though we do not rebate backup boilers, our assumed hours have been conservatively reduced to 65% of the predicted hours to account for boiler redundancy.
- Steam boiler has condensate return.
- Assumed savings for boiler tune-up = 2% for non condensing boiler. This is an average value of the two years, 4% initial to no savings at the end of the two years. Life of product is 2 years. DOE states up to 5%.
- Assumed savings for outdoor air reset on non condensing boilers = 3%. Life of product is 20 years. The Natural Gas consortium states up to 5% savings
- Assumed savings for installing Stack dampers on non condensing boilers = 1%. Life of product is 20 years. Canada energy council, up to 4%
- Assumed savings for modulating burner controls on non condensing boilers = 3%. Life of product is 20 years. The Natural Gas consortium states up to 4% savings
- Assumed savings for O2 trim controls on non condensing boilers = 2%. Life of product is 20 years. The Natural Gas consortium states of 2 to 4% savings
- For boilers: Though the BTU input and output are affected by altitude, the efficiency stays the same, so the elevation effect is not considered.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 1: Heating Equipment Efficiencies		
	Baseline Efficiency (EFFb)	Efficient Efficiency (EFFh)
New Boilers (Non-Condensing)	80.00%	85.00%
New Boilers (Condensing)	80.00%	96.20%
Boiler Tune Up	78.00%	80.00%
Outdoor Air Reset	80.00%	83.00%
Stack Dampers	80.00%	81.00%
Modulating Burner Controls	80.00%	83.00%
O2 Trim Control	80.00%	82.00%
Steam Traps	80.00%	N/A
Commercial Furnaces	78.00%	92.00%
Water Heaters	80.00%	96.00%
Pipe Insulation	80.00%	N/A

Table 2: Hours for Pipe Insulation			
Use of Pipe	Location	Pipe Insulation Hours	Explanation
Domestic Hot Water	Inside	5,584	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	2,622	Hours when boiler is running but outdoor temp is above building balance point
Space Heating	Outside	6,000	Hours that boiler is running

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 3: Hot water boiler costs, Vendor supplied, Engineered Products

Boiler Nameplate Capacity	Baseline	Non-condensing High Efficient - Non Condensing	Condensing High Efficient - Condensing	Incremental Baseline to High Efficient - Non Condensing	Incremental Baseline to High Efficient - Condensing
175,000 Btuh	\$3,000	\$3,500	\$4,600	\$500	\$1,600
500,000 Btuh	\$5,000	\$9,000	\$11,200	\$4,000	\$6,200
1,000,000 Btuh	\$7,300	\$11,700	\$15,000	\$4,400	\$7,700
2,000,000 Btuh	\$12,000	\$17,000	\$26,500	\$5,000	\$14,500
4,000,000 Btuh	\$24,000	\$34,000	\$53,000	\$10,000	\$29,000
6,000,000 Btuh	\$36,000	\$51,000	\$79,500	\$15,000	\$43,500
8,000,000 Btuh	\$48,000	\$68,000	\$106,000	\$20,000	\$58,000

Table 4

Baseline Equipment Sizing compared to New Construction
Tankless

Customer Segment	Sizing multiplier for equivalent Storage System with 100 gallons of storage
Fast Food Restaurant	48%
Sit-Down Restaurant	54%
Elementary School	52%
Junior High School	88%
Motel	98%
Apartment Building	51%
Fitness Center	65%
Other	65%

Incremental Cost per Nameplate Input BTUH for Storage Water Heater per 100 gallons of storage

Customer Segment	\$/BTUH
Fast Food Restaurant	0.0326
Sit-Down Restaurant	0.0056
Elementary School	0.0056
Junior High School	0.0085
Motel	0.0056
Apartment Building	0.0340
Fitness Center	0.0085
Other	0.0144

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Incremental Cost per Nameplate Input BTUH for Tankless Water Heater	
Customer Segment	\$/BTUH
Fast Food Restaurant	0.0105
Sit-Down Restaurant	0.0044
Elementary School	0.0044
Junior High School	-0.0049
Motel	-0.0080
Apartment Building	0.0105
Fitness Center	0.0037
Other	0.0029

**Table 5: Other Heating System Improvements**

Boiler Tune Up	Actual costs will be provided by customer
Outdoor Air Reset	Actual costs will be provided by customer
Stack Dampers > 750 Mbtuh	Actual costs will be provided by customer
Stack Dampers > 750 Mbtuh	Actual costs will be provided by customer
Modulating Burner Controls < 750 Mbtuh	Actual costs will be provided by customer
Modulating Burner Controls > 750 Mbtuh	Actual costs will be provided by customer
O2 Trim Control	Actual costs will be provided by customer
Steam Traps	Actual costs will be provided by customer
Pipe Insulation	Actual costs will be provided by customer

Table 6: Commercial Furnaces (Reference 3)

Btu Input	Incremental Cost
60,000	\$804.95
70,000	\$782.26
80,000	\$775.83
90,000	\$785.68
100,000	\$811.80
115,000	\$893.02
120,000	\$912.86
125,000	\$948.29
140,000	\$1,079.00

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 7: Pipe Insulation polynomial equation coefficients and incremental cost

Pipe Nominal Diameter (inches)	Insulation Thickness (Inches)	Polynomial Coefficients, Uninsulated				Polynomial Coefficients, Insulated			
		Coef0	Coef1	Coef2	Coef3	Coef0	Coef1	Coef2	Coef3
0.50	1.0	-3.0374E+00	4.5690E-01	8.6645E-04	4.0333E-07	-1.4187E-01	9.4515E-02	9.5675E-05	2.0500E-07
0.50	1.5	-3.0374E+00	4.5690E-01	8.6645E-04	4.0333E-07	-9.3332E-02	7.8916E-02	7.4175E-05	1.7167E-07
0.75	1.0	-3.6084E+00	5.5068E-01	1.0738E-03	4.9833E-07	-1.8348E-01	1.1210E-01	1.1840E-04	2.4000E-07
0.75	1.5	-3.6084E+00	5.5068E-01	1.0738E-03	4.9833E-07	-1.1155E-01	9.0618E-02	8.7550E-05	1.9667E-07
1.00	1.0	-4.4355E+00	6.6986E-01	1.3218E-03	6.3167E-07	-1.9200E-01	1.1754E-01	1.2070E-04	2.5333E-07
1.00	1.5	-4.4355E+00	6.6986E-01	1.3218E-03	6.3167E-07	-1.1202E-01	9.8294E-02	9.6075E-05	2.1167E-07
1.25	1.0	-5.7434E+00	8.3004E-01	1.5980E-03	8.8500E-07	-2.9272E-01	1.4849E-01	1.5975E-04	3.1667E-07
1.25	1.5	-5.7434E+00	8.3004E-01	1.5980E-03	8.8500E-07	-1.3118E-01	1.0982E-01	1.0618E-04	2.3833E-07
1.50	1.0	-6.3813E+00	9.3332E-01	1.8326E-03	9.9000E-07	-2.7700E-01	1.5147E-01	1.5938E-04	3.2500E-07
1.50	1.5	-6.3813E+00	9.3332E-01	1.8326E-03	9.9000E-07	-1.6005E-01	1.2339E-01	1.2200E-04	2.6667E-07
2.00	1.0	-7.7082E+00	1.1384E+00	2.2752E-03	1.2350E-06	-3.3948E-01	1.7646E-01	1.8525E-04	3.8333E-07
2.00	1.5	-7.7082E+00	1.1384E+00	2.2752E-03	1.2350E-06	-2.0389E-01	1.4083E-01	1.3790E-04	3.0667E-07
2.50	1.5	-9.3690E+00	1.3590E+00	2.6993E-03	1.5500E-06	-1.7869E-01	1.4528E-01	1.4075E-04	3.1667E-07
2.50	2.0	-9.3690E+00	1.3590E+00	2.6993E-03	1.5500E-06	-1.3498E-01	1.2739E-01	1.1985E-04	2.7667E-07
3.00	1.5	-1.1275E+01	1.6288E+00	3.2514E-03	1.9067E-06	-2.6414E-01	1.8400E-01	1.8783E-04	3.9500E-07
3.00	2.0	-1.1275E+01	1.6288E+00	3.2514E-03	1.9067E-06	-1.7765E-01	1.5601E-01	1.5245E-04	3.3667E-07
4.00	1.5	-1.4044E+01	2.0490E+00	4.1818E-03	2.3833E-06	-3.3314E-01	2.2060E-01	2.2868E-04	4.7167E-07
4.00	2.0	-1.4044E+01	2.0490E+00	4.1818E-03	2.3833E-06	-2.3785E-01	1.8565E-01	1.8200E-04	4.0000E-07
5.00	1.5	-1.6652E+01	2.4856E+00	5.2152E-03	2.8167E-06	-4.5046E-01	2.6745E-01	2.7580E-04	5.8000E-07
5.00	2.0	-1.6652E+01	2.4856E+00	5.2152E-03	2.8167E-06	-2.9805E-01	2.2138E-01	2.1908E-04	4.7833E-07
6.00	1.5	-2.0439E+01	2.9514E+00	6.0177E-03	3.6500E-06	-6.1558E-01	3.1278E-01	3.1310E-04	6.9333E-07
6.00	2.0	-2.0439E+01	2.9514E+00	6.0177E-03	3.6500E-06	-3.4456E-01	2.4953E-01	2.4818E-04	5.3833E-07
8.00	1.5	-2.6767E+01	3.8025E+00	7.6705E-03	4.9667E-06	-6.9016E-01	3.7481E-01	3.9035E-04	8.1000E-07
8.00	2.0	-2.6767E+01	3.8025E+00	7.6705E-03	4.9667E-06	-1.4066E+00	3.3454E-01	9.9850E-05	1.1100E-06
10.00	1.5	-3.1882E+01	4.6589E+00	9.7102E-03	5.8167E-06	-8.7637E-01	4.4116E-01	4.4313E-04	9.7500E-07
10.00	2.0	-3.1882E+01	4.6589E+00	9.7102E-03	5.8167E-06	-5.2419E-01	3.5989E-01	3.6058E-04	7.7833E-07
12.00	1.5	-3.8751E+01	5.5187E+00	1.1240E-02	7.3333E-06	-1.0195E+00	5.1188E-01	5.2188E-04	1.1250E-06
12.00	2.0	-3.8751E+01	5.5187E+00	1.1240E-02	7.3333E-06	-5.6113E-01	4.1443E-01	4.3003E-04	8.8167E-07

Note:

The updated coefficients were developed using the NAIMA 3E Plus 4.0 Software.

The following assumptions were used:

Base metal - Steel

Insulation - 650F min. Fiber Pipe and Tank, Type II, C1393-00a

Jacket Material – 0.13 Stainless Steel, new, cleaned

Ambient Temperature -45F

Wind Speed - 0mph

Max Surface Temp - 140F

System Application - Pipe Horizontal

System Units - ASTM C585

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 8: Measure Lives

Measure	Product Life (yrs)	Source of Information
Hot Water Boilers (Non-condensing)		
Hot Water Boiler - Non-condensing 175 MBTUH	20	Federal Energy Management Program
Hot Water Boiler - Non-condensing 500 MBTUH	20	Federal Energy Management Program
Hot Water Boiler - Non-condensing 1MMBTUH	20	Federal Energy Management Program
Hot Water Boiler - Non-condensing 2 MMBTUH	20	Federal Energy Management Program
Hot Water Boiler - Non-condensing 4 MMBTUH	20	Federal Energy Management Program
Hot Water Boiler - Non-condensing 6 MMBTUH	20	Federal Energy Management Program
Hot Water Boiler - Non-condensing 8, MMBTUH	20	Federal Energy Management Program
Hot Water Boilers (Condensing)		
Hot Water Boiler - Condensing 175 MBTUH	20	Federal Energy Management Program
Hot Water Boiler - Condensing 500 MBTUH	20	Federal Energy Management Program
Hot Water Boiler - Condensing 1 MMBTUH	20	Federal Energy Management Program
Hot Water Boiler - Condensing 2 MMBTUH	20	Federal Energy Management Program
Hot Water Boiler - Condensing 4 MMBTUH	20	Federal Energy Management Program
Hot Water Boiler - Condensing 6 MMBTUH	20	Federal Energy Management Program
Hot Water Boiler - Condensing 8 MMBTUH	20	Federal Energy Management Program
Commercial Furnaces	15	Federal Energy Management Program
Commercial Water Heaters		
Commercial Hot Water Heater - Condensing; 125 MBTUH	15	Federal Energy Management Program
Commercial Hot Water Heater - Condensing; 160 MBTUH	15	Federal Energy Management Program
Commercial Hot Water Heater - Condensing; 199 MBTUH	15	Federal Energy Management Program
Commercial Hot Water Heater - Condensing; 300 MBTUH	15	Federal Energy Management Program
Commercial Tankless Hot Water Heater - Non-condensing; 150 MBTUH	15	Federal Energy Management Program
Commercial Tankless Hot Water Heater - Non-condensing; 199 MBTUH	15	Federal Energy Management Program
Commercial Tankless Hot Water Heater - Non-condensing; 399 MBTUH	15	Federal Energy Management Program
Commercial Tankless Hot Water Heater - Non-condensing; 500 MBTUH	15	Federal Energy Management Program
Steam Traps		
Gas Boiler - Steam Traps - Low Pressure - average of 10 and 15 PSI	5	Internet
Gas Boiler - Steam Traps - High Pressure - average of 50 PSI and 65 PSI	5	Internet
Boiler Tune Ups	2	Federal Energy Management Program
Pipe Insulation		
Insulation - Hot Water System	7	Federal Energy Management Program
Insulation - Steam System	7	Federal Energy Management Program

Table 9: Annual Hot Water Use Data (Ref 11)

Building Type	Applicable Days/Year	Gallons / 1,000 ft² / day
Small Office	250	2.3
Large Office	250	2.3
Fast Food Restaurant	365	549.2
Sit-Down Restaurant	365	816.0
Retail	365	2.0
Grocery	365	2.2
Warehouse	250	1.0
Elementary School	200	5.7
Jr. High/High School/College	200	17.1
Health	365	342.0
Motel	365	100.0
Hotel	365	30.8
Other Commercial	250	0.7
Industrial	Site Specific	Site Specific

DEEMED SAVINGS TECHNICAL ASSUMPTIONS**References:**

1. The baseline efficiency for new boilers is based on 2009 IECC, ASHRAE 90.1, and Federal Rule10 CFR Part 431 [Docket No. EERE-2008-BT-STD-0013] RIN 1904-AB83 "Energy Conservation Program for Certain Industrial Equipment: Energy Conservation Standards and Test Procedures for Commercial Heating, Air-Conditioning, and Water-Heating Equipment"
2. The baseline efficiency for replacement hot water boilers is based on the baseline efficiency used in the DOE document "TECHNICAL SUPPORT DOCUMENT: ENERGY EFFICIENCY PROGRAM FOR COMMERCIAL AND INDUSTRIAL EQUIPMENT: EFFICIENCY STANDARDS FOR COMMERCIAL HEATING, AIRCONDITIONING, AND WATERHEATING EQUIPMENT" dated July 9, 2008
3. The baseline efficiency for baseline furnace (AFUE), as defined in the 2009 IECC. It is 78%.
4. Water heater efficiencies and standby losses are from the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) database.
5. Leakage data from Energy Management Handbook, by Wayne Turner
6. Net-to-Gross factor for Boiler Efficiency was calculated using 1/2 of the free-rider factor for Cooling Efficiency.
7. Net-to-Gross factor for Pipe Insulation is assumed to be 61% based on the average of the NTG for SCG and PG&E in the 2006-2008 Evaluation Report for the Southern California Industrial and Agricultural Contract Group
8. Net-to-Gross factor from Summit Blue 2006 Midwest Residential market Assessments DSM Potential Study
9. The average baseline and high efficiency costs are based on the California DEER database.
10. Measure life from the Federal Energy Management Program (FEMP).
11. Minnesota DER Deemed Values
12. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant.
13. 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

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Lighting Efficiency: Company Owned LED Street Lights**Algorithms:**

Electrical Demand Savings (Customer kW)	= (kW_Base - kW_EE)
Electrical Energy Savings (Customer kWh/yr)	= (kW_Base - kW_EE) x Hrs
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG

Variables:

Hrs	= Annual Operating Hours. Hours to be obtained from Table 1. The type of facility is to be supplied by Outdoor Lighting
kW_Base	= Baseline fixture wattage (kW per fixture) determined from stipulated fixture wattages from Standard Fixture information. Fixture type provided by Outdoor Lighting
kW_EE	= High Efficiency fixture wattage (kW per fixture) determined from stipulated fixture wattages from Standard Fixture information.
CF	= Coincidence Factor, the probability that peak demand of the lights will coincide with peak utility system demand. CF will be determined based on building type in table 1.
Measure Life	= Length of time the lighting equipment will be operational, see Table 2 for Measure Lifetimes
Baseline Cost	= 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 by (Reference 1) and vendors.
High Efficiency Cost	= Cost of the High Efficiency technology.
NTG	Net-to-gross = 90% for prescriptive measures
Incremental operation and maintenance cost	= Other annual savings or costs associated with the electrical savings. For exterior lighting, this is \$0.

Assumptions:

Each replacement lighting fixture is going in on a one-for-one basis for existing fixtures. New construction fixtures are put in on a one-for-one basis instead of lower efficiency options.

Each LED fixture is required to be listed on the DesignLights Consortium Qualified Products list, and therefore must meet their minimum specification. Customer must be on a company owned metered rate to qualify for program.

Info needed from Customer/Vendor Administrator for Calculations:

Number of fixtures being installed

Verified during M&V:

Yes

Lighting equipment type (baseline and efficient for Retrofit; efficient for New Construction)

Yes

Table 1: Coincident Peak Demand Factors and Annual Operating Hours by Building Type (Reference 2 and 3)

Space Type	CF	Hrs
Night Time Exterior	0%	4380

Table 2: Measure Lifetimes in Years (Reference 1,4)

Measure	Lifetime in Years
LED Fixtures	15

References

1. Deemed Savings Database, Minnesota Office of Energy Security, 2008. CF, Hours, kW, Costs, Measure life
2. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant. CF and hours
3. Technical Reference User Manual No. 2004-31, Efficiency Vermont, 12/31/04. CF and Hours
4. LED Fixture measure life based on Xcel Energy Minnesota Lighting Efficiency Program average replacement fixture lifetime

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Lighting Efficiency

Prescriptive rebates will be offered for replacement lighting equipment. New Construction rebates will be offered for new facilities or spaces overhauled for a new purpose.

Custom rebates are available for lighting-related improvements that are not prescriptive.

Algorithms:

Electrical Demand Savings (Customer kW)	= (kW_Base - kW_EE) x HVAC_cooling_kWssavings_factor
Electrical Energy Savings (Customer kWh/yr)	= (kW_Base - kW_EE) x Hrs x HVAC_cooling_kWhsavings_factor
Natural Gas Savings (Dth)	= (kW_Base - kW_EE) x Hrs x HVAC_heating_penalty_factor
Lighting Controls -Electrical Energy Savings (Customer kWh/yr)	= (kW connected) x (1-PAF) x Hrs x HVAC_cooling_kWhsavings_factor
Lighting Controls -Electrical Demand Savings (Customer kW)	= (kW connected) x (1-PAF) x HVAC_cooling_kWssavings_factor
Lighting Controls -Natural Gas Savings (Dth)	= (kW connected) x (1-PAF) x Hrs x HVAC_heating_penalty_factor
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

Variables:

Hrs	= Annual Operating Hours. Hours to be obtained from Table 2. The type of facility is to be supplied by the customer.
kW_Base	= Baseline fixture wattage (kW per fixture) determined from stipulated fixture wattages from Standard Fixture information. Fixture type provided by customer. Table 4-5
kW_EE	= High Efficiency fixture wattage (kW per fixture) determined from stipulated fixture wattages from Standard Fixture information. Fixture type provided by customer. Table 4-5
HVAC_cooling_kWssavings_factor	= Cooling system energy savings factor resulting from efficient lighting from Table 1. Reduction in lighting energy results in a reduction in cooling energy, if the customer has air conditioning. Existence of air conditioning to be provided by customer.
HVAC_cooling_kWssavings_factor	= Cooling system demand savings factor resulting from efficient lighting from Table 1. Reduction in lighting demand results in a reduction in cooling demand, if the customer has air conditioning. Existence of air conditioning to be provided by customer.
HVAC_heating_kWssavings_factor	= Heating system penalty factor resulting from efficient lighting. Reduction in lighting demand results in an increase in heating usage, if the customer has gas heating. A value of -0.000540 Dth/kWh given by (Reference 4).
CF	= Coincidence Factor, the probability that peak demand of the lights will coincide with peak utility system demand. CF will be determined based on customer provided building type in table 2.
Measure Life	= Length of time the lighting equipment will be operational, see Table 3 for Measure Lifetimes
Baseline Cost	= 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 by (Reference 4) and vendors.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

High Efficiency Cost	= Cost of the High Efficiency technology. Costs given in tables 4-6 (Reference 4, 8) and vendors.
kW connected	Total connected fixture load, determined as the sum of stipulated fixture wattages from Deemed Fixture Table 6.
PAF	Stipulated power adjustment factor based on control type from Table 6 7 .
TDLF	Transmission Distribution Loss Factor = 6.50% , the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2
NTG	Net-to-gross = 84% for prescriptive measures (Reference 5) and 96% for Custom Efficiency Lighting and Lighting Redesign based on the additional influence.
Incremental operation and maintenance cost	= Other annual savings or costs associated with the electrical savings. For Lighting, this consists of additional natural gas for heating. Methodology given by Reference 2.

Provided by Customer:

Number of Fixtures
 Lighting equipment type
 Building type
 Existence of air conditioning

Verified during M&V:

Yes
 Yes
 Yes
 Yes

Assumptions:

- Each replacement lighting fixture is going in on a one-for-one basis for existing fixtures. New construction fixtures are put in on a one-for-one basis instead of lower efficiency options.
- In the Technical Assumptions, one will note that the Operating Hours does not appear, but rather a modified version. The methodology defines kW Savings on the basis of difference in kW with the HVAC Cooling demand factor. The Annual Energy Savings takes into account any heating that has to be added.

Table 1: HVAC Interactive Factors (Reference 2)

HVAC system	HVAC_cooling_kWhsavings_factor	HVAC_cooling_kWsavings_factor	Heating Penalty	kW/Ton	COP
Heating only	1.00	1.00	-0.000540	-	-
Heating and cooling	1.13	1.33	-0.000540	-	-
Cooler Door Retrofit to LED Secondary Benefits Factor	1.40	1.40	0.000000	1.41	2.49
Freezer Door Retrofit to LED Secondary Benefits Factor	1.60	1.60	0.000000	2.09	1.68

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 2: Coincident Peak Demand Factors and Annual Operating Hours by Building Type (Reference 1 and 3)

Building Type	CF	Annual Operating Hours
24-Hour Facility	94%	8234
College	76%	2348
Cooler Door Retrofit to LED	87%	8760
Elemen./Second. School	31%	1632
Freezer Door Retrofit to LED	87%	8760
Grocery (All) / Big Box Retail (larger than 50,000 SF)	87%	4660
Health	73%	3213
Hospital	80%	5182
Hotel/Motel	9%	914
Manufacturing	57%	4739
Night Time Exterior	0%	4380
Office	61%	2567
Other/Misc.	63%	3521
Restaurant	65%	3613
Retail	73%	2829
Safety or Code Required (Including Exit Signs)	100%	8760
Traffic Signals	50%	4380
Warehouse	54%	2316

Table 3: Measure Lifetimes in Years (Reference 4,6,7)

Measure	Lifetime in Years
LED Interior Lamps	12
LED Interior Fixtures	20
LED Exterior Fixtures	20
Low Wattage T8 Lamps	8
Ballasted CFLs	20
Integrated 25W Ceramic Metal Halide	7
T8 Lighting Systems	20
T5 Lighting Systems	20
Lighting Controls	8
Stairwell Fixtures with Occupancy Sensors	14.4

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Tables 4-7: Lighting Efficiency Technical Assumption Updates

The Company has historically filed an exhaustive list with specific lighting retrofit pairings for eligible equipment in the Lighting Efficiency rebate program (for example: CMH-GEN-20-1-Fixt-EB-XX-XX-XX, which is a xxx type of bulb with an xxx type of wattage). Given that LED pairing options are rapidly entering the marketplace and evolving at a fast pace, the Company is transitioning to providing the technical assumptions—bulb qualification criteria, rebate factors, preconditions, and others—rather than listing out each pairing in the Plan. This solution will provide continued transparency while allowing the program to evolve as new LED specifications enter the market. However, the Company will continue to maintain a full list of the pairings, updated on a quarterly basis, on our website:

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

Lighting Pairing Technical Assumptions for Lamps, Fixtures and Controls:

Fluorescent:

A. Low-wattage T8 Fluorescent Lamps

Rebates are based on replacing 32W T8 lamps with 28W or 25W lamps.

B. Lighting Optimization

Rebates are based on the permanent removal of the equivalent of at least one 4-foot (T8) lamp from an 8-foot or 4-foot fixture as a result of a retrofit. Rebate amount is per fixture, based on the final quantity of lamps installed in each fixture. Reducing the quantity of fixtures does not qualify. In order to qualify, the fixture must be retrofitted such that the existing ballast(s) must be disconnected and removed, new lamp-quantity appropriate high-efficiency electronic ballast is installed, and the sockets for the eliminated lamps are removed. In addition, the customer may not remove more than 50% of the existing lamp quantity (e.g., replacing a 3-lamp system with a 1-lamp system is not allowed). High-efficiency electronic ballasts are required for all 4-foot T8 optimization rebates. A list of qualified ballasts can be found at <http://library.cee1.org/content/commercial-lighting-qualifying-products-lists>. Customer must sign the line below the optimization rebate on page 4 of the rebate application to verify that optimization has occurred. Although Xcel Energy recommends customer follow IES guidelines, the final light levels are the responsibility of the customer.

C. High-Efficiency Ballast

New fixtures that include high-efficiency electronic ballasts qualify for this rebate. Approved ballasts must be listed by CEE at <http://library.cee1.org/content/commercial-lighting-qualifying-products-lists> to qualify. The high-efficiency ballast cannot be in addition, or added to, the optimization rebates. The high-efficiency ballast is already incorporated into the optimization rebate.

D. High-Bay Fluorescent T8, T8VHO and T5HO Lamps with High-Efficiency Electronic Ballasts

Rebates are based on a one-for-one replacement of HID fixtures (including mercury vapor, high-pressure sodium, metal halide, or pulse-start metal halide) ranging in size from 175W to 1000W. Rebates are available for T8, T8VHO systems or T5HO systems. High-efficiency electronic ballasts are required for all fixtures using 4-foot, 4-lamp or less T8 ballasts. Other fixture configurations will be considered under the Custom Efficiency program.

E. Parking Garage Fluorescent T8 & T5HO with High-Efficiency Electronic Ballasts

Eligible parking garage structures need to be either underground or semi-enclosed above ground. The lighting within the garage must operate 24 hours a day. Rebates are based on a one-for-one replacement of HID fixtures (including mercury vapor, high-pressure sodium, metal halide, or pulse-start metal halide) ranging in size from 150W to 175W. Rebates are available for T8 or T5HO systems. High-efficiency electronic ballasts are required for all fixtures using 4-foot T8 ballasts, regardless of the number of lamps. Other fixture configurations will be considered under the Custom Efficiency program.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

F. Compact Fluorescent Fixtures

Rebates are based on one-for-one replacement of incandescent fixtures with new hard-wired (dedicated) or modular fixtures containing pin-based compact fluorescent lamps (CFLs). For fixtures that house more than one lamp, the rebate is based on the total fixture wattage (i.e., one fixture that houses two 18W CFLs would be rebated as one 36W CFL fixture). Screw-base (integral) CFLs do not qualify. Two-foot low-wattage CFL rebate is paid per lamp.

Ceramic Metal Halide Fixtures:

G. Ceramic Metal Halide Fixtures

Rebates are based on one-for-one replacement of incandescent, halogen, mercury vapor, high-pressure sodium, metal halide, or pulse start metal halide fixtures. Ceramic metal halide lamp wattage must be lower than the existing lamp wattage and must be a full fixture replacement.

LED:

H. LED and LEC Exit Signs

Rebates are based on one-for-one replacement of incandescent exit signs to LED or LEC exit signs. CFL and photoluminescent exit signs do not qualify for a rebate. LED Exit Signs do not need to follow the DLC requirement until a DLC category is created.

I. LED Lamps and Luminaires (ENERGY STAR-qualified)

Rebates are based on one-for-one replacement of incandescent or halogen lamps with ENERGY STAR-qualified LED lamps (screw-based or pin-based). Rebates are based on wattage per lamp, not total fixture wattage. LED lamps and commercial downlight luminaires are required for prescriptive rebates. This is a midstream incentive implemented by a third-party and the incentive is paid directly to participating distributors.

K. Commercial LED Downlight Luminaires (hardwired and screw in/retrofit) (ENERGY STAR-qualified)

Rebates are based on one-for-one full fixture replacement of incandescent fixtures with ENERGY STAR-qualified commercial LED hardwired and screw-in downlight luminaires. Rebates are based on HID lamp wattage and total fixture wattage (Fixture must be a commercial downlight; not all products listed qualify for rebates).

L. Exterior LED Canopy, Soffit and Wall Pack Fixtures (DLC QPL Required)

Rebates are based on one-for-one replacement of HID canopy, soffit or wall pack fixtures with LED fixtures rated for exterior use. Rebates are based on total fixture wattage. Wall packs can be installed in parking garages, however parking garage ceiling fixtures do not qualify for this rebate, but can be analyzed through Custom Efficiency. Wall packs must include wall pack terminology on spec sheet to qualify for rebate.

M. Refrigerated LED Case Lighting (DLC QPL Required)

Rebates are based on replacement of T12 or T8 linear 5 to 6 foot fluorescent refrigerated case door lighting with 5 to 6 foot LED refrigerated case door strip lighting. Rebates are per door, not per lamp. Linear LED tube lights do not qualify for this rebate, but can be analyzed through Custom Efficiency.

N. LED Troffer Fixture & Retrofit Kits (DLC QPL Required)

New fixtures and retrofit kits must be listed on the current DLC QPL to qualify for rebates. Rebates are based on a one-for-one fixture and retrofit kit replacement of existing linear fluorescent troffer systems to qualify for rebates. Eligible LED fixture types are 2X2, 2X1, 2X4, 1X4, and retrofit kits. LED T8 tubes do not qualify for the retrofit kit, but can be analyzed through Custom Efficiency.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

O. LED Parking Garage Fixture (DLC QPL Required)

Eligible parking garage structures need to be either underground or semi-enclosed above ground. The lighting within the garage must operate 24 hours a day. Rebates are based on a one-for-one replacement of HID (including mercury vapor, high-pressure sodium, metal halide, or pulse-start metal halide) ranging in size from 100W–250W. LED retrofit kits are not available for prescriptive rebates, but can be analyzed through Custom Efficiency.

P. Street and Area LED Lighting (DLC QPL Required)

Rebates are based on one-for-one replacement of HID fixture with LED fixtures rated for exterior use. Rebates are based on total fixture wattage.

Automatic Controls:

Q. Occupancy Sensors, Photocells and Stairwell Fixtures

Rebate is based on the type of sensor (wall vs. ceiling mount) as well as the connected load of each sensor. Stairwell fixtures may be 2–3 lamp T8 or 20W–30W LED and be controlled via an integrated occupancy sensor or step-dimming ballast. Fixture must operate in low-standby light level during vacancy and switch to full light output upon occupancy. The fixture cannot exceed 35% of full wattage during unoccupied periods. Low mode setting should be chosen so that the surface illumination levels are code compliant.

R. Standalone:

Occupancy sensors may be wall or ceiling mounted, and must be permanently installed; they can be passive infrared, ultrasonic or dual technology sensors. Photocells can only qualify for a rebate when controlling interior fixtures.

S. Integrated:

Automatic controls must be permanently integrated into the fixture to qualify for this rebate.

References

1. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant. CF and hours
2. 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".
3. Technical Reference User Manual No. 2004-31, Efficiency Vermont, 12/31/04. CF and Hours
4. Deemed Savings Database, Minnesota Office of Energy Security, 2008. CF, Hours, kW, Costs, Measure life
5. Net-to-Gross factor from 2008 Xcel Energy Lighting Efficiency Program Evaluation
6. LED Lamp measure life based on average 2009 custom project LED life of 45,000 hours / weighted hours of operation average
7. LED Fixture measure life based on Xcel Energy Minnesota Lighting Efficiency Program average replacement fixture lifetime
8. LED Fixture costs based on Xcel Energy Custom Lighting Efficiency project costs

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Lighting - Small Business

Prescriptive rebates will be offered for replacement lighting equipment. New Construction rebates will be offered for new facilities or spaces overhauled for a new purpose. Custom rebates are available for lighting-related improvements that are not prescriptive.

Algorithms:

Electrical Demand Savings (Customer kW)	= (kW_Base - kW_EE) x HVAC_cooling_kW_savings_factor
Electrical Energy Savings (Customer kWh/yr)	= (kW_Base - kW_EE) x Hrs x HVAC_cooling_kWh_savings_factor
Natural Gas Savings (Dth)	= (kW_Base - kW_EE) x Hrs x HVAC_heating_penalty_factor
Lighting Controls -Electrical Energy Savings (Customer kWh/yr)	=(kW_connected) x (1-PAF) x Hrs x HVAC_cooling_kWh_savings_factor
Lighting Controls -Electrical Demand Savings (Customer kW)	=(kW_connected) x (1-PAF) x HVAC_cooling_kW_savings_factor
Lighting Controls -Natural Gas Savings (Dth)	=(kW_connected) x (1-PAF) x Hrs x HVAC_heating_penalty_factor
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

Variables:

Hrs	= Annual Operating Hours. Hours to be obtained from Table 2. The type of facility is to be supplied by the customer.
kW_Base	= Baseline fixture wattage (kW per fixture) determined from stipulated fixture wattages from Standard Fixture information. Fixture type provided by customer. Table 4-5
kW_EE	= High Efficiency fixture wattage (kW per fixture) determined from stipulated fixture wattages from Standard Fixture information. Fixture type provided by customer. Table 4-5
HVAC_cooling_kW_savings_factor	= Cooling system energy savings factor resulting from efficient lighting from Table 1. Reduction in lighting energy results in a reduction in cooling energy, if the customer has air conditioning. Existence of air conditioning to be provided by customer.
HVAC_cooling_kWh_savings_factor	= Cooling system demand savings factor resulting from efficient lighting from Table 1. Reduction in lighting demand results in a reduction in cooling demand, if the customer has air conditioning. Existence of air conditioning to be provided by customer.
HVAC_heating_kW_savings_factor	= Heating system penalty factor resulting from efficient lighting. Reduction in lighting demand results in an increase in heating usage, if the customer has gas heating. A value of -0.00088738 Dth/kWh given by (Reference 4).
CF	= Coincidence Factor, the probability that peak demand of the lights will coincide with peak utility system demand. CF will be determined based on customer provided building type in table 2.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Measure Life	= Length of time the lighting equipment will be operational, see Table 3 for Measure Lifetimes
Baseline Cost	= 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 by (Reference 4) and vendors.
High Efficiency Cost	= Cost of the High Efficiency technology. Costs given in tables 4-6 (Reference 4, 8) and vendors.
kW connected	Total connected fixture load, determined as the sum of stipulated fixture wattages from Deemed Fixture Table 6.
PAF	Stipulated power adjustment factor based on control type from Table 6 7 .
TDLF	Transmission Distribution Loss Factor = 6.50% , the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2
NTG	Net-to-gross = 84% for prescriptive measures (Reference 5) and 96% for Custom Efficiency Lighting and Lighting Redesign based on the additional influence.
Incremental operation and maintenance cost	= Other annual savings or costs associated with the electrical savings. For Lighting, this consists of additional natural gas for heating. Methodology given by Reference 2.

Provided by Customer:

Number of Fixtures
 Lighting equipment type
 Building type
 Existence of air conditioning

Verified during M&V:

Yes
 Yes
 Yes
 Yes

Assumptions:

- Each replacement lighting fixture is going in on a one-for-one basis for existing fixtures. New construction fixtures are put in on a one-for-one basis instead of lower efficiency options.
- In the Technical Assumptions, one will note that the Operating Hours does not appear, but rather a modified version. The methodology defines kW Savings on the basis of difference in kW with the HVAC Cooling demand factor. The Annual Energy Savings takes into account any heating that has to be added.

Table 1: HVAC Interactive Factors (Reference 2)

HVAC system	HVAC_cooling_kWhsavings_factor	HVAC_cooling_kW_savings_factor	Heating Penalty	kW/Ton	COP
Heating only	1.00	1.00	-0.000540	-	-
Heating and cooling	1.13	1.33	-0.000540	-	-
Cooler Door Retrofit to LED Secondary Benefits Factor	1.40	1.40	0.000000	1.41	2.49
Freezer Door Retrofit to LED Secondary Benefits Factor	1.60	1.60	0.000000	2.09	1.68

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 2: Coincident Peak Demand Factors and Annual Operating Hours by Building Type (Reference 1 and 3)

Building Type	CF	Annual Operating Hours
24-Hour Facility	94%	8234
College	76%	2348
Cooler Door Retrofit to LED	87%	8760
Elemen./Second. School	31%	1632
Freezer Door Retrofit to LED	87%	8760
Grocery (All) / Big Box Retail (larger than 50,000 SF)	87%	4660
Health	73%	3213
Hospital	80%	5182
Hotel/Motel	9%	914
Manufacturing	57%	4739
Night Time Exterior (LED Canopy/Soffit Lights Only)	0%	4380
Office	61%	2567
Other/Misc.	63%	3521
Restaurant	65%	3613
Retail	73%	2829
Safety or Code Required (Including Exit Signs)	100%	8760
Traffic Signals	50%	4380
Warehouse	54%	2316

Table 3: Measure Lifetimes in Years (Reference 4,6,7)

Measure	Lifetime in Years
LED Interior Lamps	12
LED Interior Fixtures	20
LED Exterior Fixtures	20
Low Wattage T8 Lamps	8
Ballasted CFLs	18
Integrated 25W Ceramic Metal Halide	7
T8 Lighting Systems	18
T5 Lighting Systems	18
Lighting Controls	18
Stairwell Fixtures with Occupancy Sensors	14.4

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Tables 4-7: Lighting Efficiency Technical Assumption Updates

The Company has historically filed an exhaustive list with specific lighting retrofit pairings for eligible equipment in the Lighting Efficiency rebate program (for example: CMH-GEN-20-1-Fixt-EB-XX-XX-XX, which is a xxx type of bulb with an xxx type of wattage). Given that LED pairing options are rapidly entering the marketplace and evolving at a fast pace, the Company is transitioning to providing the technical assumptions—bulb qualification criteria, rebate factors, preconditions, and others—rather than listing out each pairing in the Plan. This solution will provide continued transparency while allowing the program to evolve as new LED specifications enter the market. However, the Company will continue to maintain a full list of the pairings, updated on a quarterly basis, on our website: http://www.xcelenergy.com/Save_Money_&_Energy/Rebates/Lighting_Efficiency_-_CO

Lighting Pairing Technical Assumptions for Lamps, Fixtures and Controls:

Fluorescent:

A. Low-wattage T8 Fluorescent Lamps

Rebates are based on replacing 32W T8 lamps with 28W or 25W lamps.

B. Lighting Optimization

Rebates are based on the permanent removal of the equivalent of at least one 4-foot (T8) lamp from an 8-foot or 4-foot fixture as a result of a retrofit. Rebate amount is per fixture, based on the final quantity of lamps installed in each fixture. Reducing the quantity of fixtures does not qualify. In order to qualify, the fixture must be retrofitted such that the existing ballast(s) must be disconnected and removed, new lamp-quantity appropriate high-efficiency electronic ballast is installed, and the sockets for the eliminated lamps are removed. In addition, the customer may not remove more than 50% of the existing lamp quantity (e.g., replacing a 3-lamp system with a 1-lamp system is not allowed). High-efficiency electronic ballasts are required for all 4-foot T8 optimization rebates. A list of qualified ballasts can be found at <http://library.cee1.org/content/commercial-lighting-qualifying-products-lists>. Customer must sign the line below the optimization rebate on page 4 of the rebate application to verify that optimization has occurred. Although Xcel Energy recommends customer follow IES guidelines, the final light levels are the responsibility of the customer.

C. High-Efficiency Ballast

New fixtures that include high-efficiency electronic ballasts qualify for this rebate. Approved ballasts must be listed by CEE at <http://library.cee1.org/content/commercial-lighting-qualifying-products-lists> to qualify. The high-efficiency ballast cannot be in addition, or added to, the optimization rebates. The high-efficiency ballast is already incorporated into the optimization rebate.

D. High-Bay Fluorescent T8, T8VHO and T5HO Lamps with High-Efficiency Electronic Ballasts

Rebates are based on a one-for-one replacement of HID fixtures (including mercury vapor, high-pressure sodium, metal halide, or pulse-start metal halide) ranging in size from 175W to 1000W. Rebates are available for T8, T8VHO systems or T5HO systems. High-efficiency electronic ballasts are required for all fixtures using 4-foot, 4-lamp or less T8 ballasts. Other fixture configurations will be considered under the Custom Efficiency program.

E. Parking Garage Fluorescent T8 & T5HO with High-Efficiency Electronic Ballasts

Eligible parking garage structures need to be either underground or semi-enclosed above ground. The lighting within the garage must operate 24 hours a day. Rebates are based on a one-for-one replacement of HID fixtures (including mercury vapor, high-pressure sodium, metal halide, or pulse-start metal halide) ranging in size from 150W to 175W. Rebates are available for T8 or T5HO systems. High-efficiency electronic ballasts are required for all fixtures using 4-foot T8 ballasts, regardless of the number of lamps. Other fixture configurations will be considered under the Custom Efficiency program.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

F. Compact Fluorescent Fixtures

Rebates are based on one-for-one replacement of incandescent fixtures with new hard-wired (dedicated) or modular fixtures containing pin-based compact fluorescent lamps (CFLs). For fixtures that house more than one lamp, the rebate is based on the total fixture wattage (i.e., one fixture that houses two 18W CFLs would be rebated as one 36W CFL fixture). Screw-base (integral) CFLs do not qualify. Two-foot low-wattage CFL rebate is paid per lamp.

Ceramic Metal Halide Fixtures:

G. Ceramic Metal Halide Fixtures

Rebates are based on one-for-one replacement of incandescent, halogen, mercury vapor, high-pressure sodium, metal halide, or pulse start metal halide fixtures. Ceramic metal halide lamp wattage must be lower than the existing lamp wattage and must be a full fixture replacement.

LED:

H. LED and LEC Exit Signs

Rebates are based on one-for-one replacement of incandescent exit signs to LED or LEC exit signs. CFL and photoluminescent exit signs do not qualify for a rebate. LED Exit Signs do not need to follow the DLC requirement until a DLC category is created.

I. LED Lamps and Luminaires (ENERGY STAR-qualified)

Rebates are based on one-for-one replacement of incandescent or halogen lamps with ENERGY STAR-qualified LED lamps (screw-based or pin-based). Rebates are based on wattage per lamp, not total fixture wattage. LED lamps and commercial downlight luminaires are required for prescriptive rebates. This is a midstream incentive implemented by a third-party and the incentive is paid directly to participating distributors.

K. Commercial LED Downlight Luminaires (hardwired and screw in/retrofit) (ENERGY STAR-qualified)

Rebates are based on one-for-one full fixture replacement of incandescent fixtures with ENERGY STAR-qualified commercial LED hardwired and screw-in downlight luminaires. Rebates are based on HID lamp wattage and total fixture wattage (Fixture must be a commercial downlight; not all products listed qualify for rebates).

L. Exterior LED Canopy, Soffit and Wall Pack Fixtures (DLC QPL Required)

Rebates are based on one-for-one replacement of HID canopy, soffit or wall pack fixtures with LED fixtures rated for exterior use. Rebates are based on total fixture wattage. Wall packs can be installed in parking garages, however parking garage ceiling fixtures do not qualify for this rebate, but can be analyzed through Custom Efficiency. Wall packs must include wall pack terminology on spec sheet to qualify for rebate.

M. Refrigerated LED Case Lighting (DLC QPL Required)

Rebates are based on replacement of T12 or T8 linear 5 to 6 foot fluorescent refrigerated case door lighting with 5 to 6 foot LED refrigerated case door strip lighting. Rebates are per door, not per lamp. Linear LED tube lights do not qualify for this rebate, but can be analyzed through Custom Efficiency.

N. LED Troffer Fixture & Retrofit Kits (DLC QPL Required)

New fixtures and retrofit kits must be listed on the current DLC QPL to qualify for rebates. Rebates are based on a one-for-one fixture and retrofit kit replacement of existing linear fluorescent troffer systems to qualify for rebates. Eligible LED fixture types are 2X2, 2X1, 2X4, 1X4, and retrofit kits. LED T8 tubes do not qualify for the retrofit kit, but can be analyzed through Custom Efficiency.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

O. LED Parking Garage Fixture (DLC QPL Required)

Eligible parking garage structures need to be either underground or semi-enclosed above ground. The lighting within the garage must operate 24 hours a day. Rebates are based on a one-for-one replacement of HID (including mercury vapor, high-pressure sodium, metal halide, or pulse-start metal halide) ranging in size from 100W–250W. LED retrofit kits are not available for prescriptive rebates, but can be analyzed through Custom Efficiency.

P. Street and Area LED Lighting (DLC QPL Required)

Rebates are based on one-for-one replacement of HID fixture with LED fixtures rated for exterior use. Rebates are based on total fixture wattage.

Automatic Controls:

Q. Occupancy Sensors, Photocells and Stairwell Fixtures

Rebate is based on the type of sensor (wall vs. ceiling mount) as well as the connected load of each sensor. Stairwell fixtures may be 2–3 lamp T8 or 20W–30W LED and be controlled via an integrated occupancy sensor or step-dimming ballast. Fixture must operate in low-standby light level during vacancy and switch to full light output upon occupancy. The fixture cannot exceed 35% of full wattage during unoccupied periods. Low mode setting should be chosen so that the surface illumination levels are code compliant.

R. Standalone:

Occupancy sensors may be wall or ceiling mounted, and must be permanently installed; they can be passive infrared, ultrasonic or dual technology sensors. Photocells can only qualify for a rebate when controlling interior fixtures.

S. Integrated:

Automatic controls must be permanently integrated into the fixture to qualify for this rebate.

References

1. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant. CF and hours
2. 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".
3. Technical Reference User Manual No. 2004-31, Efficiency Vermont, 12/31/04. CF and Hours
4. Deemed Savings Database, Minnesota Office of Energy Security, 2008. CF, Hours, kW, Costs, Measure life
5. Net-to-Gross factor from 2008 Xcel Energy Lighting Efficiency Program Evaluation
6. LED Lamp measure life based on average 2009 custom project LED life of 45,000 hours / weighted hours of operation average
7. LED Fixture measure life based on Xcel Energy Minnesota Lighting Efficiency Program average replacement fixture lifetime
8. LED Fixture costs based on Xcel Energy Custom Lighting Efficiency project costs

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Motors Efficiency - CO

Description:

Prescriptive rebates will be offered for new motors up to 500 hp, replacement of currently operating motors up to 500 hp, installation of new variable frequency drives (VFD) up to 200 hp, and Constant Speed Motor Controllers (CSMC) up to 500HP.

Equations:

Gross Annual kWh Saved at Customer/Unit_Motor	= HP x LF_Motors x Conversion x (1/Standard_Eff - 1/ High_Eff) x Hrs x Refrigeration_Factor
Gross kW Saved at Customer/Unit_Motor	= HP x LF_Motors x Conversion x (1/Standard_Eff - 1/ High_Eff) x Refrigeration_Factor
Gross Annual kWh Saved at Customer/Unit_VFD	= HP x LF_Drives x Conversion x (1/Standard_Eff) x Hrs x %_Savings_Drives x Refrigeration_Factor
Gross kW Saved at Customer/Unit_VFD	= HP x LF_Drives x Conversion x (1/Standard_Eff) x %_Savings_Drives x Refrigeration_Factor
Gross Annual kWh Saved at Customer/Unit_CSMC	= HP x kW_per_HP x Hrs
Gross kW Saved at Customer/Unit_CSMC	= HP x kW_per_HP

Variable ID	Value	Description
Hrs	See Tables 1, 2, & 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	75%	Motor load factor as percentage (Reference 3).
LF_PumpDrives	75%	Pump drive load factor as percentage (Reference 5).
LF_FanDrives	65%	Fan drive load factor as percentage (Reference 5).
HP	Customer Input	Rated motor horsepower.
High_Eff	See Table 5	Efficiency of high efficiency replacement motor as percentage. Plan A high efficiency is NEMA Premium plus 1%. Plan B high efficiency is NEMA Premium. Plan B Enhanced high efficiency is NEMA Premium plus 1%. 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.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Standard_Eff	See Table 5	Efficiency of standard replacement motor as percentage. Plan A is NEMA Premium. Plan B is EPACT. Plan B Enhanced is EPACT. Based on customer provided motor size, speed, and type.
%_Savings_Drives	33%	Average savings achieved by installing a variable frequency drive on a fan or pumping motor (Reference 5).
kW_per_HP_Escalator	0.129	Demand savings per horsepower for constant speed motor controllers on escalators (Reference 9).
kW_per_HP_Other	0.0137	Demand savings per horsepower for constant speed motor controllers for all other qualifying applications (Reference 10).
Refrigeration_Factor	1+1/COP	Multiplier to include interactive effects of refrigeration/cooling energy to remove heat from the motor. Reduction in motor energy results in a reduction in refrigeration/cooling energy.
COP	See Table 4	Coefficient of Performance = refrigeration/cooling capacity(btu/hr)/energy input(btu/hr)
Conversion	0.746	Standard conversion from horsepower to kW.
Coincidence Factor	0.78	Probability that peak demand of the motor will coincide with peak utility system demand (Reference 2).
Measure Life_New	20	Length of time the motor will be operational (Reference 3,11).
Measure Life_Upgrade	20	Length of time the motor will be operational (Reference 3,11).
Measure Life_CSMC	15	Length of time the motor will be operational (Reference 3,11).
Measure Life_CSMC	15	Length of time the drive will be operational (Reference 3,11).
Measure Life_CSMC	\$0.00	Incremental operation and maintenance costs or savings.
Incremental cost_Motors	See Table 6	
Incremental cost_VFD	See Table 7	
Incremental cost_CSMC	See Table 3	
NTG_Other	65%	Net-to-Gross factor for motor replacement, VFD, and custom products. (Reference 7)
NTG_CSMC	95%	Net-to-Gross factor for Constnt Speed Motor Controllers. (Reference 7)

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

<u>Inputs:</u>	<u>Verified during M&V:</u>
For Motors:	
New motor model and serial number (HP, efficiency, type, and speed can then be looked up in a database)	Yes
Application of motor (Industrial/non Industrial)	Yes
Building type where motor is installed for non industrial motors	Yes
Use of motor (pump, fan, other) for non industrial motors	Yes
Equipment is installed	Yes
For Variable Frequency Drives (VFD):	
Size, speed, type and use of motor drive is connected to	Yes
Application of motor (Industrial/non Industrial)	Yes
Building type where motor is installed for non industrial motors	Yes
Use of motor (pump, fan, other) for non industrial motors	Yes
Equipment is installed	Yes
For Constant Speed Motor Controllers:	
Size of motor	Yes
Application of motor (Escalator/Other that qualify)	Yes

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 variable frequency drives installed on centrifugal pump or fan applications.
- Rebates do not apply to rewound or repaired motors.
- Constant speed motor controllers are only eligible if installed on escalators, or industrial/commercial applications that cannot be shut off or slowed down during normal business operation, and operate at a load factor of less than 20% more than 65% of the time.
- COP for Low Temperature Applications and Medium Temperature Applications are from our anti-sweat heater projects, EC Motor custom projects, and are consistent with custom projects from various custom refrigeration applications.
- COP for Data Center Applications based on custom projects from various custom data center applications.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Tables:**Table 1: Operating Hours by Motor Size, Industrial Applications (5)**

HP	Fans	Pumps	Air Compressor	Other
1	4,550	3,380	1,257	2,435
1.5	4,550	3,380	1,257	2,435
2	4,550	3,380	1,257	2,435
3	4,550	3,380	1,257	2,435
5	4,550	3,380	1,257	2,435
7.5	4,316	4,121	2,131	2,939
10	4,316	4,121	2,131	2,939
15	4,316	4,121	2,131	2,939
20	4,316	4,121	2,131	2,939
25	5,101	4,889	3,528	3,488
30	5,101	4,889	3,528	3,488
40	5,101	4,889	3,528	3,488
50	5,101	4,889	3,528	3,488
60	6,151	5,667	4,520	5,079
75	6,151	5,667	4,520	5,079
100	6,151	5,667	4,520	5,079
125	5,964	5,126	4,685	5,137
150	5,964	5,126	4,685	5,137
200	5,964	5,126	4,685	5,137
250	7,044	5,968	6,148	6,102
300	7,044	5,968	6,148	6,102
350	7,044	5,968	6,148	6,102
400	7,044	5,968	6,148	6,102
450	7,044	5,968	6,148	6,102
500	7,044	5,968	6,148	6,102

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 2: Operating Hours by Application for all products other than motor controllers, Non-industrial (3)

Building Type	Operating Hours
Office HVAC Pump	2,000
Retail HVAC Pump	2,000
Hospitals HVAC Pump	2,754
Elem/Sec Schools HVAC Pump	2,190
Restaurant HVAC Pump	2,000
Warehouse HVAC Pump	2,241
Hotels/Motels HVAC Pump	4,231
Grocery HVAC Pump	2,080
Health HVAC Pump	2,559
College/Univ HVAC Pump	3,641
Office Ventilation Fan	6,192
Retail Ventilation Fan	3,261
Hospitals Ventilation Fan	8,374
Elem/Sec Schools Ventilation Fan	3,699
Restaurant Ventilation Fan	4,155
Warehouse Ventilation Fan	6,389
Hotels/Motels Ventilation Fan	3,719
Grocery Ventilation Fan	6,389
Health Ventilation Fan	2,000
College/Univ Ventilation Fan	3,631
Office Other Application	4,500
Retail Other Application	4,500
Hospitals Other Application	4,500
Elem/Sec Schools Other Application	4,500
Restaurant Other Application	4,500
Warehouse Other Application	4,500
Hotels/Motels Other Application	4,500
Grocery Other Application	4,500
Health Other Application	4,500
College/Univ Other Application	4,500
Data Center Fan	8,760
Low Temperature Case Fan	8,629
Medium Temperature Case Fan	8,629

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 3: Operating Hours & Incremental Cost for Motor Controllers by Application, Non-industrial (Reference 4,10)

Building Type and motor application	Escalator	Industrial	Incremental Cost
5	4,500	2,435	\$918
7.5	4,500	2,939	\$918
10	4,500	2,939	\$918
15	4,500	2,939	\$918
20	4,500	2,939	\$933
25	4,500	3,488	\$1,012
30	4,500	3,488	\$1,091
40	4,500	3,488	\$1,300
50	4,500	3,488	\$1,497
60	4,500	5,079	\$1,796
75	4,500	5,079	\$1,943
100	4,500	5,079	\$2,389
125	4,500	5,137	\$3,087
150	4,500	5,137	\$3,784
200	4,500	5,137	\$4,555
250	4,500	6,102	\$4,655
300	4,500	6,102	\$4,755
350	4,500	6,102	\$4,855
400	4,500	6,102	\$4,955
450	4,500	6,102	\$5,055
500	4,500	6,102	\$5,155

Table 4: Coefficient of Performance

Application	COP
Low Temperature	1.43
Medium Temperature	2.28
Data Center	4.00

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

References:

1. CEE (Consortium for Energy Efficiency) Premium Efficiency Motors Initiative - Source for premium motor efficiencies, EPAct Standard Motor Efficiencies and baseline/incremental costs
2. NYSERDA (New York State Energy Research and Development Authority), Energy \$mart Programs Deemed Savings Database - Source for Coincidence Factor
3. 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 (75%) and baseline/incremental costs
4. United States Industrial Electric Motor Systems Market Opportunities Assessment, EERE, US DOE, Dec 2002 - Source for operating hours for industrial motors and source for load factor (Table 1-18 and 1-19)
5. 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.
6. NWPCC (Northwest Power Conservation Council) RTF's (Regional Technical Forum) Archived Measures - Source for full motor cost
7. Net-to-gross factor from Program Evaluation in 2010 by third party and other sources for new products.
8. Average cost for VFD's and Motor Cost information from April 2011 effort local vendors
9. Engineering analysis performed by Xcel energy on installation of 164 controllers, Colorado custom project 404, 2009.
10. Methodology for demand savings from Esource TAS-F-1, March 2007 - Identifying Cost-Effective Applications for Motor Voltage Controllers
11. Comprehensive Process and Impact Evaluation of the (Xcel Energy) Colorado Motor and Drive Efficiency Program, FINAL, March 28, 2011, TetraTech
12. Rewind Costs from http://www.greenmotors.org/downloads/RTFSubmittalMay_08%20_2_.pdf website

Changes from recent Filing:

Updated kW/HP for escalator CSMC

Updated kW/HP for other CSMC

Updated Hours for Powerwalk CSMC

Added hours for data center fans, low temperature case fans, and medium temperature case fans.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Stipulated Values

Load Factor	0.75
Conversion	= .746 (1 HP = .746 kW)
Coincidence Factor	0.78

Table 5: Motor Efficiency and Incremental Costs (Reference 1, 2, 3, 9)

Motor Tag	HP	Speed	Type	Pre-EPACT Motor Efficiency	EPACT Motor Efficiency	NEMA Premium Motor Efficiency	NEMA Premium plus 1% Motor Efficiency	EPACT Motor Cost	NEMA Premium Motor Cost	NEMA Premium plus 1% Motor Cost	NEMA Premium Installed Cost	NEMA Premium plus 1% Installed Cost
1 HP 1800 RPM "blend"	1	1800	"blend"								\$730	\$1,003
1.5 HP 1800 RPM "blend"	1.5	1800	"blend"								\$725	\$996
2 HP 1800 RPM "blend"	2	1800	"blend"								\$800	\$1,121
3 HP 1800 RPM "blend"	3	1800	"blend"								\$840	\$1,188
5 HP 1800 RPM "blend"	5	1800	"blend"								\$860	\$1,222
7.5 HP 1800 RPM "blend"	7.5	1800	"blend"								\$1,165	\$1,730
10 HP 1800 RPM "blend"	10	1800	"blend"								\$1,298	\$1,952
15 HP 1800 RPM "blend"	15	1800	"blend"								\$2,242	\$3,098
20 HP 1800 RPM "blend"	20	1800	"blend"								\$2,522	\$3,567
25 HP 1800 RPM "blend"	25	1800	"blend"								\$2,873	\$4,152
30 HP 1800 RPM "blend"	30	1800	"blend"								\$3,095	\$4,521
40 HP 1800 RPM "blend"	40	1800	"blend"								\$3,716	\$5,558
50 HP 1800 RPM "blend"	50	1800	"blend"								\$4,073	\$6,153
60 HP 1800 RPM "blend"	60	1800	"blend"								\$5,128	\$7,913
75 HP 1800 RPM "blend"	75	1800	"blend"								\$5,888	\$9,181
100 HP 1800 RPM "blend"	100	1800	"blend"								\$7,392	\$11,262
125 HP 1800 RPM "blend"	125	1800	"blend"								\$9,076	\$14,072
150 HP 1800 RPM "blend"	150	1800	"blend"								\$9,401	\$14,615
200 HP 1800 RPM "blend"	200	1800	"blend"								\$11,250	\$17,699
250 HP 1800 RPM "blend"	250	1800	"blend"								\$13,958	\$22,216
300 HP 1800 RPM "blend"	300	1800	"blend"								\$17,744	\$28,532
350 HP 1800 RPM "blend"	350	1800	"blend"								\$25,653	\$41,726
400 HP 1800 RPM "blend"	400	1800	"blend"								\$28,962	\$47,246
450 HP 1800 RPM "blend"	450	1800	"blend"								\$49,947	\$82,254
500 HP 1800 RPM "blend"	500	1800	"blend"								\$52,358	\$86,275
1 HP 1200 RPM ODP	1	1200	ODP	76.30%	80.0%	82.5%	83.5%				\$730	\$1,003
1.5 HP 1200 RPM ODP	1.5	1200	ODP	77.40%	84.0%	86.5%	87.5%				\$725	\$996
2 HP 1200 RPM ODP	2	1200	ODP	78.50%	85.5%	87.5%	88.5%				\$800	\$1,121
3 HP 1200 RPM ODP	3	1200	ODP	80.60%	86.5%	88.5%	89.5%				\$840	\$1,188
5 HP 1200 RPM ODP	5	1200	ODP	83.20%	87.5%	89.5%	90.5%				\$860	\$1,222
7.5 HP 1200 RPM ODP	7.5	1200	ODP	85.30%	88.5%	90.2%	91.2%				\$1,165	\$1,730
10 HP 1200 RPM ODP	10	1200	ODP	86.30%	90.2%	91.7%	92.7%				\$1,298	\$1,952
15 HP 1200 RPM ODP	15	1200	ODP	87.20%	90.2%	91.7%	92.7%				\$2,242	\$3,098
20 HP 1200 RPM ODP	20	1200	ODP	88.10%	91.0%	92.4%	93.4%				\$2,522	\$3,567
25 HP 1200 RPM ODP	25	1200	ODP	88.90%	91.7%	93.0%	94.0%				\$2,873	\$4,152
30 HP 1200 RPM ODP	30	1200	ODP	89.40%	92.4%	93.6%	94.6%				\$3,095	\$4,521
40 HP 1200 RPM ODP	40	1200	ODP	89.70%	93.0%	94.1%	95.1%				\$3,716	\$5,558
50 HP 1200 RPM ODP	50	1200	ODP	89.90%	93.0%	94.1%	95.1%				\$4,073	\$6,153
60 HP 1200 RPM ODP	60	1200	ODP	90.40%	93.6%	94.5%	95.5%				\$5,128	\$7,913
75 HP 1200 RPM ODP	75	1200	ODP	90.90%	93.6%	94.5%	95.5%				\$5,888	\$9,181
100 HP 1200 RPM ODP	100	1200	ODP	90.90%	94.1%	95.0%	96.0%				\$7,392	\$11,262
125 HP 1200 RPM ODP	125	1200	ODP	91.30%	94.1%	95.0%	96.0%				\$9,076	\$14,072
150 HP 1200 RPM ODP	150	1200	ODP	91.70%	94.5%	95.4%	96.4%				\$9,401	\$14,615
200 HP 1200 RPM ODP	200	1200	ODP	92.50%	94.5%	95.4%	96.4%				\$11,250	\$17,699
250 HP 1200 RPM ODP	250	1200	ODP	94.11%	95.4%	95.5%	96.5%				\$13,958	\$22,216
300 HP 1200 RPM ODP	300	1200	ODP	94.36%	95.4%	95.5%	96.5%				\$17,744	\$28,532
350 HP 1200 RPM ODP	350	1200	ODP	94.53%	95.4%	95.5%	96.5%				\$25,653	\$41,726
400 HP 1200 RPM ODP	400	1200	ODP	95.40%	95.8%	95.9%	96.9%				\$28,962	\$47,246
450 HP 1200 RPM ODP	450	1200	ODP	95.40%	96.2%	96.3%	97.3%				\$49,947	\$82,254
500 HP 1200 RPM ODP	500	1200	ODP	95.40%	96.2%	96.3%	97.3%				\$52,358	\$86,275

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 5: Motor Efficiency and Incremental Costs (Reference 1, 2, 3, 9)

Motor Tag	HP	Speed	Type	Pre-EPACT Motor Efficiency	EPACT Motor Efficiency	NEMA Premium Motor Efficiency	NEMA Premium plus 1% Motor Efficiency	EPACT Motor Cost	NEMA Premium Motor Cost	NEMA Premium plus 1% Motor Cost	NEMA Premium Installed Cost	NEMA Premium plus 1% Installed Cost
1 HP 1800 RPM ODP	1	1800	ODP	76.30%	82.5%	85.5%	86.5%				\$730	\$1,003
1.5 HP 1800 RPM ODP	1.5	1800	ODP	77.40%	84.0%	86.5%	87.5%				\$725	\$996
2 HP 1800 RPM ODP	2	1800	ODP	78.50%	84.0%	86.5%	87.5%				\$800	\$1,121
3 HP 1800 RPM ODP	3	1800	ODP	80.60%	86.5%	89.5%	90.5%				\$840	\$1,188
5 HP 1800 RPM ODP	5	1800	ODP	83.20%	87.5%	89.5%	90.5%				\$860	\$1,222
7.5 HP 1800 RPM ODP	7.5	1800	ODP	85.30%	88.5%	91.0%	92.0%				\$1,165	\$1,730
10 HP 1800 RPM ODP	10	1800	ODP	86.30%	89.5%	91.7%	92.7%				\$1,298	\$1,952
15 HP 1800 RPM ODP	15	1800	ODP	87.20%	91.0%	93.0%	94.0%				\$2,242	\$3,098
20 HP 1800 RPM ODP	20	1800	ODP	88.10%	91.0%	93.0%	94.0%				\$2,522	\$3,567
25 HP 1800 RPM ODP	25	1800	ODP	88.90%	91.7%	93.6%	94.6%				\$2,873	\$4,152
30 HP 1800 RPM ODP	30	1800	ODP	89.40%	92.4%	94.1%	95.1%				\$3,095	\$4,521
40 HP 1800 RPM ODP	40	1800	ODP	89.70%	93.0%	94.1%	95.1%				\$3,716	\$5,558
50 HP 1800 RPM ODP	50	1800	ODP	89.90%	93.0%	94.5%	95.5%				\$4,073	\$6,153
60 HP 1800 RPM ODP	60	1800	ODP	90.40%	93.6%	95.0%	96.0%				\$5,128	\$7,913
75 HP 1800 RPM ODP	75	1800	ODP	90.90%	94.1%	95.0%	96.0%				\$5,888	\$9,181
100 HP 1800 RPM ODP	100	1800	ODP	90.90%	94.1%	95.4%	96.4%				\$7,392	\$11,262
125 HP 1800 RPM ODP	125	1800	ODP	91.30%	94.5%	95.4%	96.4%				\$9,076	\$14,072
150 HP 1800 RPM ODP	150	1800	ODP	91.70%	95.0%	95.8%	96.8%				\$9,401	\$14,615
200 HP 1800 RPM ODP	200	1800	ODP	92.50%	95.0%	95.8%	96.8%				\$11,250	\$17,699
250 HP 1800 RPM ODP	250	1800	ODP	94.44%	95.4%	95.8%	96.8%				\$13,958	\$22,216
300 HP 1800 RPM ODP	300	1800	ODP	94.62%	95.4%	95.8%	96.8%				\$17,744	\$28,532
350 HP 1800 RPM ODP	350	1800	ODP	94.06%	95.4%	95.8%	96.8%				\$25,653	\$41,726
400 HP 1800 RPM ODP	400	1800	ODP	94.73%	95.4%	95.8%	96.8%				\$28,962	\$47,246
450 HP 1800 RPM ODP	450	1800	ODP	94.96%	95.8%	96.2%	97.2%				\$49,947	\$82,254
500 HP 1800 RPM ODP	500	1800	ODP	94.97%	95.8%	96.2%	97.2%				\$52,358	\$86,275
1 HP 3600 RPM ODP	1	3600	ODP	76.30%	76.3%	77.0%	78.0%				\$730	\$1,003
1.5 HP 3600 RPM ODP	1.5	3600	ODP	77.40%	82.5%	84.0%	85.0%				\$725	\$996
2 HP 3600 RPM ODP	2	3600	ODP	78.50%	84.0%	85.5%	86.5%				\$800	\$1,121
3 HP 3600 RPM ODP	3	3600	ODP	80.60%	84.0%	85.5%	86.5%				\$840	\$1,188
5 HP 3600 RPM ODP	5	3600	ODP	83.20%	85.5%	86.5%	87.5%				\$860	\$1,222
7.5 HP 3600 RPM ODP	7.5	3600	ODP	85.30%	87.5%	88.5%	89.5%				\$1,165	\$1,730
10 HP 3600 RPM ODP	10	3600	ODP	86.30%	88.5%	89.5%	90.5%				\$1,298	\$1,952
15 HP 3600 RPM ODP	15	3600	ODP	87.20%	89.5%	90.2%	91.2%				\$2,242	\$3,098
20 HP 3600 RPM ODP	20	3600	ODP	88.10%	90.2%	91.0%	92.0%				\$2,522	\$3,567
25 HP 3600 RPM ODP	25	3600	ODP	88.90%	91.0%	91.7%	92.7%				\$2,873	\$4,152
30 HP 3600 RPM ODP	30	3600	ODP	89.40%	91.0%	91.7%	92.7%				\$3,095	\$4,521
40 HP 3600 RPM ODP	40	3600	ODP	89.70%	91.7%	92.4%	93.4%				\$3,716	\$5,558
50 HP 3600 RPM ODP	50	3600	ODP	89.90%	92.4%	93.0%	94.0%				\$4,073	\$6,153
60 HP 3600 RPM ODP	60	3600	ODP	90.40%	93.0%	93.6%	94.6%				\$5,128	\$7,913
75 HP 3600 RPM ODP	75	3600	ODP	90.90%	93.0%	93.6%	94.6%				\$5,888	\$9,181
100 HP 3600 RPM ODP	100	3600	ODP	90.90%	93.0%	93.6%	94.6%				\$7,392	\$11,262
125 HP 3600 RPM ODP	125	3600	ODP	91.30%	93.6%	94.1%	95.1%				\$9,076	\$14,072
150 HP 3600 RPM ODP	150	3600	ODP	91.70%	93.6%	94.1%	95.1%				\$9,401	\$14,615
200 HP 3600 RPM ODP	200	3600	ODP	92.50%	94.5%	95.0%	96.0%				\$11,250	\$17,699
250 HP 3600 RPM ODP	250	3600	ODP	92.99%	94.5%	95.0%	96.0%				\$13,958	\$22,216
300 HP 3600 RPM ODP	300	3600	ODP	93.89%	95.0%	95.4%	96.4%				\$17,744	\$28,532
350 HP 3600 RPM ODP	350	3600	ODP	94.24%	95.0%	95.4%	96.4%				\$25,653	\$41,726
400 HP 3600 RPM ODP	400	3600	ODP	94.35%	95.4%	95.8%	96.8%				\$28,962	\$47,246
450 HP 3600 RPM ODP	450	3600	ODP	94.62%	95.8%	95.9%	96.9%				\$49,947	\$82,254
500 HP 3600 RPM ODP	500	3600	ODP	94.60%	95.8%	95.9%	96.9%				\$52,358	\$86,275

See Ref Motor Costs

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 5: Motor Efficiency and Incremental Costs (Reference 1, 2, 3, 9)

Motor Tag	HP	Speed	Type	Pre-EPACT Motor Efficiency	EPACT Motor Efficiency	NEMA Premium Motor Efficiency	NEMA Premium plus 1% Motor Efficiency	EPACT Motor Cost	NEMA Premium Motor Cost	NEMA Premium plus 1% Motor Cost	NEMA Premium Installed Cost	NEMA Premium plus 1% Installed Cost
1 HP 1200 RPM TEFC	1	1200	TEFC	76.30%	80.0%	82.5%	83.5%				\$730	\$1,003
1.5 HP 1200 RPM TEFC	1.5	1200	TEFC	77.40%	85.5%	87.5%	88.5%				\$725	\$996
2 HP 1200 RPM TEFC	2	1200	TEFC	78.50%	86.5%	88.5%	89.5%				\$800	\$1,121
3 HP 1200 RPM TEFC	3	1200	TEFC	80.60%	87.5%	89.5%	90.5%				\$840	\$1,188
5 HP 1200 RPM TEFC	5	1200	TEFC	83.20%	87.5%	89.5%	90.5%				\$860	\$1,222
7.5 HP 1200 RPM TEFC	7.5	1200	TEFC	85.30%	89.5%	91.0%	92.0%				\$1,165	\$1,730
10 HP 1200 RPM TEFC	10	1200	TEFC	86.30%	89.5%	91.0%	92.0%				\$1,298	\$1,952
15 HP 1200 RPM TEFC	15	1200	TEFC	87.20%	90.2%	91.7%	92.7%				\$2,242	\$3,098
20 HP 1200 RPM TEFC	20	1200	TEFC	88.10%	90.2%	91.7%	92.7%				\$2,522	\$3,567
25 HP 1200 RPM TEFC	25	1200	TEFC	88.90%	91.7%	93.0%	94.0%				\$2,873	\$4,152
30 HP 1200 RPM TEFC	30	1200	TEFC	89.40%	91.7%	93.0%	94.0%				\$3,095	\$4,521
40 HP 1200 RPM TEFC	40	1200	TEFC	89.70%	93.0%	94.1%	95.1%				\$3,716	\$5,558
50 HP 1200 RPM TEFC	50	1200	TEFC	89.90%	93.0%	94.1%	95.1%				\$4,073	\$6,153
60 HP 1200 RPM TEFC	60	1200	TEFC	90.40%	93.6%	94.5%	95.5%				\$5,128	\$7,913
75 HP 1200 RPM TEFC	75	1200	TEFC	90.90%	93.6%	94.5%	95.5%				\$5,888	\$9,181
100 HP 1200 RPM TEFC	100	1200	TEFC	90.90%	94.1%	95.0%	96.0%				\$7,392	\$11,262
125 HP 1200 RPM TEFC	125	1200	TEFC	91.30%	94.1%	95.0%	96.0%				\$9,076	\$14,072
150 HP 1200 RPM TEFC	150	1200	TEFC	91.70%	95.0%	95.8%	96.8%				\$9,401	\$14,615
200 HP 1200 RPM TEFC	200	1200	TEFC	92.50%	95.0%	95.8%	96.8%				\$11,250	\$17,699
250 HP 1200 RPM TEFC	250	1200	TEFC	94.40%	95.0%	95.8%	96.8%				\$13,958	\$22,216
300 HP 1200 RPM TEFC	300	1200	TEFC	94.40%	95.0%	95.8%	96.8%				\$17,744	\$28,532
350 HP 1200 RPM TEFC	350	1200	TEFC	94.28%	95.0%	95.8%	96.8%				\$25,653	\$41,726
400 HP 1200 RPM TEFC	400	1200	TEFC	95.00%	95.0%	95.8%	96.8%				\$28,962	\$47,246
450 HP 1200 RPM TEFC	450	1200	TEFC	95.00%	95.0%	95.8%	96.8%				\$49,947	\$82,254
500 HP 1200 RPM TEFC	500	1200	TEFC	95.00%	95.0%	95.8%	96.8%				\$52,358	\$86,275
1 HP 1800 RPM TEFC	1	1800	TEFC	76.30%	82.5%	85.5%	86.5%				\$730	\$1,003
1.5 HP 1800 RPM TEFC	1.5	1800	TEFC	77.40%	84.0%	86.5%	87.5%				\$725	\$996
2 HP 1800 RPM TEFC	2	1800	TEFC	78.50%	84.0%	86.5%	87.5%				\$800	\$1,121
3 HP 1800 RPM TEFC	3	1800	TEFC	80.60%	87.5%	89.5%	90.5%				\$840	\$1,188
5 HP 1800 RPM TEFC	5	1800	TEFC	83.20%	87.5%	89.5%	90.5%				\$860	\$1,222
7.5 HP 1800 RPM TEFC	7.5	1800	TEFC	85.30%	89.5%	91.7%	92.7%				\$1,165	\$1,730
10 HP 1800 RPM TEFC	10	1800	TEFC	86.30%	89.5%	91.7%	92.7%				\$1,298	\$1,952
15 HP 1800 RPM TEFC	15	1800	TEFC	87.20%	91.0%	92.4%	93.4%				\$2,242	\$3,098
20 HP 1800 RPM TEFC	20	1800	TEFC	88.10%	91.0%	93.0%	94.0%				\$2,522	\$3,567
25 HP 1800 RPM TEFC	25	1800	TEFC	88.90%	92.4%	93.6%	94.6%				\$2,873	\$4,152
30 HP 1800 RPM TEFC	30	1800	TEFC	89.40%	92.4%	93.6%	94.6%				\$3,095	\$4,521
40 HP 1800 RPM TEFC	40	1800	TEFC	89.70%	93.0%	94.1%	95.1%				\$3,716	\$5,558
50 HP 1800 RPM TEFC	50	1800	TEFC	89.90%	93.0%	94.5%	95.5%				\$4,073	\$6,153
60 HP 1800 RPM TEFC	60	1800	TEFC	90.40%	93.6%	95.0%	96.0%				\$5,128	\$7,913
75 HP 1800 RPM TEFC	75	1800	TEFC	90.90%	94.1%	95.4%	96.4%				\$5,888	\$9,181
100 HP 1800 RPM TEFC	100	1800	TEFC	90.90%	94.5%	95.4%	96.4%				\$7,392	\$11,262
125 HP 1800 RPM TEFC	125	1800	TEFC	91.30%	94.5%	95.4%	96.4%				\$9,076	\$14,072
150 HP 1800 RPM TEFC	150	1800	TEFC	91.70%	95.0%	95.8%	96.8%				\$9,401	\$14,615
200 HP 1800 RPM TEFC	200	1800	TEFC	92.50%	95.0%	96.2%	97.2%				\$11,250	\$17,699
250 HP 1800 RPM TEFC	250	1800	TEFC	94.22%	95.0%	96.2%	97.2%				\$13,958	\$22,216
300 HP 1800 RPM TEFC	300	1800	TEFC	94.44%	95.4%	96.2%	97.2%				\$17,744	\$28,532
350 HP 1800 RPM TEFC	350	1800	TEFC	94.56%	95.4%	96.2%	97.2%				\$25,653	\$41,726
400 HP 1800 RPM TEFC	400	1800	TEFC	94.83%	95.4%	96.2%	97.2%				\$28,962	\$47,246
450 HP 1800 RPM TEFC	450	1800	TEFC	94.88%	95.4%	96.2%	97.2%				\$49,947	\$82,254
500 HP 1800 RPM TEFC	500	1800	TEFC	94.86%	95.8%	96.2%	97.2%				\$52,358	\$86,275

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 5: Motor Efficiency and Incremental Costs (Reference 1, 2, 3, 9)

Motor Tag	HP	Speed	Type	Pre-EPACT Motor Efficiency	EPACT Motor Efficiency	NEMA Premium Motor Efficiency	NEMA Premium plus 1% Motor Efficiency	EPACT Motor Cost	NEMA Premium Motor Cost	NEMA Premium plus 1% Motor Cost	NEMA Premium Installed Cost	NEMA Premium plus 1% Installed Cost
1 HP 3600 RPM TEFC	1	3600	TEFC	76.30%	75.5%	77.0%	78.0%				\$730	\$1,003
1.5 HP 3600 RPM TEFC	1.5	3600	TEFC	77.40%	82.5%	84.0%	85.0%				\$725	\$996
2 HP 3600 RPM TEFC	2	3600	TEFC	78.50%	84.0%	85.5%	86.5%				\$800	\$1,121
3 HP 3600 RPM TEFC	3	3600	TEFC	80.60%	85.5%	88.5%	87.5%				\$840	\$1,188
5 HP 3600 RPM TEFC	5	3600	TEFC	83.20%	87.5%	88.5%	89.5%				\$860	\$1,222
7.5 HP 3600 RPM TEFC	7.5	3600	TEFC	85.30%	88.5%	89.5%	90.5%				\$1,165	\$1,730
10 HP 3600 RPM TEFC	10	3600	TEFC	86.30%	89.5%	90.2%	91.2%				\$1,298	\$1,952
15 HP 3600 RPM TEFC	15	3600	TEFC	87.20%	90.2%	91.0%	92.0%				\$2,242	\$3,098
20 HP 3600 RPM TEFC	20	3600	TEFC	88.10%	90.2%	91.0%	92.0%				\$2,522	\$3,567
25 HP 3600 RPM TEFC	25	3600	TEFC	88.90%	91.0%	91.7%	92.7%				\$2,873	\$4,152
30 HP 3600 RPM TEFC	30	3600	TEFC	89.40%	91.0%	91.7%	92.7%				\$3,095	\$4,521
40 HP 3600 RPM TEFC	40	3600	TEFC	89.70%	91.7%	92.4%	93.4%				\$3,716	\$5,558
50 HP 3600 RPM TEFC	50	3600	TEFC	89.90%	92.4%	93.0%	94.0%				\$4,073	\$6,153
60 HP 3600 RPM TEFC	60	3600	TEFC	90.40%	93.0%	93.6%	94.6%				\$5,128	\$7,913
75 HP 3600 RPM TEFC	75	3600	TEFC	90.90%	93.0%	93.6%	94.6%				\$5,888	\$9,181
100 HP 3600 RPM TEFC	100	3600	TEFC	90.90%	93.6%	94.1%	95.1%				\$7,392	\$11,262
125 HP 3600 RPM TEFC	125	3600	TEFC	91.30%	94.5%	95.0%	96.0%				\$9,076	\$14,072
150 HP 3600 RPM TEFC	150	3600	TEFC	91.70%	94.5%	95.0%	96.0%				\$9,401	\$14,615
200 HP 3600 RPM TEFC	200	3600	TEFC	92.50%	95.0%	95.4%	96.4%				\$11,250	\$17,699
250 HP 3600 RPM TEFC	250	3600	TEFC	94.68%	95.4%	95.8%	96.8%				\$13,958	\$22,216
300 HP 3600 RPM TEFC	300	3600	TEFC	94.71%	95.4%	95.8%	96.8%				\$17,744	\$28,532
350 HP 3600 RPM TEFC	350	3600	TEFC	94.65%	95.4%	95.8%	96.8%				\$25,653	\$41,726
400 HP 3600 RPM TEFC	400	3600	TEFC	94.75%	95.4%	95.8%	96.8%				\$28,962	\$47,246
450 HP 3600 RPM TEFC	450	3600	TEFC	94.50%	95.4%	95.8%	96.8%				\$49,947	\$82,254
500 HP 3600 RPM TEFC	500	3600	TEFC	94.50%	95.4%	95.8%	96.8%				\$52,358	\$86,275

Measure Life

Measure Life New Motors =	Ref (2), (3), (5)	20
Measure Life Upgrade Motor=		20

References

- 1 WASU Last Rev. June 25, 2007. Source of EPAct and Premium Motor Efficiencies
- 2 Estimates based on interpolation for selected EPAct efficiencies
- 3 NYSERDA (New York State Energy Research and Development Authority); NY Energy \$mart Programs Deemed Savings Database - Source for coincidence factor, measure life, and motor load factor
- 4 NWPCC (Northwest Power Conservation Council) RTF's (Regional Technical Forum) Archived Measures - Source for full motor cost
- 5 Washington State University Motor Test Lab Results. June 25, 2007 - Source for efficiencies
- 6 Washington State and DOE Pre-EPAct Default Motor Efficiency Table. 2004.
- 7 Table A-1 and A-2, pp. 264-265, Energy Efficient Motor Systems, ACEEE. 1999.
- 8 United States Industrial Electric Motor Systems Market Opportunities Assessment, EERE, US DOE, Dec 2002 - Source for operating hours for industrial motors and source for motor load factor data (Tables 1-18 and 1-19)
- 9 Efficiency Vermont's Technical Reference User Manual, 2004 - Source for operating hours for commercial motors (p.15) and source for measure life and source for

References -2011 Plan A Enhanced and Plan B Enhanced

Costs were determined for 1800 RPM TEFC motors, but will be used for all RPM and Types of Enhanced NEMA Premium motors as

Incremental costs for Plan A represents the cost differential between standard motor and efficient motor

Incremental costs for Plan B motors represent the full purchase and installation costs for the new motor

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

VFDs

460V, 3 phase, normal duty
 HP rated as constant torque
 All NEMA 1 enclosure or less

Table 6: ASD Costs (Reference 8)

HP	MSRP motor - Avg of all	Motor less discount plus mark-up and inflation	Installed Loaded
1	\$537	415	622
1.5	\$1,600	1,237	1,856
2	\$1,652	1,277	1,915
3	\$1,696	1,311	1,966
5	\$1,969	1,522	2,282
7.5	\$2,130	1,647	2,470
10	\$2,504	1,935	2,903
15	\$3,091	2,390	3,584
20	\$3,739	2,890	4,336
25	\$4,508	3,485	5,227
30	\$5,666	4,380	6,569
40	\$6,436	4,975	7,462
50	\$8,194	6,334	9,500
60	\$10,717	8,284	12,426
75	\$12,509	9,669	14,504
100	\$15,677	12,118	18,178
125	\$17,937	13,865	20,797
150	\$23,025	17,798	26,697
200	\$22,867	17,676	26,514

Average % savings ¹	33%
Measure Life (years)	15
Pumping Load Factor	75%
Fan Load Factor	65%
Fan Load Factor	70%
Fan Load Factor	

1. From Office of Industrial Electric Motor Systems Market Opportunities Assessment : Department of Energy
 (assessment of 265 industrial facilities in 1997)

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Business New Construction

Description:

This is a custom product including electric and gas measures. This product relies heavily on expert consultants in the design process; however, we will perform independent project review in accordance with standard engineering methods. Customer may apply for rebate under the New Construction product.

Algorithms:

Electrical and gas 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. Prescriptive items within the project will be handled through their respective deemed products.

Variables:

Net To Gross	Electric 90% for the EDA tracks and 93% for the Energy Efficient Buildings track. Gas EDA NTG is 99% and Gas Energy Efficient Building track is 97%. Product requirements are well above code, so we feel free-ridership will be negligible. As code requirements increase, NTG will be increased correspondingly.
--------------	--

Assumptions:

Operation and Maintenance Savings will be calculated for each specific project based on project details.

Life of product is 20 years for gas and electric measures.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Process Efficiency

Description:

The Process Efficiency program targets energy intensive processes at large industrial facilities. Customers who implement identified upgrades may receive rebates for large process changes that are not completed through Custom Efficiency or the prescriptive products. Calculations for prescriptive products will follow the methodologies described in end use program with the exception of net to gross.

Variables:

Net to Gross = 90%

Changes from 2014:

No technical assumption changes

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program Name: Recommissioning / Refrigeration Recommissioning

Description:

Recommissioning is a special product that involves a Study phase and an Implementation phase. The customer may apply for rebate under the Recommissioning product. Each Recommissioning project will be analyzed individually by Xcel Energy. A qualified engineering vendor will perform the study and provide a report and technical calculations to Xcel Energy for review. Analysis will be based on standard engineering methodologies. Customer may also submit for implementation a proposed "Fast Track" project without going through the Recommissioning Study phase, as long as they have performed a study. Recommissioning projects do not have to demonstrate a TRC factor greater than one on a project by project basis. In that regard the product is similar to deemed products. In most other respects it is more of a custom product.

Calculations:

Electric and Gas energy savings and electrical demand savings will be calculated by a study vendor based on the project specific details. Each project will undergo an engineering review by Xcel Energy in accordance with standard engineering practices.

Variables:

NTG	A net-to-gross factor of 90% will be used for Recommissioning projects, based on the following justification: Without having completed a Recommissioning study through our product, the customer would not have known about the opportunities. If they would have known about them, they would have done them on their own due to the likelihood they are no/low cost items with very quick paybacks.
TDLF	A transmission distribution loss factor of 6.50% will be used for Recommissioning projects. Reference the Enhanced DSM filing, SRD-2; no significant system changes have been noted since then.
Measure Life	Persistence of the Recommissioning product (product life) is set at 7 years, reference "Recommissioning Persistence - Task 1 Benchmarking Deliverable 040607.pdf"

Changes from 2014

None

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Building Tune-up

Description:

This new measure under the Recommissioning product provides a recommissioning-type study at a smaller scale and targeted towards buildings less

Calculations:

Electric and Gas energy savings and electrical demand savings will be calculated by a study vendor based on the project specific details. Each project
--

Variables:

NTG	A net-to-gross factor of 90% will be used for Building Tune-up projects, based on the following justification: Without having completed a Building Tune-up study, the customer would not have known about the opportunities to save energy. If they would have known about them, they would have done them on their own due to the likelihood they are no/low cost items with very quick paybacks.
TDLF	A transmission distribution loss factor of 6.50% will be used for Building Tune-up projects, the same as the Recommissioning product. Reference the Enhanced DSM filing, SRD-2
Measure Life	Persistence of the Building Tune-up product (product life) is set at 7 years, same as the Recommissioning product; reference "Recommissioning Persistence - Task 1 Benchmarking Deliverable 040607.pdf"

Changes from 2014

None

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Self Direct

The Self-Direct product will provide large commercial and industrial customers in Colorado the opportunity to self-fund electric energy conservation projects at their facilities. Customers who engineer, implement, and commission qualifying projects will receive rebates to offset their costs to implement efficient projects.

Calculations:

Electrical energy savings and electrical demand savings will be calculated based on the actual savings from a project.

A net-to-gross factor of 91% will be used for Self-Direct projects. The NTG assumption (91%) was developed based on the weighted average of the net-to-gross factors from our stand alone programs, using the weighting from previously completed self-direct projects.

Measure life and operation and maintenance savings will be calculated for each project.

Changes from 2014:

No changes.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Energy Efficient Showerhead - CO

Description:

Residential customers are eligible to receive a free kit containing a high-efficiency showerhead, kitchen aerator, and bathroom aerator to reduce energy and water use. First time participants receive a kit containing 2 showerheads, 2 bathroom aerators, and 1 kitchen aerator. Previous 2014 program participants will receive 1 showerhead and 1 bathroom aerator. Previous program participants prior to 2014 receive 1 showerhead, 2 bathroom aerators, and 1 kitchen aerator.

Equations:

Showerhead or Aerator Natural Gas Savings (Gross Dth/unit)	= GPY_DHW_Savings x Water_Heater_Delta_T x 8.33 / Gas_Water_Heater_Efficiency / 1,000,000 x Gas_Split_Factor
Showerhead or Aerator Energy Savings (Gross Annual kWh Saved at Customer/unit)	= GPY_DHW_Savings x Water_Heater_Delta_T x 8.33 / Electric_Water_Heater_Efficiency / 3,412 x (1 - Gas_Split_Factor)
Water Heater_Delta_T	= Water_Heater_Temperature - City_Mains_Temperature
Showerhead or Aerator Demand Savings (Gross kW Saved at Customer/unit)	= Customer_kWh / 8,760
Showerhead or Aerator Demand Savings (Gross Generator kW)	= Customer_kw * Coincidence_Factor

Variable ID	Value	Description
GPY_DHW_Savings	See Table 1	Gallons per year of hot water saved with high-efficiency showerhead or aerator.
Water_Heater_Temperature	120	Water heater setpoint temperature °F. (Reference 1)
City_Mains_Temperature	51.4	Water temperature of city water entering the water heater °F. (Reference 2)
Gas_Water_Heater_Efficiency	80%	Assumed gas water heater efficiency without standby losses. This only includes combustion efficiency.
Electric_Water_Heater_Efficiency	100%	Assumed electric water heater efficiency without standby losses.
Gas_Split_Factor	See Table 2	Gas_Electric_Split_Factor is based on customer response to showerhead post card. The
Coincidence_Factor	See Table 1	Amount of Customer_kw demand that will coincide with peak utility system demand.
NTG	99%	Net to Gross is assumed to be 99%

Inputs: Verified during M&V:

Showerhead received by customer	Yes
Showerhead installed by customer	Yes
Water Heating Fuel provided by Customer	Yes

Assumptions:

Baseline Flowrates	Baseline showerhead flowrate is assumed to be 2.5GPM per federal minimum standards. Kitchen and bathroom aerator baseline flowrates are assumed to be 2.2GPM per federal minimum standards.	
Heat content of 1 gallon water	8.33	Btu/gal °F
Conversion from Btu to kWh	3,412	1 kWh = 3,412 Btuh
Conversion from Btu to Dth	1,000,000	1 Dth = 1,000,000 Btuh
Measure Life	10	Lifetime of showerhead and aerator measures. (Reference 3)
Incremental Costs	See Table 1	Actual costs provided by vendor; cost per showerhead is assumed for the material costs for cost/benefit calculation purposes.

Table 1	Showerhead	Showerhead 2nd	Kitchen Aerator	Bathroom Aerator	Bathroom Aerator 2nd
GPY_DHW_Savings	2,749	2,395	309	361	361
Total Water Savings/Year - Gallons	3,519	3,066	368	462	462
Coincidence_Factor (Reference 1)	58%	58%	106%	106%	106%
O&M Savings	\$22.03	\$19.19	\$2.30	\$2.89	\$2.89
Incremental Costs 2015	\$ 2.90	\$ 2.90	\$ 1.40	\$ 0.42	\$ 0.42
Incremental Costs 2016	\$ 3.00	\$ 3.00	\$ 1.45	\$ 0.45	\$ 0.45

Table 2	Gas_Split_Factor
Gas Water Heater	100%
Electric Water Heater	0%

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Unknown Water Heater	94%
----------------------	-----

DEEMED SAVINGS TECHNICAL ASSUMPTIONS**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 version 2011 4.01; www.deeresources.com
4. Denver Water 2014 Rate Schedule; <http://www.denverwater.org/BillingRates/RatesCharges/2014Rates/InsideCity/>
5. City and County of Denver Sanitary Sewer Rate Schedule;
<https://www.denvergov.org/wastewatermanagement/Wastewater/BillingPayment/WastewaterRates/SanitarySewerRates/tqid/441674/Default.aspx>
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 2009; <http://www.eia.gov/consumption/residential/>
9. 2010 Xcel Energy Colorado Home Use Study (PS Co Service Area)

Changes from Recent Filing:

1. Water heater temperature delta increased to 69F. This is based on a water heater temperature of 120F and an average ground water temperature of 51F.
2. Water heater make-up efficiencies increased to 100% and 80% for electric and gas water heaters respectively.
3. Measure lifetime increase to 10 years.
4. Bathrooms, showers, and dishwashers per household based on RECS2009 data.
5. Added measures for 2nd showerhead and 2nd bathroom aerator.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Residential Energy Feedback**Description:**

Program will deliver energy use feedback via print, email and online web portal access to customer groups and measure the difference in energy use between Participants and a similarly sized Control Group that does not receive energy use feedback. Program will include residential customers with both gas and electric service from Xcel Energy.

Algorithms:

Monthly Electrical Energy Savings (Gross_Treatment_Monthly_kWh)	The development of the savings by each variable group (Print, Email, Online) follow this basic formula: = (Control_kWh_usage_post_treatment - Group_Rebate_Product_Participation) - (Treatment_kWh_usage_post_treatment - Group_Rebate_Product_Participation)
Electrical Energy Savings (Gross_Annual_kWh)	= sum of each month of Monthly Electrical Energy Savings
Electrical Demand Savings (Gross_Coincident_kw)	= Gross_kw * CF
Electrical Demand Savings (Gross_kw)	= Customer_kw_Max
Coincidence Factor (CF)	= Customer_kw_Peak_Month / Customer_kw_Max
Monthly Natural Gas Energy Savings (Gross_Treatment_Monthly_Dth)	The development of the savings by each variable group (Print, Email, Online) follow this basic formula: = (Control_Dth_usage_post_treatment - Group_Rebate_Product_Participation) - (Treatment_Dth_usage_post_treatment - Group_Rebate_Product_Participation)
Natural Gas Energy Savings (Gross_Annual_Dth)	= Sum of each month of the Monthly Natural Gas Energy Savings
Behavioral Adjustment	= -2/3 * Gross_kw; This adjustment is applied to reduce the first year savings to 1/3 of the actual savings in compliance with ordered treatment.

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.
Control_Print	= 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_Email	= 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	= 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_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.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

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.	
Gross_Treatment_Monthly_kWh_Saved	Provided by Vendor	= monthly MWh savings provided by the vendor for all homes in the treatment group.
Customer_kw_Peak_Month	Provided by Vendor	= Average electrical demand savings per household achieved in the month, day, and hour that contained the peak demand on Xcel Energy's system. Actual value calculated each year.
Customer_kw_Max	Provided by Vendor	= The maximum of the peak electrical demand savings per household achieved in the summer months: June, July, August, and September. Actual value calculated each year. Formula for each monthly Customer_kw = Customer_Daily_kw * Treatment_Percent_Savings * Peak_Factor * Daily_Usage_at_Peak
Gross_Treatment_Monthly_Dth_Saved	Provided by Vendor	= monthly therm savings provided by the vendor for all homes in the treatment group.
Peak_Factor	Provided by Vendor	= The ratio of energy usage in peak hour to average hourly energy use. Actual value calculated each year.
Daily_Usage_at_Peak	Provided by Vendor	= Percentage of energy usage in peak hour to daily total energy use. Actual value calculated each year.
Measure Life	= Assumed to be 1.0 year since there is no equipment purchase - just behavior changes.	
Measure Life (Behavioral Adjustment)	= is set to zero in order to not affect the lifetime net benefits	
Incremental Cost	= Assumed to be zero since the program induces behavior change which has no capital cost.	
Operation & Maintenance (O&M) Savings	= Assumed to be zero.	
Net-to-Gross Factor (NTG)	= 100%	

References:

Savings data from Xcel Colorado Opower pilot, June 2011 - July 2014. File "Xcel_Monthly Results Summary_Through July 2014"

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: ENERGY STAR New Homes**Description:**

The CO ENERGY STAR New Homes (ESNH) product provides residential homebuilders with an incentive to build new single-family, small multi-family and town homes that are at least 15% more energy-efficient than what local building codes require. Builders are encouraged to consider a "whole-house" approach and have the flexibility to install any combination of efficient technologies and building techniques to meet the program requirements and qualify for rebate. The product utilizes Performance testing per Residential Energy Services Network (RESNET) Home Energy Rating System (HERS) and each home will be modeled by a certified RESNET energy rater using the widely adopted REM/Rate™ software application.

Program References:

CFLs	Refer to Program "Home Lighting & Recycling" to find formulas for (Customer kW, Customer kWh, Customer PkW, etc.) for the "CFL" measure.
CFLs	Refer to Program "Home Lighting & Recycling" to find reference table for "Existing lighting wattage for residential lights" values.
CFLs	Refer to Program "Home Lighting & Recycling" to find reference table for "Average Cost" values.
CFLs	Refer to Program "Home Lighting & Recycling" to find reference table for "Measure Life" values.

Algorithms:

Gross kW Saved at Customer Envelope Measures	= The maximum of (summer peak kW savings ; winter peak kW savings) Data for the summer and winter peak kW savings are included in the REM/Rate model for each individual home as provided by the House Rating Agent.
Gross Coincident kW Saved at Customer Envelope Measures	= (Gross kW Saved at Customer) x 90% Coincidence Factor
Gross Annual kWh Saved at Customer Envelope measure	= Total Reference Home kWh - Total As-built Home kWh Data for The Reference Home and As-Built Home kWh are included in the REM/Rate model for each individual Home As provided by the House Rating Agent and based on Local codes.
Gross Dth/Yr Envelope Measures	= Total Reference Home kWh - Total As-built Home kWh Data for The Reference Home and As-Built Home kWh are included in the REM/Rate model for each individual Home As provided by the House Rating Agent and based on Local codes.
Gross kW Saved at Customer	= Gross Annual kWh / Hours
Gross Coincident kW Saved at Customer	= Gross kW Saved at Customer * CF
Baseline_HERS	= (Ref_Home_MMBTU / (IECC2004_MMBTU) x 100
As-Built_Home_MMBTU	As-Built Home's annual energy use calculated by the Home Rater using the REMRate software modeling tool, in units of MMBTU. = (As-Built Heating (kWh) + As-Built Cooling (kWh) + As-Built Lights & Appliances (kWh)) x 3412 / 1000000 + (As-Built Heating (therms) + As-Built Water Heating (therms) + As-Built Lights & Appliances (therms)) / 10
Ref_Home_MMBTU	Reference Home's annual energy use calculated by the Home Rater using the REMRate software modeling tool, in units of MMBTU. = (Reference Heating (kWh) + Reference Cooling (kWh) + Reference Lights & Appliances (kWh)) x 3412 / 1000000 + (Reference Heating (therms) + Reference Water Heating (therms) + Reference Lights & Appliances (therms)) / 10
%_Improvement	As-built Home's Percent Improvement over local energy code requirements. = Absolute Value ((As-Built_Home_MMBTU - Ref_Home_MMBTU) / Ref_Home_MMBTU)

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

IECC2004_MMBTU	HERS Index Scores are all based on the IECC 2004 code and assumes that a home built to IECC2004 receives a HERS score of 100. = As-Built_Home_MMBTU / (As-Built_HERS / 100)
HERS_ICC_Adj_Factor	= Incremental Capital Cost Adjustment Factor for Envelope HERS Index based Measures = $1 + (-0.000278945675 \times \text{Home_Size} + 0.901939330309)$
As-built_HERS_ICC/SF	= As-built Incremental Capital Cost per Square Foot for Envelope HERS Index based Measures. As-Built_HERS_ICC/SF = $(-0.032032105669 \times \text{Baseline_HERS} + 2.481679527547) \times \text{HERS_ICC_Adj_Factor}$
Baseline_HERS_ICC/SF	= Baseline Incremental Capital Cost per Square Foot for Envelope HERS Index based Measures. Baseline_HERS_ICC/SF = $(-0.032032105669 \times \text{Baseline_HERS} + 2.481679527547) \times \text{HERS_ICC_Adj_Factor}$
HERS_ICC	= (As-built_HERS_ICC/SF - Baseline_HERS_ICC/SF) * Home_Size
summer peak kW savings	= Summer Peak kW (Reference) - Summer Peak kW (As Built)
winter peak kW savings	= Winter Peak kW (Reference) - Winter Peak kW (As Built)

Variables:	Value	Description
As-Built_HERS	Customer Input	As-Built Home's HERS Index Score calculated by the Home Rater using the REMRate software modeling tool and provided under HERS Index (Final) = (As-Built Home MMBTU / IECC2004 MMBTU) x 100
Clothes washer electric energy savings (Gross Annual kWh)	See Table 1	Energy savings for the clothes washer are based on the ENERGY STAR Clothes Washer Savings Calculator: http://www.energystar.gov/index.cfm?c=clotheswash.pr_clothes_washers . This will vary based on source for domestic hot water heat; gas or electric.
Clothes washer Hours	312	Assumed Hours of operation for a clothes washer, based on number of duty cycles and a duty cycle of 1 hour.
Clothes washer natural gas savings (Gross Dth/Yr)	0.67	Energy savings for the clothes washer are based on the ENERGY STAR Clothes Washer Savings Calculator: http://www.energystar.gov/index.cfm?c=clotheswash.pr_clothes_washers . For homes with gas domestic hot water heat.
Dishwasher electric energy savings (Gross Annual kWh)	See Table 1	Energy savings for the dishwasher were based on the ENERGY STAR Dishwasher Savings Calculator: http://www.energystar.gov/index.cfm?c=dishwash.pr_dishwashers . This will vary based on source for domestic hot water heat; gas or electric.
Dishwasher Hours per year	215	Assumed Hours of operation for a dishwasher, based on number of duty cycles and a duty cycle of 1 hour.
Dishwasher natural gas savings (Gross Dth/Yr)	0.03	Energy savings for the dishwasher are based on the ENERGY STAR Dishwasher Savings Calculator: http://www.energystar.gov/index.cfm?c=dishwash.pr_dishwashers . For homes with gas domestic hot water heat.
Refrigerator electric energy savings (Gross Annual kWh)	16	Energy savings for the refrigerator were based on the ENERGY STAR Refrigerator Savings Calculator: http://www.energystar.gov/index.cfm?c=refrig.pr_refrigerators .

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Incremental Cost Energy Star Certification	\$ 505.00	Incremental cost for completing the construction measures necessary and the paperwork required to achieve Energy Star Certification. This covers the additional costs incurred by the builder for the paperwork portion of achieving the certification. The cost of the actual construction measures that result in the energy savings will be captured in the as-built home incremental cost.
Non-energy O&M savings	See Table 1	Water Savings per year for an Energy Star Clothes Washer or Energy Star Dishwasher.
CF Clothes Washer	See Table 1	Coincidence Factor of an energy star Clothes Washer
CF Dishwasher	See Table 1	Coincidence Factor of an energy star Dishwasher
CF Refrigerator	100%	Coincidence Factor of an energy star Refrigerator
Measure Life As-built Home	20 Years (Reference 1)	Envelope Measures
Measure Life Refrigerator	13 Years (Reference 14)	Life of an energy star refrigerator
Measure Life Clothes Washer	11 Years (Reference 16)	Life of an energy star Clothes Washer
Measure Life Dishwasher	11 Years (Reference 15)	Life of an energy star Dishwasher

Inputs:

Home As-built energy model and the reference home energy model are developed by the House Rater using REM/Rate modeling software. The model output represents the total home's thermal envelope influence on energy use including secondary impacts from lights and appliances. A full list of the data that will be used as calculator inputs are as follows:

Reference Summer Peak kW
As-Built Summer Peak kW
Reference Winter Peak kW
As-Built Winter Peak kW
Home Size (Square Footage)
HERS Index (Final)
Reference Heating (therms)
Reference Heating (kWh)
Reference Cooling (kWh)
Reference Water Heating (therms)
Reference Lights & Appliances (therms)
Reference Lights & Appliances (kWh)
As-Built Heating (therms)
As-Built Heating (kWh)
As-Built Cooling (kWh)
As-Built Water Heating (therms)
As-Built Lights & Appliances (therms)
As-Built Lights & Appliances (kWh)
Energy Star Certification
Water Heater Fuel
Dishwasher Installed
Clothes Washer Installed
Refrigerator Installed
Quantity CFLs Installed (Minimum 20)

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Assumptions:

Assumptions		

Tables:

Table 1	Clothes Washer	Dishwasher
Total Water Savings/Year - Gallons	3,385	156
kWh Savings in home with electric water heater	184	12
kWh Savings in home with gas water heater	37	5
Coincidence Factor (CF)	3.56%	2.45%
Non-Energy O&M Savings	\$ 21.19	\$ 0.98
Incremental Costs 2015	\$ 50.00	\$ 10.00
Incremental Costs 2016	\$ 50.00	\$ 10.00

References:

1. California Measurement Advisory Committee (CALMAC) Protocols, Appendix F (www.calmac.org/events/APX_F.pdf).
2. 2006 Residential Energy Use Colorado Service Area - Xcel: Bruce Neilson
3. American Housing Survey for Denver - US Census Bureau
4. Xcel Energy CO DSM Potential 2006 - prepared by Kema
5. National Energy Efficiency Best Practices Study - Residential Single-Family Comprehensive Weatherization Best Practices Report from December 2004.
6. RS Means Repair and Remodeling 2007 at a cost of \$0.028 per square foot per increase in R-value.
7. National Energy Audit Tool (NEAT) and Frontier estimates.
8. EEBP web site - Tacoma Residential Weatherization program.
9. US Lighting Market Characterization Study performed for the Department of Energy in 2002
10. MEEA/ES Change A Light campaign info
11. Xcel Energy estimate
12. Draft Technical Support Document: Energy Conservation Standards for Residential Furnaces and Boilers, Efficiency Standards for Consumer Products
- Prepared for US DOE, September 2006
13. California Energy Commission's Database for Energy Efficient Resources (DEER)
14. www.energystar.gov
15. DOE 2007
16. Appliance Magazine, September 2007
17. Incremental cost data are estimates from Residential Science Resources

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program Description: Evaporative Cooling

Prescriptive rebates will be offered for the purchase and installation of evaporative coolers. Three tiers of rebates are offered based on the Evaporative Efficacy of the unit and the type of media. The rebates and analyses are based on a nominal 3 ton cooling load. Tier 1 units are standard efficiency evaporative coolers. Tier 2 units are high efficiency evaporative coolers (see assumptions for details). Tier 3 is an integrated HVAC system rebate that compares the "whole house" conventional HVAC with an integrated heating and evaporative cooling system in new homes or homes with major remodeling. Credit will be calculated based on the number and type of units installed, the type of the existing unit and the location of the home

Algorithms:

Tier 1: 13 SEER 3 Ton to evap cooling savings:

Energy Savings (Gross Annual kWh Saved at Customer per unit)	Front Range
Demand Savings (Gross Annual kW Saved at Customer per unit)	Front Range
Energy Savings (Gross Annual kWh Saved at Customer per unit)	Western Slope
Demand Savings (Gross Annual kW Saved at Customer per unit)	Western Slope

= 3Ton A/C - Tier 1 Evap Cooling energy = 1,573kWh
= 3Ton A/C - Tier 1 Evaporative cooler demand = 2.566 kW
= 3Ton A/C - Tier 1 Evap Cooling energy = 1,831 kWh
= 3Ton A/C - Tier 1 Evaporative cooler demand = 2.566 kW

Tier 2: 13 SEER 3 Ton to Tier 2 evap cooler savings:

Energy Savings (Gross Annual kWh Saved at Customer per unit)	Front Range
Demand Savings (Gross Annual kW Saved at Customer per unit)	Front Range
Energy Savings (Gross Annual kWh Saved at Customer per unit)	Western Slope
Demand Savings (Gross Annual kW Saved at Customer per unit)	Western Slope

= 3Ton A/C - Tier 2 Evaporative cooling energy = 1,573 kWh
= 3Ton A/C - Tier 2 Evaporative cooler demand = 2.566 kW
= 3Ton A/C - Tier 2 Evaporative cooling energy = 1,831 kWh
= 3Ton A/C - Tier 2 Evaporative cooler demand = 2.566 kW

Tier 3: Whole house conventional HVAC to Integrated Evap Cooler

Energy Savings (Gross Annual kWh Saved at Customer per unit)	Front Range
Demand Savings (Gross Annual kW Saved at Customer per unit)	Front Range
Energy Savings (Gross Annual kWh Saved at Customer per unit)	Western Slope
Demand Savings (Gross Annual kW Saved at Customer per unit)	Western Slope

= 3Ton A/C - Whole house evap energy = 1,345 kWh
= 3Ton A/C - Whole house evap demand = 2.194kW
= 3Ton A/C - Whole house evap energy = 1,565 kWh
= 3Ton A/C - Whole house evap demand = 2.194 kW

Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLF)
Electrical Demand Savings (Gross Coincident kW Saved at Customer per Unit)	= Cust_kw * CF / (1-TDLF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Coincident kW Saved at Generator per Unit)	= Gross Coincident kW x NTG

Variables:

13 SEER 3 Ton energy	=Energy use of 13 SEER 3 Ton AC unit = 1,811 kWh (Front Range) 2,107 kWh (Western Slope)
13 SEER 3 Ton demand	=Demand of 13 SEER 3 Ton AC unit = 2.954 kW
Tier 1 Evaporative cooler energy	= Motor HP x 0.746 x Load Factor / Motor Eff x OpHr = 165 kWh
Tier 1 Evaporative cooler demand	= Motor HP x 0.746 x Load Factor / Motor Eff = 0.388 kW
Tier 2 Evaporative cooler energy	= Motor HP x 0.746 x Load Factor / Motor Eff x OpHr for Hi and Lo speeds additively = 320 kWh
Tier 2 Evaporative cooler demand	= Motor HP x 0.746 x Load Factor / Motor Eff = 0.760 kW
Tier 3 Evaporative cooler energy	= Motor HP x 0.746 x Load Factor / Motor Eff x OpHr for Hi and Lo speeds additively = 320 kWh

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Tier 3 Evaporative cooler demand	= Motor HP x 0.746 x Load Factor / Motor Eff = 0.760 kW
EFLH Front Range/Denver	=613
EFLH Western Slope	=713

MotorHP	Motor Horsepower - We will use 0.52 hp for tier 1 units. We will use 0.52 hp for tier 2 units and 1.02 Hp for tier 3 units represent the motor size for an evaporative cooler which corresponds to the cooling output of a 3 ton AC unit. (Reference 5)
0.746	Standard conversion from HP to kW
Load Factor	Load factor for motor - We will use 80% for tier 1 and 80% on high and 10% on low for tier 2.
Motor Eff	Efficiency of the evaporative cooler motor - We will use 80% (Reference 3)
CF_AC	= Coincidence factor for the refrigerated air system, the probability that peak demand of the AC unit will coincide with peak utility system demand. 0.70 will be used. (Program Evaluation 2010)
TDLF	Transmission Distribution Loss Factor = 7.7%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2
NTG	Net-to-Gross Factor = We will use 52% for tier 1 and 59% for tier 2 replacements, 70% for tier 1 and tier 2 first time installations, and 100% for tier 3 based on Xcel Energy product experience.
Incremental Costs	= Incremental cost of efficient technology over baseline technology. Values listed in Table 1
O&M savings	= Operation and Maintenance savings related to water use are listed in Table 2.
Measure Life	= 15 years (Program Evaluation 2010)

Table 1. Incremental Cost of Evaporative Coolers (Reference 6,7,8)

	Baseline Cost	Incremental Cost
13 SEER AC 3 T (Baseline System)	\$ 4,329	
Tier 1 Evaporative Cooling Unit	\$ 611	\$ (3,718)
Tier 2 HE Evaporative Cooling Unit	\$ 1,120	\$ (3,209)
Tier 3 Whole House Integrated Evap Cooling Unit	\$ 4,367	\$ 38

Table 2. Operation and Maintenance Savings (Reference 9)

Base System	New System	O&M Savings
13 SEER AC 3 T	Standard Evap Cooling (Tier 1)	\$ (10.43)
13 SEER AC 3 T	High Efficient Evap Cooling (Tier 2)	\$ (4.38)
Conventional 3 Ton HVAC; gas furn; elec cen AC	Gas furnace; integrated evap cooling (Tier 3)	\$ (4.38)

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Provided by Customer:

Type of unit installed (Tier 1 or Tier 2) or installation type (Tier 3).

Verified during M&V

Yes

Assumptions:

Baseline AC equipment is matched to the HEAC program. Please see the HEAC program for more information

The installed unit is assumed to have a 3/4 hp motor (commonly available unit, confirmed through metering)

Qualifying equipment must be new and be a permanently installed direct (Tier 1 or 2), indirect or two-stage evaporative cooling unit. Portable coolers or systems with vapor compression equipment are not eligible, nor is used or reconditioned equipment.

Tier 1: Qualifying evaporative cooling units must have a minimum Industry Standard Rated airflow of 2,500 CFM

Tier 2: Qualifying evaporative cooling units must meet tier 1 requirements and additionally have a minimum Media Saturation Effectiveness of 85%. The units must be installed with a remote thermostat and a periodic purge water control.

Tier 3: Integrated HVAC system rebate that compares the "whole house" conventional HVAC with an integrated heating and evaporative cooling system in new homes or homes with major remodeling. Tier 3 evaporative cooling units must be indirect or indirect/direct combination units. Units utilizing only direct cooling units do not

Tier 3 incremental cost data from 2013 program invoices

The technical assumptions for the Evaporative Cooling Rebate product were developed assuming that a standard 13 SEER central air conditioning system was replaced or displaced by either a standard evaporative cooling system or a high efficiency evaporative cooling unit with the same capacity. These units have a measure life of 10 years.

Changes from 2013:

No Changes

References:

1. ESPRE 2.1 engineering model: Simplified energy analysis methods for residential buildings
2. Building America, Research Benchmark Definitions, Pg 9, http://www.eere.energy.gov/buildings/building_america/pdfs/37529.pdf
3. Average motor efficiency for 0.75 hp motor from NEMA, http://www.eere.energy.gov/buildings/appliance_standards/commercial/pdfs/small_motors_tsd.pdf
4. Kinney, Larry. New Evaporative Cooling Systems: An Emerging Solution for Homes in Hot Dry Climates with Modest Cooling Loads. SWEEP 2007
5. Web site information - Grainger Evap Cooler - Essick Model N28W; Pheonix Mfg Corp; Model PD4231
6. An average of the price for a 13 SEER Goodman (<http://www.acfactoryoutlet.com/home.asp?p=listgoodman.asp&cat=73&sort=1&ah=1>) and the price as noted in the DOE's AC calculator spreadsheet (www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/Calc_CAC.xls) is assumed.
7. http://www.google.com/products?q=home+depot+evaporative+cooler+cost&ie=UTF-8&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&sa=X&oi=product_result_group&resnum=1&ct=title
8. <http://www.toolbase.org/TechInventory/techDetails.aspx?ContentDetailID=750>: "A two-stage evaporative cooler with a cooling capacity equivalent to a three-ton conventional system retails for about \$1,800." The California Energy Commission states that installation costs are equivalent to refrigerated air systems, so only equipment cost is included in this analysis (http://www.consumerenergycenter.org/home/heating_cooling/evaporative.html: "Installation costs of swamp coolers are comparable to air conditioning units").
9. SWEEP 2007 Report. O&M Savings based on manufacturers water use data and an assumed \$3.82/thousand gallons cost for water (Denver Water Board).
10. ASHRAE Applications 2007 p.36.3 Used AC window unit as estimate for evaporative cooler.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: High Efficiency Air Conditioning

Prescriptive rebates will be offered for new cooling equipment. Rebates for most measures are dependent on size and on meeting a minimum efficiency. Plan A is defined as central air conditioning (CAC) or air-source heat pump (ASHP) systems installed in new homes, existing homes without CAC or ASHP systems or homes with CAC or ASHP systems that are inoperable or unrepairable. Plan B is for existing CAC or ASHP systems that are operable or made operable for a reasonable cost (\$500 to \$1500). The equations for calculating savings are identical between Plan A and Plan B, but the baseline unit efficiencies are different as described below. Ground Source Heat Pumps will be rebated with a Quality Install (appropriate for GSHP) in new homes or when replacing electric resistance heating equipment in existing homes.

Algorithms:

Conversions:

Seasonal Energy Efficiency Ratio (SEER)	= Total seasonal cooling output (kBtuh) / Total electrical input (kWh); for estimating seasonal performance
Energy Efficiency Ratio (EER)	= Rated cooling output (kBtuh) / Rated electrical input (kW) for equipment tested at 95F estimating peak
kW/ton	= 12 / Energy Efficiency Ratio
Coefficient of Performance (COP)	= EER / 3.413 or, EER = 3.413*COP
Coefficient of Performance (COP) Heating	= Heat Energy Output (Btu) / Energy Input to Compressor (Btu)

For Split System Air Conditioners and Air Source Heat Pumps and Ground Source Heat Pumps

New Equipment Electrical Energy Savings (Gross Annual kWh Saved at Customer)	= Size x EFLH x (12/SEER_Standard - 12/SEER_Eff) / (1-Loss_No_QI)
New Equipment Electrical Demand Savings (Gross kW Saved at Customer)	= Size x (12/EER_Standard - 12/EER_Eff)
Quality Install Electrical Energy Savings (Gross Annual kWh Saved at Customer)	= Size x EFLH x (12/SEER_Eff) x (1/(1-Loss_No_QI) - 1/(1-Loss_QI))
Quality Install Electrical Demand Savings (Gross kW Saved at Customer)	= Size x (12/EER_Eff) x (1 - ((1-Loss_No_QI) / (1-Loss_QI)))
GSHP Cooling Electrical Energy Savings (Gross Annual kWh Saved at Customer)	=(GSHP_Size/2) x EFLH (12/SEER_Standard - 12/GSHP_SEER) / (1-Loss_No_QI)
GSHP Cooling Electrical Energy Savings (Gross kW Saved at Customer)	=GSHP_Size x (12/EER_Standard - 12/GSHP_EER)
GSHP Heating Electrical Energy Savings (Gross Annual kWh Saved at Customer)	=GSHP_Size x GSHP_EFLHH x (12/EER_Standard - 12/GSHP_EER) / (1-Loss_No_QI)
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
Present Value (\$)	=Future Value * (1+rate) ^ (number of periods * -1)

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Variables:

Size	= The new equipment capacity in tons, provided by customer
EFLH	= Equivalent Full Load Hours. The Equivalent number of hours that equipment would be running at Full Load over the course of the year. We will use 613 for the non-quality install on the equipment and 490.4 for the quality install EFLH which was determined by modeling a home in Denver with a 3 ton 13 SEER AC unit. The resulting kWh were divided by the connected load to derive the EFLH value. Modeling used ESPRE
GSHP_EFLHH	= Ground Source Heat Pump Equivalent Full Load Hours Heating: The equivalent number of hours that GSHP equipment would be running at Full Load over the course of the year for heating. We will use 846 EFLH for new homes and 1,419 for existing homes. GSHP EFLHH was determined by REMRATE modeling of a new and an existing home adjusted for Denver Degree Days. The resulting kWh were divided by the connected load to derive the EFLHH value.
SEER_Standard (Plan A)	= Seasonal Energy Efficiency Ratio of standard equipment, based upon the minimum Federal standard for efficiency as manufactured. For residential AC units, we will use 13 SEER.
SEER_Standard (Plan_B)	= Seasonal Energy Efficiency Ratio of existing equipment based upon the minimum Federal standard for efficiency manufactured between 1992 and 2006. For existing residential AC units, we will use 10 SEER.
SEER_Eff	= Seasonal Energy Efficiency Ratio of High Efficiency equipment that the customer will install, provided by the customer
EER_Standard (Plan_A)	= EER of standard equipment, based upon the minimum Federal acceptable efficiency. We will use 11.18 based on the federal standard 13 SEER and the conversion listed above.
EER_Standard (Plan_B)	= EER of existing equipment, based upon the 1992 to 2006 minimum Federal acceptable efficiency. We will use 9.2 based on the federal standard 10 SEER and the conversion listed above.
EER_Eff	= EER of High Efficiency that the customer will install, provided by customer. If value is not provided by the customer we will use the conversion listed above.
GSHP_EER	= EER of High Efficiency that the customer will install, provided by customer.
GSHP_SEER	= EER/0.95
Standard_COP	= Coefficient of Performance of electric resistance heater = 1.00 The COP of an airsource heatpump in an existing home = 2.0 The COP of an airsource heatpump in a new home = 3.1.
GSHP_COP	= Coefficient of Performance of GSHP equipment that the customer will install, provided by the customer. We will use COP if EER is not available. Baseline GSHP COP assumed to be 3.1
GSHP_Size	=Size of Ground Source Heat Pump, provided by customer. We will divide size by 2 for GSHP cooling calculations based on REMRATE modeling of a new and an existing home adjusted for Denver Degree Days. The resulting kWh were divided by the connected load to derive the EFLHH value.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Loss_No_QI Loss_No_QI_GSHP	Efficiency of unit lost due to improper installation. This is the Baseline condition for Quality Installations. We will use 30.5% which is the summation of the following losses: Equipment sizing = 3%, Refrigeration Charge = 5%, Improper air flow = 2%, Duct leaks = 15%. Loss_No_QI_GSHP will be equal to the 2% improper air flow + 15% duct leaks = 17%.
Loss_QI	Efficiency of unit lost due to improper installation. All non-QI losses will be eliminated with quality install in a new home so the Loss_QI for a new home will be 0. In existing homes and all Plan B installations, all non-QI losses will be eliminated except for the duct leakage losses. Duct leakage losses in an existing home will be cut in half resulting in a Loss_QI for existing homes of 3.75%. Savings will be reduced for quality installation according to the percentages above when it is determined through M & V that one or more facets of quality installation (equipment sizing, refrigeration charge, proper airflow, duct leakage) fall outside the acceptable range according to industry standards.
CF	= Coincidence Factor, the probability that peak demand savings will coincide with peak utility system demand. - 0.90 will be used for prescriptive AC rebate equipment and WCCD - 1.0 will be used for quality install - 1.0 will be used for GSHP Cooling - 0.0 will be used for GSHP Heating
Measure Life	Measure life is taken at 14 years for all Plan A cooling equipment and 7 years for all Plan B cooling equipment, Quality Installations (Reference 2), and WCCD. Plan Life for GSHP is 20 years (Reference 3).
TDLF	Transmission-Distribution Loss Factor = 7.69%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2
NTG	Net-to-gross; we will use -67.6% for AC units which is calculated from High Efficiency AC Program Evaluation conducted in 2012. We will use 100% for GSHP.
Western Cooling Control Device (WCCD)	Savings Deemed based on internal analysis at 95 64 kWh and 0.155 0.105 kW
Future Value	Estimated cost of the standard replacement equipment at expected end of life of current equipment
Rate	Assumed interest rate. 7.88% used for discounting the future purchase price and 2.57% used for inflation to calculate the future purchase price based on current cost.
Number of Periods	Number of years expected until existing equipment end of life
Incremental operation and maintenance cost	= 0 - conservative approach, taking no credit for improved mean time between failure.
Incremental Capital Cost	Incremental cost of efficient equipment. Values listed in table 1 below. Values will be scaled for different equipment sizes. Plan A and Plan B incremental capital costs include \$200 \$250 for quality install.
Plan B Baseline Cost	Inflation rate. The inflated value was then discounted back to present value using Xcel's Weighted Average Cost of Capital for Colorado. An average repair cost of \$750 was then added to the present value to arrive at the baseline cost used to establish the incremental costs for the various options. See Table 2 for calculations.
GSHP Incremental Cost Split	Incremental Costs were split according to percentage of annual energy used for heating (81%) and percentage of annual energy used for cooling (19%).
Federal Tax Incentive:	30% of installed Cost of Energy Star Certified GSHP

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 1. Incremental Capital Costs

Unit Description	Current Year Purchase Price	Incremental Cost per ton Plan A	Incremental Cost Plan A	Baseline Plan B Cost	Incremental Cost per ton Plan B	Incremental Cost Plan B
13 SEER 3 ton unit	\$ 4,329	NA	NA	NA	NA	NA
14 SEER 3 ton unit	\$ 4,948	NA	NA	\$ 3,949	\$ 333.00	\$ 999
14.5 SEER 3 ton unit	\$ 5,050	\$ 240	\$ 720	\$ 3,949	\$ 366.83	\$ 1,100
15 SEER 3 ton unit	\$ 5,222	\$ 298	\$ 894	\$ 3,949	\$ 424.83	\$ 1,274
16 SEER 3 ton unit	\$ 5,569	\$ 413	\$ 1,239	\$ 3,949	\$ 539.83	\$ 1,619
17 SEER 3 ton unit	\$ 6,002	\$ 558	\$ 1,674	\$ 3,949	\$ 684.83	\$ 2,054
18 SEER 3 ton unit	\$ 6,435	\$ 702	\$ 2,106	\$ 3,949	\$ 828.83	\$ 2,486
Unit Description	Current Year Purchase Price	Incremental cost per ton Cooling	Incremental Cost per ton Heating	Incremental cost cooling	Incremental cost heating	
GSHP 14.1 EER 3.4 ton unit*	\$ 9,770	\$ 262	\$ 1,117	\$ 891	\$ 3,799	
GSHP 14.1 EER 6 ton unit*	\$ 16,790	\$ 262	\$ 1,117	\$ 1,572	\$ 6,704	

* Current Year Purchase Price for GSHP units is discounted by Federal Tax Incentive.

Incremental costs for unit sizes not listed will be interpolated/extrapolated from listed values

Incremental costs for GSHP to High Efficient GSHP will use the incremental cost table for standard A/C Units. This is due to a GSHP to HE GSHP the loop cost are the same so that cost is ignored. When the baseline system has electric resistance heat or is an air source heat pump the cost for the ground loop is included. The cost to install a GSHP loop is approximately \$2,005 per ton.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Provided by Customer: Plan A and Plan B

New cooling equipment type

New cooling equipment size (tons)

New cooling equipment efficiency (SEER, EER)

Type of home (Existing or New Construction)

Type of Existing Heating system (GSHP)

Provided By Installing Contractor: Plan B or GSHP

Make, model and serial number from existing condensing unit

Unit SEER and/or EER rating or COP for GSHP as given by the manufacturer

M&V Process

Evidence of Manual J load cal'cs and equipment sizing

Acceptable refrigerant charge

Acceptable air flow at coil

Acceptable range of duct leakage

Verified during M&V

Yes

Yes

Yes

Yes

Yes

Table 2. Plan B baseline present value

Discount Rate	7.88%	
10 Yr. Avg. Inflation Rate	2.57%	
SEER =	13 3 Ton Unit	
2014 Cost	\$ 4,329	Inc. Cost
2015	\$ 4,440	\$ 4,116
2016	\$ 4,555	\$ 3,914
2017	\$ 4,672	\$ 3,721
2018	\$ 4,792	\$ 3,538
2019	\$ 4,916	\$ 3,364
2020	\$ 5,042	\$ 3,199
2021	\$ 5,172	\$ 3,041
2022	\$ 5,305	\$ 2,892

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Assumptions:

Baseline equipment meets applicable minimum Federal standards for efficiency

Baseline equipment installation (for QI) has 30.5% efficiency losses.

Baseline equipment installation in Existing Homes has 26.75% efficiency losses

High efficiency equipment exceeds minimum Federal standards for efficiency

Installed equipment does not operate at optimum efficiency until a Quality Installation is completed.

To qualify for a rebate, each piece of equipment must meet the minimum EER and SEER requirements. The customer should provide both the EER and SEER values for the particular piece of equipment. If the customer is unable to provide both values, the value(s) not provided will be calculated using the equations shown above. If a value is not provided by the customer, the calculated value still must meet the minimum requirement.

10-year Average Inflation Rate = 2.57% (InflationData.com)

CO Weighted Average Cost of Capital = 7.88%

Average Cost of Central AC Repair=\$750 (EEBC)

Federal Tax Incentive: As part of the American Recovery and Reinvestment Act of 2009 a Federal Tax Incentive of 30% of the installed cost of a new Ground Source Heat Pump system is available to taxpayers through 2016.

GSHP New Home REMRATE Modeling = Larger , more tightly built, better insulated new home was modeled with GSHP COP of 3.3

GSHP Existing Home REMRATE modeling = Smaller, less tightly built, poorly insulated existing home was modeled with GSHP of 3.3.

GSHP Installed Loop Cost/Ton = \$2004 per loop per Ton

GSHP Baseline Equipment Cost combines AC unit and electric resistance heating

GSHP appropriate Quality Install savings included in modeling

No Heating kW saving are claimed for GSHP during winter, only summer cooling kW savings are claimed.

References:

1. Building America, Research Benchmark Definitions, p. 9
2. ASHRAE, 2007, Applications Handbook, Ch. 36, table 4, Comparison of Service Life Estimates
3. http://www.energysavers.gov/your_home/space_heating_cooling/index.cfm/mytopic=12640 (indoor components up to 25 years; ground loop =50 years)

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Home Energy Squad - CO**Description:**

Residential electric and natural gas customers can have energy efficiency measures directly installed while paying for certain material and/or contractor costs.
--

Program References:

CFL Lighting Measures	Refer to Product "CO Home Lighting & Recycling" formulas for (Gross kW, Gross Annual kWh, Gross Coincident kW, etc.) for the "Replace incandescent lamps with CFLs" measure.
CFL Lighting Measures	Refer to Product "CO Home Lighting & Recycling" reference table for "CFL" values.
LED Lighting Measures	Refer to Product "CO Home Lighting & Recycling" formulas for (Gross kW, Gross Annual kWh, Gross Coincident kW, etc.) for the "Replace incandescent lamps with LEDs" measure.
LED Lighting Measures	Refer to Product "CO Home Lighting & Recycling" reference table for "LED" values.
Measure "Direct Install - Low-Flow Showerhead"	Refer to Product "CO Energy Efficient Showerhead" formulas for (Gross kW, Gross Annual kWh, Gross Coincident kW, etc.) for the "Provide Efficient Showerhead" measure.
Measure "Direct Install - Low-Flow Showerhead"	Refer to Product "CO Energy Efficient Showerhead" reference table for "Low-Flow Showerhead" values.
Measure "Direct Install - Kitchen Aerator"	Refer to Product "CO Energy Efficient Showerhead" formulas for (Gross kW, Gross Annual kWh, Gross Coincident kW, etc.) for the "Provide Kitchen Faucet Aerator" measure.
Measure "Direct Install - Kitchen Aerator"	Refer to Product "CO Energy Efficient Showerhead" reference table for "Kitchen Aerator" values.
Measure "Direct Install - Bath Aerator"	Refer to Product "CO Energy Efficient Showerhead" formulas for (Gross kW, Gross Annual kWh, Gross Coincident kW, etc.) for the "Provide Bath Faucet Aerator" measure.
Measure "Direct Install - Bath Aerator"	Refer to Product "CO Energy Efficient Showerhead" reference table for "Bath Aerator" values.
Measure "Weatherstrip Door"	Refer to Product "CO Insulation" formulas for (Gross kW, Gross Annual kWh, Gross Coincident kW, etc.) for the "Air Sealing" measure.
Measure "Weatherstrip Door"	Refer to Product "CO Insulation" reference table for "Air Sealing" values with the following exceptions: CFM50_Baseline and CFM50_Proposed are calculated below in the equations section.

Equations:

Programmable Thermostat Electrical Energy Savings (Gross Annual kWh)	= Cooling_Delta_T x kWh_Savings_per_Degree
Programmable Thermostat Electric Demand Savings (Gross kW)	= Cooling_Delta_T x kW_Savings_per_Degree
Programmable Thermostat Gas Savings (Gross Dth/Yr)	= Heating_Delta_T x Dth_Savings_per_Degree
Water Heater Blanket Electrical Energy Savings (Gross Annual kWh)	= (HLF before - HLF with blanket) x 8760 / HE_Elec / 3412 = 550 kWh
Water Heater Blanket Electrical Demand Savings (Gross kW)	= (HLF before - HLF with blanket) x 8760 / HE_Elec / 3412 / Hr Operation = 0.06 kW
Water Heater Blanket Gas Savings (Gross Dth/Yr)	= (HLF before - HLF with blanket) x 8760 / HE_Gas / 1,000,000 = 2.17 Dth
CFM50_Baseline	= (Air_Gap_Base X Gap_Length)/LAF, CFM at 50 pascals similar to blower door tests results. For use in "Air Sealing" equations.
CFM50_Proposed	= (Air_Gap_Eff X Gap_Length)/LAF, CFM at 50 pascals similar to blower door test results. For use in "Air Sealing" equations.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Variable ID	Value	Description
HE_Elec	0.9172	Heat generation efficiency for electric water heater based on steady-state water heater efficiency.
HE_Gas	0.80	Heat generation efficiency for gas water heater based on steady-state water heater efficiency.
Hr_Operation	8760	Annual water heater "on" time
HLF_before	441	Heat loss from a 50 gallon water heater with an 1" fiberglass insulation at 140 degrees, Btu/hr
HLF_with_blanket	352.8	Heat loss from a 50 gallon water heater with a 1" fiberglass insulation at 140 degrees plus an additional 2" fiberglass blanket, Btu/hr
Cooling_Delta_T	Vendor Input	Average difference between normal operation and cooling setback temperature in degrees F based on information provided by the customer during the interview.
KW_Savings_per_Degree	0.109	kW per degree F of setback (Reference 1, 2)
kWh_Savings_per_Degree	90.90	kWh per degree F of setback (Reference 1, 2)
KW_Savings_per_Degree_2	0.054	kW per degree F of setback for second thermostat = half of savings for first thermostat (Reference 1, 2)
kWh_Savings_per_Degree_2	45.45	kWh per degree F of setback for second thermostat = half of savings for first thermostat (Reference 1, 2)
Heating_Delta_T	Vendor Input	Average difference between normal operation and heating setback temperature in degrees F based on information provided by the customer during the interview.
Dth_Savings_per_Degree	1.754	Dth per degree F of setback (Reference 1, 2)
Dth_Savings_per_Degree_2	0.877	Dth per degree F of setback for second thermostat = half of savings for first thermostat (Reference 1, 2)
Air_Gap_Base	0.56	Square Inches per linear foot of door gap, Assumed air gap for door without weatherstripping. (Reference 5)
Air_Gap_Eff	0.15	Square Inches per linear foot of door gap, Assumed air gap for door with weatherstripping. (Reference 5)
Gap_Length	Vendor Input	Length of weatherstripping installed. Provided by contractor.
Air_Density	See Table 2	Density of air, Lbm / ft^3
LAF	See Table 2	Leakage Area Factor calculated from formula below for use in calculating CFM50 from a gap area in the building envelope. Values for different climate zones provided in table 2. "= 0.186 X SQRT (Air_Density / (2 X Ref_Pressure)) / Discharge_Coefficient"
Ref_Pressure	0.20	Reference pressure, inches WC, equivalent to 50 Pa
Discharge_Coefficient	1.00	Discharge coefficient for opening, dimensionless
Coincidence Factor	See Table 1	Coincidence Factor for programmable thermostat, door weatherstrip, and water heater blanket.
Measure Life	See Table 1	Measure life for programmable thermostat, door weatherstrip, and water heater blanket.
Incremental Cost	See Table 1	Incremental cost for second programmable thermostat, second door weatherstrip.
NTG	100%	Net-to-gross factor. Assumed to be 100% for a new program.

Table 1: Measure Life, Coincidence Factor, and Hours (Reference 3)

Type of measure:	Measure life:	Incremental Cost:	Coincidence Factor:	Hours of Operation
Programmable thermostat (Cooling)	15	\$ 30	90%	
Programmable thermostat (Heating)	15	\$ 30	0%	
Weatherstripping (electrically heated and cooled homes)	10	\$ 10	19%	
Weatherstripping (electrically cooled and gas heated homes)	10	\$ 10	90%	
Water heater blanket elec HW	7.5	na	100%	8760

Table 2: Leakage Area Factor (Reference 4)

Front Range	Front Range	Western Slope	Mountain
Air Density	0.06190000	0.06290000	0.05650000
Leakage Area Factor	0.07304822	0.07363591	0.06978925

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. Consumer Electronics Characteristics <http://standby.lbl.gov/summary-table.html>
4. 2013 ASHRAE Fundamentals, Chapter 16
5. Door leakage from Colorado Energy Office website: http://www.coloradoenergy.org/procorner/stuff/window_air_leakage.htm

Changes from Last Filing

N/A New Product

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Home Lighting & Recycling

Home Lighting product encourages the purchase of compact fluorescent lamps (CFLs) and Light Emitting Diodes (LEDs) and recycling of all fluorescent lamps.

Algorithms:

Electrical Energy Savings (Gross Annual kWh Saved at Customer per unit)	=Number_of_Bulbs x (kW_Savings_per_Bulb) x Hours
Electrical Demand Savings (Gross kW Saved at Customer per unit)	=Number_of_Bulbs x (kW_Savings_per_Bulb)
Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLF)
Electrical Demand Savings (Gross Coincident kW Saved at Customer per Unit)	= Customer kW x CF / (1-TDLF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG x Realization Rate
Electrical Demand Savings (Net Coincident kW Saved at Generator per Unit)	= Gross Generator kW x NTG x Realization Rate

Variables:

Number_of_Bulbs	= Number of bulbs sold
kW_Savings_per_Bulb	= kW savings per replaced bulb. We will subtract the manufacturer provided wattage for each CFL/LED from the wattage of the halogen bulb it replaces. The halogen wattages will be determined based on the CFL/LED wattage as seen in Table 1.
Hours of operation	= Hours of operation per year for the bulb. Hours of operation for residential installations is assumed to be 1.9 hours per day (693.5 hrs) Hours of operation for non-residential purchases are 2,450.5 hours 94% of all bulbs purchased are assumed to be residential and 6% are assumed to be non-residential. Reference 1
Measure Life	= Measure life for the average bulb sold will be equal to the lifetime hours divided by the annual hours of operation. CFL lifetime hours = 10,000 LED lifetime hours = 25,000 Reference 1
CF	= Probability that peak demand of the bulb will coincide with peak utility system demand. 0.08 will be used for all residential CFLs\LEDs 0.7246 will be used for all non residential CFLs\LEDs. (From business program) Reference 1
TDLF	= Total Distribution Loss Factor, Residential = 7.69%, Non-residential = 6.51%

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Incremental Cost of Bulbs	= See Table 2
Net-to-Gross Factor	= We will use 70% for residential CFL's and 100% for residential LED's
Realization Rate	= 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 = 99% of the savings if all bulbs are installed when purchased
O&M savings	= Operation and Maintenance savings are assumed to be zero.

Provided by product Vendor:

Number and type of bulbs purchased

Verified during M&V:

Yes

Assumptions:

The baseline bulb is a blend between the EISA standards (Halogen bulbs) and available incandescent bulbs

The baseline bulb cost is deemed as stated in table 2 below

The efficient LED bulb cost will be tracked and updated at the end of the year to account for the rapidly evolving market and cost for LED bulbs.

Non EISA impacted lights will use incandescent baseline

Table 1 - EISA impacted lighting wattage for residential lights

Bulb Wattage Table						
Eff Watts	Baseline Watt		Eff Watts	Baseline Watt		Baseline Watts LED
	CFL	LED		CFL	LED	
4		29.00	19	53.00	72.00	
5		29.00	20	53.00	72.00	
6		29.00	21	53.00	72.00	
7	29.00	43.00	22	53.00	72.00	
8	29.00	43.00	23	72.00	72.00	
9	29.00	43.00	24	72.00	72.00	
10	29.00	43.00	25	72.00	150.00	
11	29.00	53.00	26	72.00	150.00	
12	29.00	53.00	27	72.00	150.00	
13	43.00	53.00	28	72.00	150.00	
14	43.00	53.00	29	72.00	150.00	
15	43.00	53.00	30	72.00	150.00	
16	43.00	72.00	31	150.00	150.00	
17	43.00	72.00	32	150.00	150.00	
18	43.00	72.00	>=32	150.00	150.00	

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Table 2 - Average Cost Table

	CFLs	LEDs 2015*	LEDs 2016*
Gross Retail (per bulb)	\$ 2.69	\$ 16.25	\$ 14.88
Baseline (per bulb)	\$ 0.95	\$ 1.89	\$ 1.89
Incremental	\$1.74	\$ 14.36	\$ 12.99
Rebate	\$ 1.15	\$ 5.25	\$ 4.75
Net Retail	\$0.59	\$9.11	\$8.24

* = See note above on LED costs throughout the program year.

References:

1. Michaels Tech Assumptions Review 2013
2. 2013 Program Results compiled by WECC (program administrator)

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Home Performance with ENERGY STAR

Description:

Home Performance with Energy Star program, residential natural gas and electric customers receive a cash rebate for implementing multiple energy efficiency improvements.

The Home Performance with ENERGY STAR Product provides a "systems approach" to comprehensive energy improvements. Public Service uses this approach by requiring an upgraded home "shell," including code level attic insulation and a reduction in air infiltration coupled with a combustion safety check if naturally vented combustion appliances (furnace/boiler or water heater) remain in the home after product participation.

Product savings were determined by using a surrogate computer modeled home (modeled with Energy Gauge) with characteristics that approximate the most common home attributes as reported in the 2005 Home Use Survey and the energy consumption characteristics of the metropolitan Denver general housing stock excluding low-income customers. Low-income customers may participate in this product, but also have dedicated product offerings. Savings were determined by modeling the required improvements for the product (attic insulation and air infiltration control) and setting a secondary "baseline", then adding the product "options" to the model. Wall insulation, programmable thermostat impacts, furnace and water heater improvements were modeled with this technique.

Program References:

Measures "Attic Insulation", "Wall Insulation", and "Air Sealing"	Refer to Program "Insulation Rebates - CO" to find formulas for (Gross kW Saved at Customer, Gross kWh Saved at Customer, Customer PCKW, etc.) for all "Attic Insulation", "Wall Insulation", and "Air Sealing" measures.
---	---

Lighting Algorithms:

CFL Gross kW Saved at Customer	= (kW_Bulb_Existing - kW_Bulb_New) x (#_CFL_After - #_CFL_Before)
CFL Gross Annual kWh Saved at Customer	= (kW_Bulb_Existing - kW_Bulb_New) x (#_CFL_After - #_CFL_Before) x (CFL_Hours_Per_Bulb)

Thermostat Algorithms:

Setback Thermostat Gross kW Saved at Customer	= Setback thermostat kWh / Hours_Electric_Cooling
---	---

Heating System Algorithms:

Measures "Heating Efficiency"	Refer to Program "Residential Heating - CO" to find formulas for (Customer Dth, Gross kW Saved at Customer, Gross kWh Saved at Customer, Customer PCKW, etc.) for all "Heating Efficiency" measures.
-------------------------------	--

Water Heater Algorithms:

Measures for "Water Heating Efficiency"	Refer to Program "Water Heating - CO" to find formulas for (Customer Dth, Gross kW Saved at Customer, Gross kWh Saved at Customer, Customer PCKW, etc.) for all "Water Heating Efficiency" measures including condensing water heaters, instantaneous water heaters, and heat pump water heaters.
---	---

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Appliance Algorithms:

Measures for "Energy Star Dishwasher" "Energy Star Clothes Washer" and "Energy Star Refrigerator"	Refer to Program "Energy Star New Homes - CO" to find formulas for (Gross kW Saved at Customer, Gross kWh Saved at Customer, Customer PCKW, etc.) for all "Energy Star appliance" measures.
---	---

Evaporative Cooling Algorithms:

Measures for "Evaporative Cooling"	Refer to Program "Evaporative Cooling - CO" to find formulas for (Gross kW Saved at Customer, Gross kWh Saved at Customer, Customer PCKW, etc.) for all "Evaporative Cooling" measures.
------------------------------------	---

Algorithms For Split System Air Conditioners and Air Source Heat Pumps and Ground Source Heat Pumps:

Measures for "Air Conditioning" and "Ground Source Heat Pumps"	Refer to Program "Air Conditioning - CO" to find formulas for (Gross kW Saved at Customer, Gross kWh Saved at Customer, Customer PCKW, etc.) for all "Air Conditioning", "Ground Source Heat Pump" and "Quality Install" measures.
--	--

Envelope Variables:

Measures "Attic Insulation", "Wall Insulation", and "Air Sealing"	Refer to Program "Insulation Rebates - CO" to find reference table for Measure Life, Deemed and Customer Inputs, Heating and Cooling Degree Days, Climate Zone data, Heating and Cooling Hour Data values.
Coincidence Factor (CF) Heating	Probability that savings will occur during Xcel's system peak periods (0% since heating savings only)
Measures for "Air Conditioning"	Probability that savings will occur during Xcel's system peak periods. Refer to Program "Air Conditioning - CO" to find reference table for Measure Life, Coincidence Factors Deemed and Customer Inputs,

Heating System Variables:

Measures "Heating Efficiency"	Refer to Program "Residential Heating - CO" to find references for Heating Degree Days, Heating Hours, Incremental Cost, measure life, EC Motor Fan Efficiency, baseline heating efficiency, oversize factors, and EC Motor Oprating Hours values.	
Effn	Customer Input	= Efficiency of the newly installed natural gas heating unit. We will use the nameplate value provided by the customer.
BTUH	Customer Input	= Size of the newly installed natural gas heating unit. We will use the nameplate value provided by the customer.

Water Heating Variables:

Measures "Water Heating Efficiency"	Refer to Program "Water Heating - CO" to find references for baseline water heater efficinecy, tank sizes, incremental costs, heating penalty and cooling benefit values.	
-------------------------------------	---	--

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Lighting Variables:

#_CFL_After	Customer Input	= Number of CFL bulbs present in the home after the upgrade (minimum of 20), provided by customer
#_CFL_Before	Customer Input	= Number of CFL bulbs present in the home before upgrade, provided by the customer
Measures "CFLs"	Refer to Program "Home Lighting and Recycling - CO" to find values for kW_Bulb_Existing, kW_Bulb_New, and Average CFL Hours per lamp, Coincidence Factors, Incremental Costs, and Measure Life.	

Appliance Variables:

Measures for "Energy Star Dishwasher" "Energy Star Clothes Washer" and "Energy Star Refrigerator"	Refer to Program "Energy Star New Homes - CO" to find formulas for (Customer kW, Customer kWh, Customer PCkW, etc.) for all "Energy Star appliance" measures.
Measures for "Refrigerator recycling"	Refer to Program "Refrigerator Recycling - CO" to find formulas for (Customer kW, Customer kWh, Customer PCkW, etc.) for refrigerator recycling measures.

Thermostat Set Back Variables:

Setback thermostat natural gas savings (Gross Dth)	4.19	Average temperature setback of 1.33 degree F for Heating Season and baseline home heating is 61.6 DTherms / year. Savings is = 4.19 DTherms / year.
Setback thermostat Electric Energy savings (kWh)	121	Average temperature setback of 1.33 degree F for Heating Season and 2.4 Degree F for Cooling Season. Baseline cooling energy per year is 1,901 kWh and the annual savings is 121 kWh / year.
Setback Thermostat Coincidence Factor	See Table 1	
Setback Thermostat Measure Life	See Table 1	
Setback Thermostat Incremental Cost	See Table 1	

Evaporative Cooling Variables:

Measures for "Evaporative Cooling"	Refer to Program "Evaporative Cooling - CO" to find references and tables for Measure Life, Coincidence Factors, Customer Inputs, kWh savings, kW savings, water consumption and O&M Costs.
Measures for "Air Conditioning"	Refer to Program "Air Conditioning - CO" to find references and tables for Measure Life, Coincidence Factors, Customer Inputs, kWh savings, kW savings, Quality Install savings percents, O&M Costs, etc.

General Variables:

3412	Conversion from BTU to kWh, 1kWh = 3412 BTU
NTG	Net-to-Gross Factor = We will use 116% based on Reference 1.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Inputs:

Type of Measures Implemented	Customer Input					
Actual cost of Attic Insulation	Customer Input					
Actual Cost of Air Sealing	Customer Input					
BTUH size of new fuel fired heating equipment	Customer Input					
EFFn of new heating equipment	Customer Input					
EFn of new domestic water heating equipment	Customer Input					
Blower Door Test-in CFM50	Customer Input					
Blower Door Test-out CFM50	Customer Input					
Climate Zone (Front Range, Western Slope, or Mountains)	Customer Input					
Number of Stories above grade in Home	Customer Input					
Conditioned Square Footage	Customer Input					

Tables:**Table 1 (Reference 1):**

Type of measure:	Measure life:	Incremental cost:	Coincidence Factor
Setback thermostat	5 years (Reference 2)	\$50 (Reference 2)	0% Heating Only 81% w/ Central A/C

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Assumptions:

The baseline home had an existing level of insulation in the attic of R-19 and the change case had an elevated insulation level of R-40.

Any home with an existing ACH natural of 0.45 ACH will not be eligible for the air sealing measure.

A Blower Door Test will be required for all participating homes.

The Attic Bypass Air Sealing energy savings will be captured with Air Sealing and Weather Stripping measure.

TMY3 Climate Data used for the following areas: Front Range = Denver; Western Slope = Grand Junction; Mountains = Alamosa

The NTG for the Tier 1 evaporative coolers is 59.7%. This was determined in the 2006 Summit Blue Consulting report. The NTG for the Tier 2 evaporative Qualifying Evaporative Cooling Equipment must be new and be a permanently installed direct (Tier 1 or 2), indirect or two-stage evaporative cooling unit. Portable

References:

1. COLORADO HOME PERFORMANCE WITH ENERGY STAR® PROGRAM EVALUATION Printed May 2014
3. Xcel Energy estimate

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Insulation and Air Sealing Rebate**Description:**

Residential natural gas and/or electric customers receive a cash rebate for installing insulation in their existing single-family home or one-to-four unit property.

Wall Insulation Equations:

Customer Dth	= (1 / R_Wall_Base - 1 / R_Wall_Proposed) * Wall_Area * HDD * 24 / 1,000,000 / Heating_Eff_Gas
Cooling_kWh	= (1 / R_Wall_Base - 1 / R_Wall_Proposed) * Wall_Area * CDD * 24 / 3,412 / Cooling_Eff
Heating_kWh	= (1 / R_Wall_Base - 1 / R_Wall_Proposed) * Wall_Area * HDD * 24 / 3,412 / Heating_Eff_Elec
Gross Annual kWh Saved at Customer	= Cooling_kWh + Heating_kWh
Gross kW Saved at Customer	= Gross Annual kWh Saved at Customer / (Cooling_Hours + Heating_Hours)
Customer PCkW	= Cooling_kWh / Cooling_Hours

Attic Insulation Equations:

Customer Dth	= (1 / (2 + R_Attic_Base) - 1 / (2 + R_Attic_Proposed)) * Attic_Area * HDD * 24 / 1,000,000 / Heating_Eff_Gas
Cooling_kWh	= (1 / (2 + R_Attic_Base) - 1 / (2 + R_Attic_Proposed)) * Attic_Area * CDD * 24 / 3,412 / Cooling_Eff
Heating_kWh	= (1 / (2 + R_Attic_Base) - 1 / (2 + R_Attic_Proposed)) * Attic_Area * HDD * 24 / 3,412 / Heating_Eff_Elec
Gross Annual kWh Saved at Customer	= Cooling_kWh + Heating_kWh
Gross kW Saved at Customer	= Gross Annual kWh Saved at Customer / (Cooling_Hours + Heating_Hours)
Customer PCkW	= Cooling_kWh / Cooling_Hours

Air Sealing Equations:

Customer Dth	= (CFM50_Baseline - CFM50_Proposed) / N_Winter * ATF * HDD * 24 / Heating_Eff_Gas / 1,000,000
Cooling_kWh	= (CFM50_Baseline - CFM50_Proposed) / N_Summer * ATF * CDD * 24 / Cooling_Eff / 3,412
Heating_kWh	= (CFM50_Baseline - CFM50_Proposed) / N_Winter * ATF * HDD * 24 / Heating_Eff_Elec / 3,412
Gross Annual kWh Saved at Customer	= Cooling_kWh + Heating_kWh
Gross kW Saved at Customer	= Gross Annual kWh Saved at Customer / (Cooling_Hours + Heating_Hours)
Customer PCkW	= Cooling_kWh / Cooling_Hours

Variable ID	Value	Description
R_Wall_Base	4.41	R-Value for baseline wall insulation, calculated assuming no cavity insulation
R_Wall_Proposed	13.09	R-Value for proposed wall insulation, calculated assuming R-11 cavity insulation
Wall_Area	Customer Input	Square footage of wall insulation added, provided by customer
R_Attic_Base	Customer Input	R-Value for baseline attic insulation, provided by customer
R_Attic_Proposed	Customer Input	R-Value for proposed attic insulation, provided by customer
Attic_Area	Customer Input	Square footage of attic insulation added, provided by customer
Heating_Efficiency_Gas	See Table 1	Heating Efficiency is determined based on the customer's heating system type.
Cooling_Eff	See Table 2	Cooling Efficiency is determined based on the customer's cooling system type.
Heating_Efficiency_Elec	See Table 1	Heating Efficiency is determined based on the customer's heating system type.
CFM50_Baseline	Customer Input	Blower Door test air leakage rate at 50 pascals maintained pressure, measured in cubic feet per minute. The contractor will capture actual readings.
CFM50_Proposed	Customer Input	Blower Door test air leakage rate at 50 pascals maintained pressure, measured in cubic feet per minute. The contractor will capture actual readings.
N_Winter	See Table 3	Conversion factor used to relate actual measured CFM leakage rate (taken at a reference pressure of 50 pascals) to a natural CFM of infiltration
N_Summer	See Table 3	Conversion factor used to relate actual measured CFM leakage rate (taken at a reference pressure of 50 pascals) to a natural CFM of infiltration
ATF	See Table 4	Air Transfer Factor is a conversion factor for calculating BTU/hour from airflow in CFM
HDD	See Table 4	Heating Degree Days base 65, based on TMY3 data.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

CDD	See Table 4	Cooling Degree Days base 65, based on TMY3 data.
Conversion from Btu to Dth	1,000,000	1 Dth = 1,000,000 Btuh
Conversion from Btu to kWh	3,412	1 kWh = 3,412 Btuh
Cooling Hours	613	Full load cooling hours as determined by the Residential Cooling program
Heating Hours	818	Full load heating hours as determined by the Residential Heating program
Incremental Cost	Customer Input	Cost of the insulation or air sealing is provided by the customer
Measure Lifetime	See Table 5	(Reference 1)

	Heating_Eff_Gas	Heating_Eff_Elec
Air Source Heat Pump	0.00	2.00
Electric Resistance	0.00	1.00
Ground Source Heat Pump	0.00	4.00
Natural Gas	0.78	0.00

	Cooling_Eff
AC/Air Source Heat Pump	2.93
Evap or None	0.00
Ground Source Heat Pump	4.00

Stories	N_Winter			N_Summer		
	Front Range	Western Slope	Mountain	Front Range	Western Slope	Mountain
1	14,328	16,021	15,138	19,313	18,405	18,321
2	11,282	12,405	11,52	16,449	15,969	14,762
3	9,713	10,577	9,73	14,932	14,712	12,89

	Front Range	Western Slope	Mountain
ATF	0.891	0.906	0.813
HDD	6,016	5,580	9,015
CDD	1,116	1,452	434

	Lifetime
Wall Insulation	20
Attic Insulation	20
Air Sealing	10

References:

1. California Measurement Advisory Committee (CALMAC) Protocols, Appendix F (www.calmac.org/events/APX_F.pdf).
2. 2013 ASHRAE Fundamentals, Chapter 16
3. Engineering Toolbox; Air Densities; http://www.engineeringtoolbox.com/air-altitude-density-volume-d_195.html

Changes from Recent Filing:

1. Recalculated Summer and Winter N Factors
2. Changed Attic Insulation and Wall Insulation measures to use the standard heat transfer formula, instead of a kWh/sqft or Dth/sqft

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Refrigerator Recycling

Rebates will be offered for pickup of a primary or secondary working refrigerator or freezer that will be demanufactured and re-cycled. Program will be offered only during select periods throughout the year to increase the likelihood of a customer participating the program.

Algorithms:

Refrigerator Electrical Energy Savings (Gross Annual kWh Saved at Customer per unit)	= Base kWh - Efficient kWh
Refrigerator Electrical Demand Savings (Gross kW Saved at Customer per unit)	= Customer kWh / Hours_of_operation
Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLF)
Electrical Demand Savings (Gross Coincident kW Saved at Customer per Unit)	= Customer kW x CF / (1-TDLF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh * NTG
Electrical Demand Savings (Net Coincident kW Saved at Generator per Unit)	= Gross Coincident kW x NTG

Variables:

Baseline Product Consumption - Base kWh	= Baseline Product Consumption is the predicted future consumption of refrigerator being removed as seen in Table 1 based on the year of manufacture which will be provided by the vendor for each refrigerator. (Reference 1)
Efficient Product Consumption - Efficient kWh	= Efficient Product Consumption is 0 kWh when unit has been demanufactured. All units are removed from service and recycled so they can not be installed at another location.
Measure Life	= Measure life is assumed to be the remaining service life of the existing secondary refrigerators that are removed under this program. = 8.0 years (Reference 2). Primary refrigerators and freezers = 9.7 years (Reference 6)
Incremental Costs	= Estimated to be \$0 as the customer does not pay to recycle the refrigerator or freezer.
TDLF	Energy Loss Factor = 7.70%, the percentage loss of electricity as it flows from the power plant to the customer
O&M savings	= Operation and Maintenance savings are assumed to be zero for refrigerator recycling.
CF	= Coincidence Factor = 55%; probability that refrigerator will be operating during the peak period. (Reference 3)

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Hours of Operation	= 4,818 hr/yr (Reference 3)
Freezer Product Consumption	= 85% of the refrigerator usage (Reference 4)
NTG	= Net to gross will be 61% for secondary refrigerator recycling (Reference 5) and will be 52.5% for primary units (Reference 6)

Needed from Customer/Vendor/Administrator for Calculations:

Confirm removal of working refrigerator

Year of manufacture for the working refrigerator

Assumptions:

Rebates are available only for working units. Primary units, secondary units and standalone freezers

Primary Units are removed and recycled under the assumption if they were not recycled they would become a secondary unit

Table 1
Deemed Savings by Age of Refrigerator (Reference 1)

Year of Manufacture	Deemed Savings kWh
1970	2,271
1971	2,258
1972	2,244
1973	2,150
1974	2,114
1975	2,032
1976	1,914
1977	1,848
1978	1,788
1979	1,676
1980	1,539
1981	1,449
1982	1,425
1983	1,395
1984	1,379
1985	1,262
1986	1,257
1987	1,138
1988	1,127
1989	1,072
1990	1,083
1991	1,077

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

1992	1,071
1993	764
1994	760
1995	755
1996	751
1997	746
1998	742
1999	737
2000	733
2001 to present	510

References

1. Baseline kWh and Average to peak kW ratio from Energy Data Sourcebook for the U.S. Residential Sector. Berkeley, CA: Lawrence Berkeley National Laboratory. LBNL-40297
2. 9th year Persistence Study for Southern California Edison KEMA - Xenergy; 2004
3. Coincidence factor is Average load factor from Appliance Recycling Centers of America (ARCA)
- 4.KEMA-XENERGY (2004). Final Report, Measurment and Evaluation Study of 2002 Statewide Residential Appliance Recycling Program. February 13, 2004
5. Net-to-Gross factor from Fort Collins, CO Utility report
6. *Primary Refrigerators: An Examination of Appliance Recycling Program Design* Kate Bushman, The Cadmus Group, Inc., Portland, OR

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Residential Heating - CO**Description:**

Residential natural gas customers receive a cash rebate for purchasing high-efficiency heating equipment. Residential electric customers can receive an additional cash rebate for purchasing an electronically commutated motor (ECM) furnace fan with their heating system.

Equations:

New Furnace & Boiler Savings (Gross Dth)	= ((BTUH x EFFp / EFFb) - BTUH) x Hours / 1,000,000
ECM Furnace Fan Efficiency Electric Demand Savings (Gross kWSaved at Customer)	= ECM_Baseline_kw - ECM_Proposed_kw
ECM Furnace Fan Efficiency Electric Demand Savings (Gross Generator kW)	= Customer_kw * Coincidence_Factor
ECM Furnace Fan Efficiency Electric Energy Savings (Gross Annual kWh Saved at Customer)	= Customer_kw x ECM_Operating_Hours

Variable ID	Value	Description
BTUH	Customer Input	Rated new furnace or boiler Input BTUH nameplate data provided by customer on rebate form.
EFFb	See Table 1	Efficiency of baseline code minimum boiler or furnace (Reference 1)
EFFp	Customer Input	Efficiency for higher efficiency furnace will be provided by the customer on the rebate form.
Hours	818	Equivalent Full Load Heating Hours assumed for Furnace and Boiler equipment
Conversion from Btu to Dth	1,000,000	1 Dth = 1,000,000 Btuh
ECM_Baseline_kw	0.208	Average PSC furnace fan kW (Reference 4, 5)
ECM_Proposed_kw	0.090	Average ECM furnace fan kW (Reference 4, 5)
ECM_Operating_Hours	See Table 2	ECM furnace fan hours of operation
Coincidence_Factor	See Table 2	Percentage of Customer_kw savings that will coincide with peak summer kW savings
NTG	See Table 1 & 2	Net to Gross

Inputs:

Verified during M&V:	
Furnace Efficiency	Yes
Furnace Nameplate Capacity of new unit at sea level (BTUH, Input)	Yes
Was ECM furnace fan motor provided	Yes
Does residence have central air conditioning	Yes

Table 1	EEFb	Measure Life	Incremental Cost	NTG
		(Reference 2)	(Reference 5)	
Furnace (78% 2015 Baseline)	78%	18	\$519.95	77%
Furnace (80% 2016 Baseline)	80%	18	\$519.95	77%

Table 2	ECM_Operating_Hours	Measure Life	Incremental Cost	Coincidence Factor	NTG
		(Reference 4)	(Reference 5)		
ECM w/ AC	8,755	18	\$464.33	88%	94%
ECM w/o AC	8,288	18	\$464.33	73%	94%

References:

1. US Department of Energy; Residential Furnaces and Boilers; http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/72
2. 2011 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. Center for Energy and Environment Comments to Docket Number EERE-2010-BT-STD-0011-0022, July 27, 2010
5. California Energy Commission's Database for Energy Efficient Resources (DEER) <http://www.energy.ca.gov/deer>

Changes from Recent Filing:

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

- 1. Baseline efficiency for boilers increased to 82% per federal standards.
- 2. Updated calculation for heating EFLH to use TMY3 data for Denver.
- 3. Updated ECM kW, Hours, and CF calculation to account for PSC motor standby time.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: School Education Kit
Description:

A package of home energy efficiency measures in a kit that can be distributed to 6th grade students. Each participant receives a kit containing five compact fluorescent bulbs, one LED bulb, a low flow shower head, a kitchen faucet aerator, and a bathroom faucet aerator.

Program References:

Mearsures "Provide Efficient Showerhead"	Refer to Program "Energy Efficient Showerhead - CO" to find formulas for Customer Dth, Customer kWh, customer kW, customer PCKW, etc. for the "Efficient Showerhead" measures.
Measures "Provide Efficient Kitchen Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find formulas for Customer Dth, Customer kWh, customer kW, customer PCKW, etc. for the "Efficient Kitchen Faucet Aerator" measure.
Measures "Provide Efficient Bath Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find formulas for Customer Dth, Customer kWh, customer kW, customer PCKW, etc. for the "Efficient Bath Faucet Aerator" measure.
Measures "Replace incandescent lamps with CFLs"	Refer to Program CO Home Lighting & Recycling to find formulas for Customer kW, Customer kWh, Customer PCKW for the "CFL" measure.
Measures "Replace incandescent lamps with LEDs"	Refer to Program CO Home Lighting & Recycling to find formulas for Customer kW, Customer kWh, Customer PCKW for the "LED" measure.
Measure "Provide Efficient Showerhead"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for "Gas Split Factor", "Measure Life", "Hours", "Coincidence Factor", etc values.
Measures "Provide Efficient Kitchen Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for "Gas Split Factor", "Measure Life", "Hours", "Coincidence Factor", etc values.
Measures "Provide Efficient Bath Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for "Gas Split Factor", "Measure Life", "Hours", "Coincidence Factor", etc values.
Measures "Replace incandescent lamps with CFLs"	Refer to Program "Home Lighting and Recycling - CO" to find references and tables for "Measure Life", "Hours", "Coincidence Factor", etc values.
Measures "Replace incandescent lamps with LEDs"	Refer to Program "Home Lighting and Recycling - CO" to find references and tables for "Measure Life", "Hours", "Coincidence Factor", etc values.
Measure "Provide Efficient Showerhead"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for Operation and Maintenance cost savings value due to water savings.
Measures "Provide Efficient Kitchen Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for Operation and Maintenance cost savings value due to water savings.
Measures "Provide Efficient Bath Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for "Operation and Maintenance cost savings", value due to water savings.

Algorithms:

Gas Savings (Gross Dth)	= Customer Dth x (# kits distributed)
Gas Savings (net Dth)	= Customer Dth x NTG
Electrical Energy Savings (Net Gen kWh)	= Customer Generator kWh x NTG x Install Rate
Electrical Demand Savings (Net Gen kW)	= Customer Generator kW x NTG x Install Rate

Variables:

Incremental Costs	= costs provided by vendor.
Net-to-Gross Factor (NTG)	= We will use 100% for school education kits as these kits would not be available without the product.
Install Rate	= Actual Installation Rates will be collected as part of the M&V exercise. For these assumptions, an install rate of 60% for CFLs and 40% for showerheads and aerators has been assumed.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Inputs:**Provided by Customer:**

Number of kits distributed
 Number of 13 Watt CFLs installed
 Number of 18 Watt CFLs installed
 Was LED installed
 Was showerhead installed
 Was Kitchen aerator installed
 Was Bath aerator installed

Verified during M&V:

Yes
 Yes
 Yes
 Yes
 Yes
 Yes
 Yes
 Yes

Assumptions:

Savings shown above include homes with either electric or gas water heaters. The Energy Efficient Showerhead - CO program monitors and establishes a gas split factor for use in homes where the water heater type is unknown. Energy Savings Kits will use the Energy Efficient Showerhead - CO program's gas split factor for unknown water heater types to calculate and claim energy savings.

Showerhead savings are based on the Energy Efficient Showerhead - CO program's second showerhead assumptions which have reduced usage compared to the first showerhead.

Tables:

See Reference Programs

References:

See Reference Programs
 Energy Efficient Showerhead - CO
 Home Lighting and Recycling - CO

Changes from Recent Filing

Update to EISA baseline Wattages for CFL and LED measures

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: CO - Water Heating**Description:**

Residential natural gas customers receive a cash rebate for purchasing high-efficiency natural gas water heating equipment. Residential electric customers with standard electric water heaters can receive a rebate for replacing it with a heat pump water heater.

Equations:

Hot_Water_Energy	= Hot_Water_Demand / Standard_Tank_Size x Water_Heater_Delta_T x 365 x 8.33 x Proposed_Tank_Size
Water_Heater_Delta_T	= Water_Heater_Temperature - City_Mains_Temperature

Gas Equations:

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
Baseline_Eff_Gas (Reference 4) 2015 - All Tank Sizes	= 0.67 - .0019 x Proposed_Tank_Size
Baseline_Eff_Gas (Reference 4) 2016 - Tank Size >= 20gal, <=55gal	= 0.675 - .0015 x Proposed_Tank_Size
Baseline_Eff_Gas (Reference 4) 2016 - Tank Size > 55gal, <=100gal	= 0.8012 - .00078 x Proposed_Tank_Size

Electric Equations:

Gross Annual kWh Saved at Customer	= Baseline_kWh - Proposed_kWh + Cooling_Benefit - Heating_Penalty
Baseline_kWh	= Hot_Water_Energy / Baseline_Eff_Electric / 3,412
Proposed_kWh	= Hot_Water_Energy / Proposed_Eff / 3,412
Baseline_Eff_Electric (Reference 4) 2015 - All Tank Sizes	= 0.97 - .00132 x Proposed_Tank_Size
Baseline_Eff_Electric (Reference 4) 2016 - Tank Size >= 20gal, <=55gal	= 0.96 - .0003 x Proposed_Tank_Size
Baseline_Eff_Electric (Reference 4) 2016 - Tank Size > 55gal, <=100gal	= 2.057 - .00113 x Proposed_Tank_Size
Gross kW saved at Customer	= Baseline_kW - Proposed_kW
Baseline_kW	= Standard_Water_Heater_kW + Cooling_Benefit / Cooling_Hours
Proposed_kW	= Standard_Water_Heater_kW - (Baseline_kW - Proposed_kW) / 8760
Customer_PkW	= Customer_kW x Coincidence_Factor

Variable ID

Variable ID	Value	Description
Hot_Water_Demand	64.3	Average gallons per day of hot water use. (Reference 1)
Water_Heater_Temperature	See Table 3	Water heater setpoint temperature °F. (Reference 1, 7)
City_Mains_Temperature	51.4	Water temperature of city water entering the water heater °F. (Reference 2)
Standard_Tank_Size	40	Assumed a standard hot water tank size of 40 gallons.
Heat_content of 1 gallon water	8.34	Btu/gal °F
Conversion from Btu to Dth	1,000,000	1 Dth = 1,000,000 Btuh
Conversion from Btu to kWh	3,412	1 kWh = 3,412 Btuh
Heating_Penalty	See Table 1	Heating penalty due to heat pump water heater operating during heating season.
Cooling_Benefit	See Table 1	Cooling savings due to heat pump water heater operating during cooling season.
Standard_Water_Heater_kW	4.5	Assumed kW for a typical electric resistance water heater.
Cooling_Hours	957	Number of hours in a TMY3 year above 77°F.
Coincidence_Factor	100%	The coincidence factor is 100%. We are using the average water heater savings over the summer hours.
Proposed_Tank_Size	Customer Input	Storage capacity for tank type water heaters.
Type_of_Proposed_Water_Heater	Customer Input	Type of proposed water heater. (i.e. Storage, Tankless, Heat Pump)
Home_Heating_and_Cooling_Type_for_HP_Water_Heaters	Customer Input	Source for the home's heating and cooling. See Table 1.
Proposed_Eff	Customer Input	Efficiency Factor for proposed water heater.
Measure_Life	See Table 2	Lifetime of water heaters. (Reference 3)

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Incremental Costs	See Table 2	Incremental cost of efficient technology over baseline technology.
NTG	See Table 2	Net to Gross

Table 1 Heating Type	Cooling Type	Cooling_Benefit	Heating_Penalty	Non-Energy O&M
		kWh	kWh	\$
Natural Gas	Air Source	68.8	0	\$ 42.91
Electric Resistance	Air Source	68.8	1,595	\$ -
Heat Pump	Air Source	68.8	707	\$ -
Natural Gas	None	0.0	0	\$ 42.91
Electric Resistance	None	0.0	1,595	\$ -
Heat Pump	None	0.0	707	\$ -

Table 2

Water Heater Type	Incremental Cost	Lifetime	NTG
67% EF Storage Water Heater 2015	\$ 400.00	13	90%
67% EF Storage Water Heater 2016	\$ 330.00	13	90%
90% EF Tankless Water Heater	\$ 1,741.66	20	90%
Heat Pump Water Heater	\$ 1,072.91	10	100%

	2015	2016
Water_Heater_Temperature	135	125

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; http://www.energystar.gov/ia/partners/prod_development/new_specs/downloads/water_heaters/WaterHeaterAnalysis_Final.pdf
4. US Department of Energy; Residential Water Heater Standards; http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/27
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; Residential Air Conditioners and Heat Pumps; http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/75
8. Department of Energy, Test Procedure for Residential and Commercial Water Heaters; http://energy.gov/sites/prod/files/2014/06/f17/rwh_tp_final_rule.pdf
8. Energy Star Residential Water Heaters, Final Analysis http://www.energystar.gov/ia/partners/prod_development/new_specs/downloads/water_heaters/WaterHeaterAnalysis_Final.pdf

Changes from Recent Filing:

1. Cooling_Benefit was previously being calculated with a weighted average of homes with central air conditioning. The weighting has been removed and the cooling benefit will only apply to houses with air source cooling as indicated by customer input.
2. Hot_Water_Demand was previously being taken from a RemRate model. This has been updated to use the DOE residential water heater test procedure numbers.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Energy Savings Kit
Description:

A package of home energy efficiency measures in a kit that will be distributed to low-income customers. Each participant receives a kit containing a high-efficiency showerhead, two high efficiency sink aerators (1.0 GPM and 1.5 GPM), and eight compact fluorescent bulbs (4 - 13 W and 4 - 20 W CFLs).

Program References:

Mearsures "Provide Efficient Showerhead"	Refer to Program "Energy Efficient Showerhead - CO" to find formulas for Customer Dth, Customer kWh, customer kW, customer PCkW, etc. for the "Efficient Showerhead" measures.
Measures "Provide Efficient Kitchen Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find formulas for Customer Dth, Customer kWh, customer kW, customer PCkW, etc. for the "Efficient Kitchen Faucet Aerator" measure.
Measures "Provide Efficient Bath Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find formulas for Customer Dth, Customer kWh, customer kW, customer PCkW, etc. for the "Efficient Bath Faucet Aerator" measure.
Replace incandescent lamps with CFLs	Refer to Program CO Home Lighting & Recycling to find formulas for Customer kW, Customer kWh, Customer PCkW for the "Replace incandescent lamps with CFL" measure.
Measure "Provide Efficient Showerhead"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for "Gas Split Factor", "Measure Life", "Hours", "Coincidence Factor", etc values.
Measures "Provide Efficient Kitchen Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for "Gas Split Factor", "Measure Life", "Hours", "Coincidence Factor", etc values.
Measures "Provide Efficient Bath Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for "Gas Split Factor", "Measure Life", "Hours", "Coincidence Factor", etc values.
Measure "CFL"	Refer to Program "Home Lighting and Recycling - CO" to find references and tables for "Measure Life", "Hours", "Coincidence Factor", etc values.
Measure "Provide Efficient Showerhead"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for Operation and Maintenance cost savings value due to water savings.
Measures "Provide Efficient Kitchen Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for Operation and Maintenance cost savings value due to water savings.
Measures "Provide Efficient Bath Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for "Operation and Maintenance cost savings", value due to water savings.

Algorithms:
Variables:

Energy O&M savings	= Savings attributed to savings of fuel not served by Xcel Energy. Varies by customer depending on customer type and water heating fuel.
Net-to-Gross Factor (NTG)	= We will use 100% as these kits would not be available without the product.
Install Rate	= Installation rates will be determined during the year.
Incremental Costs for all measures	= costs provided by vendor.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Inputs:

Provided by Vendor/customer:	Verified during
M&V:	
Number of kits distributed	Yes
Number of CFLs installed	Yes
Showerhead Installed	Yes
Kitchen aerator installed	Yes
Bath aerator installed	Yes

Assumptions:

Savings shown above include homes with either electric or gas water heaters. The Energy Efficient Showerhead - CO program monitors and establishes a gas split factor for use in homes where the water heater type is unknown. Energy Savings Kits will use the Energy Efficient Showerhead - CO program's gas split factor for unknown water heater types to calculate and claim energy savings.

Tables:

See Reference Programs

References:

See Reference Programs
 Energy Efficient Showerhead - CO
 Home Lighting and Recycling - CO

Changes from Recent Filing

Update to EISA baseline wattages for CFL measures

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: CO - Low Income Multifamily Weatherization

Description:

Low Income service agency may apply for a grant to improve the natural gas and electric efficiency measures of low income multi-family housing units and common spaces/systems.

Equations:

Savings will be determined by results of an engineering audit of potential energy savings for the facility and living units. Calculations may include standard energy calculations or hourly energy modeling with recognized software packages. Savings for CFL lighting, refrigerator upgrades or evaporative coolers installed in living units will be deemed per other products for low income participants or prescriptive products.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: CO - Low Income Non-Profit

Description:

Low Income service agency may apply for a grant to improve the natural gas and electric efficiency measures of low income non-profit housing units and common spaces/systems.

Equations

Savings will be determined by results of an engineering audit of potential energy savings for the facility and living units. Calculations may include standard energy calculations or hourly energy modeling with recognized software packages.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Low Income SF Weatherization**Description:**

Residential income-qualified natural gas and electricity customers have energy efficiency measures performed at no cost.
--

Program References:

Measures "Heating Efficiency" and "EC Motor Furnace Fan"	Refer to Program "Residential Heating - CO" to find formulas for (Customer Dth, Customer kW, Customer kWh, Customer PCkW, etc.) for all "Heating Efficiency" measures.
Measures for "Water Heating Efficiency"	Refer to Program "Water Heating - CO" to find formulas for (Customer Dth, Customer kW, Customer kWh, Customer PCkW, etc.) for all "Water Heating Efficiency" measures.
Measures "Attic Insulation", "Wall Insulation", and "Air Sealing"	Refer to Program "Insulation Rebates - CO" to find formulas for (Customer kW, Customer kWh, Customer PCkW, etc.) for all "Attic Insulation", "Wall Insulation", and "Air Sealing" measures.
Measures "CFLs"	Refer to Program "Home Lighting and Recycling - CO" to find formulas for (Customer kW, Customer kWh, Customer PCkW, etc.) for the "CFL" measure.
Mearures "Provide Efficient Showerhead"	Refer to Program "Energy Efficient Showerhead - CO" to find formulas for Customer Dth, Customer kWh, customer kW, customer PCkW, etc. for the "Efficient Showerhead" measures.
Measures "Provide Efficient Kitchen Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find formulas for Customer Dth, Customer kWh, customer kW, customer PCkW, etc. for the "Efficient Kitchen Faucet Aerator" measure.
Measures "Provide Efficient Bath Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find formulas for Customer Dth, Customer kWh, customer kW, customer PCkW, etc. for the "Efficient Bath Faucet Aerator" measure.
Measures "Heating Efficiency" and "EC Motor Furnace Fan"	Refer to Program "Residential Heating - CO" to find values for Heating Hours, Coincidence Factors, EC Motor Baseline Watts and EC Motor Efficient Watts and EC Motor Operating Hours.
Measures "CFLs"	Refer to Program "Home Lighting and Recycling - CO" to find values for kW_Bulb_Existing, kW_Bulb_New, CF, and Average CFL Hours per lamp.
Measures "Attic Insulation", "Wall Insulation", "Crawl Space Wall", and "Air Sealing"	Refer to Program "Insulation Rebates - CO" to find reference table for Measure Life, Deemed and Customer Inputs, Heating and Cooling Degree Days, Climate Zone data, Heating and Cooling Hour Data values.
Measures "Storm Windows"	Refer to Program "Residential Heating - CO" to find values for Heating Hours. For use in the Storm Windows Customer kW calculation.
Measure "Provide Efficient Showerhead"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for "Gas Split Factor", "Measure Life", "Hours", "Coincidence Factor", etc values.
Measures "Provide Efficient Kitchen Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for "Gas Split Factor", "Measure Life", "Hours", "Coincidence Factor", etc values.
Measures "Provide Efficient Bath Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for "Gas Split Factor", "Measure Life", "Hours", "Coincidence Factor", etc values.
Measures "Water Heating Efficiency"	Refer to Program "Water Heating - CO" to find references for baseline water heater efficinency, tank sizes, incremental costs.
Measure "Provide Efficient Showerhead"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for Operation and Maintenance cost savings value due to water savings.
Measures "Provide Efficient Kitchen Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for Operation and Maintenance cost savings value due to water savings.
Measures "Provide Efficient Bath Faucet Aerator"	Refer to Program "Energy Efficient Showerhead - CO" to find reference table for "Operation and Maintenance cost savings", value due to water savings.

Algorithms:

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Crawl Space Wall Insulation:

Customer Dth	= (1 / R_Crawl_Space_Wall_Base - 1 / R_Crawl_Space_Wall_Proposed) * Wall_Area * HDD_Insulation * 24 / 1,000,000 / Heating_Eff_Gas
Customer kWh	= (1 / R_Crawl_Space_Wall_Base - 1 / R_Crawl_Space_Wall_Proposed) * Wall_Area * HDD_Insulation * 24 / 3,412 / Heating_Eff_Elec
Customer kW	= Customer kWh / (Heating_Hours)
Customer PCKW	= Customer_kw * CF

Storm Window Equations:

Storm Windows Customer kW	= Customer kWh / Heating_Hours Heating Hours from the Heating Efficiency CO Program
---------------------------	--

Refrigerator Recycling Equations:

Customer kW	= Customer kWh / (Operating_Hours)
-------------	--------------------------------------

Variables:

Variables:	Value	
R_Crawl_Space_Wall_Base	4.41	R-Value for baseline wall insulation, calculated assuming no cavity insulation
R_Crawl_Space_Wall_Proposed	20.34	R-Value for proposed crawl space wall insulation, calculated assuming R-19 cavity insulation
CF	0%	Insulation Coincidence Factor in electrically heated homes.
Crawlspace Insulation Measure Life	20 (Reference 5)	Measure Life for crawl space insulation

Storm Window Variables:

Storm Window Variables:	Value	
Customer kWh Savings	See Table 3	Storm window savings in electrically heated homes.
Customer Dth savings	See Table 2	Storm window savings in gas heated homes.
CF	0%	Storm window Coincidence Factor in electrically heated homes.
Storm Window Installation	\$1225 (Reference 8)	Incremental Cost for Storm window installation.
Storm Window Measure Life	20 (Reference 5)	Life of the installed Storm Windows.

Refrigerator Recycling Variables:

Refrigerator Recycling Variables:	Value	
Customer kWh Refrigerator Recycling	584	Refrigerator replacement energy savings kWh
Refrigerator Hours	7,361	Operating Hours for the refrigerator
CF	100%	Coincidence Factor for Refrigerator measures
Refrigerator Replacement Measure Life	7.30 (Reference 3)	Measure Life for Refrigerator Replacement measure
Incremental Cost	See Table 4	The incremental costs for equipment only in low income program.

Inputs:

Inputs as required by referenced programs		
Quantity of CFLs Installed	Customer Input	
Quantity of Refrigerators Replaced	Customer Input	
R-Value of existing Attic Insulation	Customer Input	R-value of existing insulation without adjustments for structure or air films.
R-Value of as-built Attic Insulation	Customer Input	Overall R-value of insulation at completion of work; existing plus new insulation.
Attic Insulation Square Feet Installed	Customer Input	
Wall Insulation Square Feet Installed	Customer Input	
Crawl Space Insulation Square Feet Installed	Customer Input	
BTUH size of new fuel fired heating equipment	Customer Input	
EFFn of new heating equipment	Customer Input	
EFn of new domestic water heating equipment	Customer Input	
Blower Door Test-in CFM50	Customer Input	
Blower Door Test-out CFM50	Customer Input	

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Conditioned Square Footage	Customer Input	
Climate Zone (Front Range, Western Slope, or Mountains)	Customer Input	
Quantity of Storm Windows Installed	Customer Input	
Quantity of Showerhead or Aeroator Installed	Customer Input	

Assumptions:

Work performed in coordination with the Governors Energy Office

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Tables:

Table 1: Home Characteristics (Reference 1)

Category	Characteristic	Evaluation Result	Home Type
Envelope and Mechanical Systems	Home Type	Mobile and Site Built	Specified
	Location	Multiple Regions	Both
	Conditioned Floor Area	961 Square Feet	Mobile
		1,452 Square Feet	Site Built
	Number of Bedrooms	Two	Mobile
		Three	Site Built
	Foundation Type	Open Crawlspace	Mobile
		Enclosed Crawlspace	Site Built
	Foundation Wall Type	Mobile Home Skirt	Mobile
		R-11 Draped Insulation	Site Built
	Home Complexity	Four Corners	Both
	Nominal Ceiling Height	7.6 Feet Mobile	Mobile
		8.2 Feet Site Built	Site Built
	Ceiling Type Baseline	REM/Rate Default	Mobile
		R-11 + Grade III	Site Built
	Above Grade Wall Type Baseline	REM/Rate Default	Mobile
		Empty Cavity Insulation	Site Built
		R-4.37 Grade III	
	Foundation Floor Type	R-9.3	Mobile
		Uninsulated	Site Built
	Door Type	R-1.7	Both
	Infiltration Rate	0.8 ACH	Both
	Window Properties	U Value 0.86	Mobile
		SHGC 0.72	
		U Value 0.75	Site Built
		SHGC 0.67	
		108.25 sqft	Mobile
		144.15 sqft	Site Built
Refrigerators	Adjusted Volume	21.58 Cubic Feet	Both
	Survival Rate	Dependent on age	Both
	Degradation	1.25%	Both
CFLs	Coincidence Factor	8%	Both

Table 2: Gas Energy Savings by Region (Reference 1)*

Measure	Denver	Dillon	Eagle	Grand Junction	Leadville
Storm Window Installation	16.3	29.0	23.1	14.8	33.7

*SB = Site Built, MH = Mobile Home. All others are not expected to be affected by home type.

Table 3: Electric Energy Savings by Measure (Reference 1)*, **

Measure	Denver	Dillon	Eagle	Grand Junction	Leadville
Storm Window Installation	3,794	6,771	5,384	3,454	7,873

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

*SB = Site Built, MH = Mobile Home. All others are not expected to be affected by home type.

** envelope measures contribute electric savings when an electric heating source is utilized. Assumed efficiency is 98%.

Table 4: Incremental Equipment Cost by Measure (Reference 11)

Measure	Incremental Cost
Refrigerator Replacement (2014 standard)	\$ 630.00
CFL per lamp	\$ 1.75
Storm Windows	\$ 1,225.00
High Efficiency Furnace	\$ 550.00
67% EF Storage Water Heater	\$ 300.00
Efficient Showerhead	\$ 5.00
Efficient Kitchen Faucet Aerator	\$ 3.00
Efficient Bath Faucet Aerator	\$ 3.00
EC Motor Furnace Fan	\$ 200.00
Attic insulation to code minimum	\$ 715.00
Air Sealing & Weather-stripping (25% reduction)	\$ 200.00
Wall Insulation from R-0 to R11	\$ 670.00
crawl space wall insulation R-0 to R-19	\$ 175.00

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

References:

- 1) 2011 Program Evaluation by Cadmus Group
- 2) US Lighting Market Characterization Study performed for the Department of Energy in 2002
- 3) Environmental Protection Agency Energy Star Program - www.energystar.gov
- 4) Xcel Energy Water Heater Rebate Program
- 5) California Measurement Advisory Committee (CALMAC) Protocols, Appendix F (www.calmac.org/events/APX_F.pdf).
- 6) Energy Conservation Standards for Residential Furnaces and Boilers, Efficiency Standards for Consumer Products
- 7) CO Governor's Energy Office Guidance
- 8) RS Means RR 2007
- 9) Database for Energy Efficient Resources (DEER)
- 10) NEAT/Frontier
- 11) Energy Outreach Colorado equipment costs

Changes from Recent Filing

Insulation and air sealing measures calculated based on formulas developed in stand alone residential insulation program.
updated CFL light baseline with current EISA baseline standards.
Added Energy Efficient Showerhead, Kitchen Aerator, and Bath Aerator measures
Updated Heating Efficiency measures to be based on the calculations and baseline assumptions from the standalone Heating Efficiency Program.
Updated Water Heating measures to be based on the calculations and baseline assumptions from the standalone Water Heating Program.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Multifamily Buildings Pilot - CO

Description:

Multifamily buildings that are electric and natural gas customers can receive an energy assessment and direct-install measures they are eligible for based on the assessment at no-cost. Those customers will also be eligible to participate in larger, capital-intensive projects that will offer them rebates for custom, prescriptive, and whole-building measures like those in EEB.

Program References:

Measure "Direct Install - CFL"	Refer to Product "CO School Education Kits" formulas for (Customer kW, Customer kWh, Customer PCKW, etc.) for the "Replace incandescent lamps with CFLs" measure.
Measure "Direct Install - CFL"	Refer to Product "CO School Education Kits" reference table for "CFL" values.
Measure "Direct Install - LED"	Refer to Product "CO School Education Kits" formulas for (Customer kW, Customer kWh, Customer PCKW, etc.) for the "Replace incandescent lamps with LEDs" measure.
Measure "Direct Install - LED"	Refer to Product "CO School Education Kits" reference table for "LED" values.
Measure "Direct Install - Low-Flow Showerhead"	Refer to Product "CO School Education Kits" formulas for (Customer kW, Customer kWh, Customer PCKW, etc.) for the "Provide Efficient Showerhead" measure.
Measure "Direct Install - Low-Flow Showerhead"	Refer to Product "CO School Education Kits" reference table for "Low-Flow Showerhead" values.
Measure "Direct Install - Kitchen Aerator"	Refer to Product "CO School Education Kits" formulas for (Customer kW, Customer kWh, Customer PCKW, etc.) for the "Provide Kitchen Faucet Aerator" measure.
Measure "Direct Install - Kitchen Aerator"	Refer to Product "CO School Education Kits" reference table for "Kitchen Aerator" values.
Measure "Direct Install - Bath Aerator"	Refer to Product "CO School Education Kits" formulas for (Customer kW, Customer kWh, Customer PCKW, etc.) for the "Provide Bath Faucet Aerator" measure.
Measure "Direct Install - Bath Aerator"	Refer to Product "CO School Education Kits" reference table for "Bath Aerator" values.
Measure "Direct Install - LED Exit Sign"	Refer to Product "CO Lighting Efficiency" formulas for (Customer kW, Customer kWh, Customer PCKW, etc.) for the "Exit sign retrofit and replacement" measure.
Measure "Direct Install - LED Exit Sign"	Refer to Product "CO Lighting Efficiency" reference table for "LED Exit Sign" values.
Measure "Energy Efficient Buildings"	Refer to Product "Business New Construction" formulas for (Customer kW, Customer kWh, Customer PCKW, etc.) for the "Average EEB Project" measure.
Measure "Energy Efficient Buildings"	Refer to Product "Business New Construction" reference table for "Energy Efficient Buildings" values.

Equations:

Water Heater Blanket Electrical Energy Savings (Customer kWh)	= (HLF before - HLF with blanket) x Hr_Operation / HE_Elec / 3412 = 550 kWh
Water Heater Blanket Electrical Demand Savings (Customer kWh)	= (HLF before - HLF with blanket) x Hr_Operation / HE_Elec / 3412 / Hr Operation = 0.06 kW
Water Heater Blanket Gas Savings (Customer Dth)	= (HLF before - HLF with blanket) x Hr_Operation / HE_Gas / 1,000,000 = 2.17 Dth
Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TLDF)
Electrical Demand Savings (Gross Generator kW)	= Customer kW * CF / (1-TLDF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG x Install Rate
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG x Install Rate

Variable ID	Value	Description
HE_Elec	0.9172	Heat generation efficiency for electric water heater based on steady-state water heater efficiency.
HE_Gas	0.80	Heat generation efficiency for gas water heater based on steady-state water heater efficiency.
Hr_Operation	8760	Annual water heater "on" time
HLF before	441 Btu/hr	Heat loss from a 50 gallon water heater with an 1" fiberglass insulation at 140 degrees
HLF with blanket	352.8 Btu/hr	Heat loss from a 50 gallon water heater with a 1" fiberglass insulation at 140 degrees plus an additional 2" fiberglass blanket
Coincidence_Factor_DI_CFL	8.0%	Coincident factor for CFL lamps, based on CO School Education Kits
Coincidence_Factor_DI_LED	8.0%	Coincident factor for LED lamps, based on CO School Education Kits
Coincidence_Factor_DI_Lo_Flow_SH	57.6%	Coincident factor for Showerheads based on CO Energy Efficient Showerheads
Coincidence_Factor_DI_Kitchen_Aerator	105.6%	Coincident factor for Kitchen Aerators based on CO Energy Efficient Showerheads
Coincidence_Factor_DI_Bath_Aerator	105.6%	Coincident factor for Bathroom Aerators based on CO Energy Efficient Showerheads
Coincidence_Factor_DI_WH_Blanket	100.0%	Coincident factor for water heater blankets, based on assumption that blanket is permanently installed
Coincidence_Factor_DI_LED_Exit	100.0%	Coincident factor for LED exit signs, based on CO Lighting Efficiency
Coincidence_Factor_EEB	92.8%	Coincident factor for EEB projects, based on CO Energy Design Assistance
NTG	100%	Net-to-gross factor. Assumed to be 100% for a new program.

Assumptions:

* CFL and LED costs are estimated values based on historical program costs, but the pilot will determine new incremental costs and those values will be used in final calculations

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Provided by Customer:

Number of DI measures distributed
 Were all identified CFLs and LEDs installed
 Was showerhead installed
 Was Kitchen aerator installed
 Was Bath aerator installed

Verified during M&V:

Yes
 Yes
 Yes
 Yes
 Yes

References:

1. US DOE US Lighting Market Characterization Study 2002
2. Composite Wattages, Operating Hours and Coincidence from CFL METERING STUDY FINAL REPORT, Prepared for: Pacific Gas & Electric Company, San Diego Gas & Electric Company, Southern California Edison Company, 2005
3. Xcel Energy Home Lighting and Recycling Program Assumptions
4. "The effects of variation in body temperature on the preferred water temperature and flow rate during showering" Authors: Tadakatsu Ohnaka, Yutaka Tochihara, Yumiko Watanabe. Affiliations: a) Department of Physiological Hygiene, The
5. Handbook of Water Use and Conservation, Denver Water Conservation
6. California Measurement Advisory Committee (CALMAC) Protocols, Appendix F (www.calmac.org/events/APX_F.pdf).
7. DOE HW Appliance calculator
8. Lighting Baseline Watts per Agreement with Minnesota Division of Energy Resources. Based on a EPA Next Generation Lighing Program: Opportunities to Advance Efficient Lighting for a Cleaner Environment- Table 3.
9. DEER Database for Energy Efficient Resources 2011 update to EUL data

Changes from Last Filing

- | |
|--------------|
| 1. New Pilot |
|--------------|

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Smart Thermostat Pilot**Description:**

Residential customers that are electric and natural gas Xcel Energy customers are eligible to receive a rebate for purchasing and installing a qualifying smart thermostat device. In addition to the rebate for purchase and installation, another subset of customers that are electric customers of Xcel Energy can receive rebates for participating in demand response.

Equations:

Electrical Energy Savings (Gross Annual kWh Saved at Customer)	= (Group_Consumption - Group_Rebate_Product_Participation) * Control_Group - (Group_Consumption - Group_Rebate_Product_Participation) * Test Group = Deemed kWh as determined through pilot M&V, 197 kWh used for forecast based on preliminary data
Electrical Demand Savings (Gross kW Saved at Customer)	= Determined by pilot evaluation, 0.2 kW used for forecast based on preliminary data
Electrical Peak Demand Savings (PCKW)	= Electrical_Demand_Savings * Coincidence_Factor_EE
Natural Gas Energy Savings (Customer Dth)	= (Group_Consumption - Group_Rebate_Product_Participation) * Control_Group - (Group_Consumption - Group_Rebate_Product_Participation) * Test Group
Demand Response Electrical Energy Savings (Gross Annual kWh Saved at Customer)	= measured by event, 13 kWh used for forecast based on Savers Switch
Demand Response Electrical Demand Savings (Gross kW Saved at Customer)	= measured by event, 1.03 kW used for forecast based on Savers Switch
Demand Response Electrical Peak Demand Savings (PCKW)	= Demand_Response_Electrical_Demand_Savings * Coincidence_Factor_DR

Variable ID	Value	Description
Coincidence_Factor_EE	58%	TBD through pilot evaluation, 58% used for forecast based on initial assumptions
Coincidence_Factor_DR	100%	Coincidence Factor for Demand Response, based on Savers Switch
Test_Group	TBD by M&V	Group of participating gas & electric customers participating in Smart Thermostat Pilot
Control_Group	TBD by M&V	Uninformed random sample of gas & electric customers receiving no specific information or treatment from this program of similar size to Participant group.
Group_Consumption	TBD by M&V	Gross consumption for each group (Test or Control), kWh and Dth resulting from pilot evaluation
Group_Rebate_Product_Participation	TBD by M&V	Energy savings generated by participation in our rebate products for both Test and Control groups, kWh and Dth. Rebated product participation from other products, (e.g. rebate for installing new lighting fixtures), are savings that will be included in the regression analysis and deducted from the pilot results if statistically significant. DSM Product participation from other Public Service DSM products will come from the Company database.
Measure_Life_Thermostats	10	Measure life is assumed to be 10 years for Smart Thermostats energy savings.
Measure_Life_Demand_Response	1	Measure life is assumed to be 1 years for Demand Response.

Assumptions:

The forecasted values presented in these assumptions are based on data from the Energy Information Administration's (EIA) 2009 Residential Energy Consumption Survey (RECS), along with proprietary data provided by thermostat manufacturers. This data was used to build a model that compared temperature setbacks and setback schedules for an average customer against a customer with an installed smart thermostat device, and the resulting energy consumption and demand savings. The forecasted values are estimates of expected savings. Actual savings will be determined through a pilot evaluation which will be filed at the conclusion of the pilot.

The M&V plan will evaluate annual consumption reductions for electricity and gas, as well as peak electric load reduction. To do this, the Company will hire a third-party evaluator to perform all analysis via a controlled-match methodology, comparing customers with smart thermostats (participant group) to a matched control group based on similar consumption, location, segmentation, etc. The analysis to calculate peak electric load savings will involve deploying data-loggers on air conditioning equipment for test and control group participants, and conducting a difference of differences analysis. The intent of this analysis is to deem an electric energy, electric peak-load demand, and natural gas reduction for smart thermostat owners going forward.

For the demand response measure, the forecasted values are those used for the Company's Saver Switch program. Similar to the efficiency measure, this is a forecast of anticipated savings, but the pilot will M&V actual reductions and report those in the final evaluation. The M&V methodology deployed will be the same as Saver Switch - sampling a portion of participants with data loggers and recording actual load reductions during events. The intent of this analysis is to deem an average reduction value across all participants going forward.

References:

1. Energy Information Administration's (EIA) 2009 Residential Energy Consumption Survey (RECS)
2. Proprietary data provided by thermostat manufacturers

Changes from Last Filing:

1. New Pilot

DEEMED SAVINGS TECHNICAL ASSUMPTIONS**Product: Saver's Switch - Residential - CO****Description:**

Prescriptive rebates will be offered to residential customers who install a Saver's Switch on their AC system.

Algorithms:

Gross kW Saved at Customer/Unit	= kW Savings_ResSS
Gross Annual kWh Saved at Customer/Unit	= kW Savings_ResSS x Hours_ResSS
Peak Coincident kW at the Customer (PC_KW_CUST)	= Gross kW Saved at Customer/Unit x CF_ResSS

Variable ID	Value	Description
kW Savings_ResSS	1.030	Average kW savings per AC Unit (Reference 1)
Hours_ResSS	4.17	The typical hours of operation per year that a Switch achieves energy savings at the average kW per unit by controlling an AC.
CF_ResSS	32%	Coincidence Factor. Percentage of the Average kW per Unit savings that occur during the annual hour of system peak. The numbers provided by (Reference 1) are calculated at peak generation periods.
Life_ResSS	15	Length of time the switch will be operational.
NTG	100%	Net-to-Gross factor for Saver's Switch will be 100% as customers would not have the ability to install a switch without the program.

Assumptions:

Average Efficiency SEER/EER	13	11.18
Average Size (tons)		3

Inputs:**Provided by Customer:**

Number of units with switch installed.

Verified during M&V:

Yes

References:

(1) Saver Switch Program, Residential Program, 2013 Impact Evaluation Report by AEC.

Changes from Recent Filing:

1. Updated kW savings per unit.
2. Updated hours per year.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Small Business Smart Thermostat - Business - CO

Description:

Prescriptive rebates will be offered to business customers who install a programmable communicating thermostat (smart thermostat) on their cooling system(s).

Algorithms:

Gross kW Saved at Customer/Unit	= kW Savings_BizT-stat
Gross Annual kWh Saved at Customer/Unit	= Event_Energy_Savings X Annual_Events
Cycling Peak Coincident kW at the Customer (Cycling PC_kw_CUST)	= Gross kW Saved at Customer/Unit x CF_Cycling_BizT-stat
Set-up Peak Coincident kW at the Customer (Set-up PC_kw_CUST)	= Gross kW Saved at Customer/Unit x CF_Set-up_BizT-stat
Coincidence Factor for Cycling control strategy (CF_Cycling_BizT-stat)	= Maximum Load Relief / Full Load conditions
Coincidence Factor for Cycling control strategy (CF_Set-up_BizT-stat)	= Maximum Load Relief / Full Load conditions X 2
Effective annual hours of operation cycling strategy (Hours_BizT-stat)	= kWh Savings_BizT-stat / kW Savings_BizT-stat

Variable ID

Variable ID	Value	Description
kW Savings_BizT-Stat	1.42	Average kW savings per AC Unit (Reference 3)
Event_Energy_Savings	1.11	Energy savings per event minus energy consumed due to snap-back at end of control period (Reference 3)
Annual_Events	8	Historical average number of events per year (Reference 5)
kWh Savings_BizT-stat	8.50	Annual kWh savings
Hours_BizT-stat	6.00	The typical hours of operation per year that a Switch achieves energy savings at the average kW per unit by controlling an AC.
CF_Cycling__BizT-stat	18%	Coincidence Factor for cycling control scenario. Percentage of the Average kW per Unit savings that occur during the annual hour of system peak. The numbers provided by (Reference 2,3) are calculated at peak generation periods. Value to be verified through M&V.
CF_Set-up_BizT-stat	24%	Coincidence Factor for temperature set-up control scenario. Pre-cooling occurs an hour before the control event, resulting in 1 hour less cooling needed during the 4 hour event (estimate). Value to be verified through M&V, but until M&V is done we are using only 33% more than the standard cycling unit. It could be as high as 100% more.
Life_BizT-stat	15	Length of time the thermostat will be operational.
NTG	100%	Net-to-gross factor. Assumed the same NTG as the saver Saver Switch program. Net-to-gross factor for Saver's Switch will be 100% as customers would not have the ability to install a switch without the program.

Assumptions:

A/C Unit specifications	
Cooling Tons/unit ¹	7.75
	Per ton Per unit
Full Load conditions (at customer) kW ²	1.19 9.21
Maximum load relief (100% of units controlled) kW ³	0.22 1.67
Event Energy Savings ³	0.17 1.28
Snap back energy per event ³	0.02 0.17
Control signal received ⁴	85%
Annual Events ⁵	8

References:

1. Estimate based on Historical CO Business SS (10.95 ton/unit) and 2014 NM Business SS (6 ton/unit), MN (6.3 ton/unit)
2. Full load kW based on typical 7.75 ton, 2004 vintage unit (ASHRAE 90.1 2004 air-cooled split systems w/ natural gas heating units, 10.1 EER)
3. Maximum load relief, event energy savings, and snap back energy drawn from CO 2004 Business Saver's Switch evaluation, CO 2013 IHSD evaluation, and NM 2014 Business Saver's Switch evaluation.
4. Event Energy Savings and snap back
5. Historical number of Demand Response represents the average number of Saver's Switch events called per year between 2000 and 2014

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: Building Energy Optimization DR Pilot**Description:**

This pilot will determine whether software tools designed for "Predictive Energy Optimization" of commercial building control systems can be leveraged to provide Demand Response resources.

Algorithms:

Gross EE kW Saved at Customer/Unit	= kW Savings_BldgOpt_EE
Gross DR kW Saved at Customer/Unit	= kW Savings_BldgOpt_DR
Gross Annual kWh Saved at Customer/Unit	= kW Savings_BldgOpt x Hours_BldgOpt
Peak Coincident kW at the Customer (PC_KW_CUST)	= Gross kW Saved at Customer/Unit x CF_BldgOpt_DR
Baseline Product Consumption (watts)	= Average Demand X Average Building size
Efficient Product Consumption (watts)	= Average Demand X Average Building Size X kW Curtailment %
Energy Efficiency Cost Allocation %	= EECA

Variables:

Variable	Value	Description
kW Savings_BldgOpt_EE	30	Annual kW savings through optimization of building's HVAC controls
kW Savings_BldgOpt_DR	78	Annual kW savings through optimization of building's HVAC controls
Hours_BldgOpt_EE	8,125	Effective hours of operation to obtain annual kWh savings at given demand reduction
Hours_BldgOpt_DR	32	Hours demand response events are actively called (number of events X hours per event)
CF_BldgOpt_EE	100%	
CF_BldgOpt_DR	100%	Coincidence Factor. Percentage of the demand reduction that occurs during the annual hour of system peak.
EECA	29%	The percentage of average avoided revenue requirements associated with Energy Efficiency
Life_BldgOpt	5	Length of contract for Optimization Software Services
NTG	100%	Net-to-gross factor. Assumed the same NTG as the saver Saver Switch program. Net-to-gross factor for Saver's Switch will be 100% as customers would not have the ability to install a switch without the program.

Assumptions:

Average Building Size (sf) ¹	250,000						
	Per Square Foot	Per Building					
Annual usage (kWh/sf/yr) ²	15	3,750,000					
Average demand (kW/sf) ³	0.004	1,000					
Subscription Fees (\$/sf) ⁴	\$ 0.09	\$ 22,500					
kWh Savings (%) ⁴	6.5%	243,750					
Peak kW reduction EE (%) ⁴	3.0%	30					
kW DR curtailment (%) ⁴	10.8%	78,000					
WAAC	7%		Note: This number has yet to be verified	2015	2016	2017	2018
Participation Rate ⁶	100.0%						2019
Subscription Costs ⁵	\$91,178			Annual Cost	\$ 22,500	\$ 22,500	\$ 22,500
Rebate ⁵	\$45,589				\$ 22,500	\$ 22,500	\$ 22,500
DR Events per year ⁷	8						
Hours per DR Event ⁷	4						
Avoided Revenue Requirements ⁸	Capacity	Energy					
2015	\$ 745,892	\$ 313,393					
2016	\$ 763,276	\$ 308,687					
Average	\$ 754,584	\$ 311,040					

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

References:

1. Average square footage of building size being targeted for the pilot
2. Reference EMS TA of 15-20 kWh/sf/yr for Office Buildings
3. Reference EMS TA of 4-6 watts/sf for Office Buildings
4. Estimate from vendor quotes
5. Estimate of 5 year Net Present Value for subscription costs and associated rebates
6. Participation rate addresses the likelihood of customers opting out of a given event. Reflected in produce Realization Rate
7. Number of DR events per year and hours per event based on historical average dispatch of Colorado Saver's Switch program 2004 through 2014
8. Avoided Energy Requirements as calculated through 2015-2016 DSM cost benefit analysis, Round 2.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Product: ISOC**Description:**

Participants receive a discount on their demand charges in return for reducing electric loads when notified by the Utility.

Equations:

Gross Annual kWh Saved at Customer/Unit	= Average kW per Customer x Hours_ISOC
Gross kW Saved at Customer/Unit	= Average kW per Customer
Gross Coincident kW Saved at Customer/Unit	= Gross kW Saved at Customer/Unit x CF_ISOC

Variable ID	Value	Description
Average kW per customer	500	Average interruptable kW per customer (Reference 1).
Hours_ISOC	6	Hours of Operation that a customer achieves energy savings by controlling their electric load during a typical year. (Reference 1)
CF_ISOC	61.57%	Coincidence Factor is the probability that peak demand of the measure will coincide with peak utility system demand (Reference 1)
Life_ISOC	5	Length of contract period in years.
NTG	100.00%	Net-to-gross

References:

(1) ISOC Forecast

Changes from Recent Filing:

None

Business Program	Measure Description	Electric Measure Description	Electric Product Desired Technical Assumptions	Baseline Product Assumptions	Economic Assumptions	Regional Output	Economic Assumptions	Technical Assumptions	Program Impact Reports		Simplified Forecast Inputs
									2015	2016	
									2015 Units (G)	2016 Units (G)	NTG (%)
Commercial Refrigeration Efficiency											
Prescriptive	ECD - Medium Temp Display Case	Electrolytic Compressor Model (ECD) Case	Medium Temp Display Case	1.00	1.000	Display Case Model	\$0.00	0.00%	840	840	0.00%
Prescriptive	ECD - Low Temp Display Case	Electrolytic Compressor Model (ECD) Case	Low Temp Display Case	1.00	1.000	Display Case Model	\$0.00	0.00%	840	840	0.00%
Prescriptive	ECD - Medium Temp Walk-In, Evap Fan < 15° Diameter	Electrolytic Compressor Model (ECD) Case	Medium Temp Walk-In, Evap Fan < 15° Diameter	1.00	1.000	Display Case Model	\$0.00	0.00%	570	570	0.00%
Prescriptive	ECD - Low Temp Walk-In, Evap Fan > 15° Diameter	Electrolytic Compressor Model (ECD) Case	Low Temp Walk-In, Evap Fan > 15° Diameter	1.00	1.000	Display Case Model	\$0.00	0.00%	570	570	0.00%
Prescriptive	Anti-Sweat Heater Controls	Anti-Sweat Heater Controls	Anti-Sweat Heater Controls	1.00	1.000	Anti-Sweat Heater Controls	\$0.00	0.00%	560	560	0.00%
Prescriptive	Water Heater Cases - Recirc	Water Heater Cases - Recirc	Water Heater Cases - Recirc	1.00	1.000	Water Heater Cases - Recirc	\$0.00	0.00%	560	560	0.00%
Prescriptive	LED Refrigerator Cases - Recirc	LED Refrigerator Cases - Recirc	LED Refrigerator Cases - Recirc	1.00	1.000	LED Refrigerator Cases - Recirc	\$0.00	0.00%	560	560	0.00%
Prescriptive	Medium Temperature Reach-In Case (per linear foot)	Medium Temperature Reach-In Case (per linear foot)	Medium Temperature Reach-In Case (per linear foot)	1.00	1.000	Medium Temperature Reach-In Case (per linear foot)	\$0.00	0.00%	560	560	0.00%
Prescriptive	Right Curved	Right Curved	Right Curved	1.00	1.000	Right Curved	\$0.00	0.00%	560	560	0.00%
Prescriptive	Drop Head Fan Controls	Drop Head Fan Controls	Drop Head Fan Controls	1.000	1.000	No Controls	\$0.00	0.00%	560	560	0.00%
Curative	Planted Head Fan Controls (per foot)	Planted Head Fan Controls (per foot)	Planted Head Fan Controls (per foot)	1.000	1.000	No Controls	\$0.00	0.00%	560	560	0.00%
Blank Detail	None	None	None	1.000	1.000	None	\$0.00	0.00%	560	560	0.00%
Blank Detail	Gold Standard System - electric water heating	Gold Standard System - electric water heating	Gold Standard System - electric water heating	1.000	1.000	Gold Standard System - electric water heating	\$0.00	0.00%	560	560	0.00%
Blank Detail	Water (Reservoir) - electric water heating	Water (Reservoir) - electric water heating	Water (Reservoir) - electric water heating	1.000	1.000	Water (Reservoir) - electric water heating	\$0.00	0.00%	560	560	0.00%
Blank Detail	Water (Vessel) - electric water heating	Water (Vessel) - electric water heating	Water (Vessel) - electric water heating	1.000	1.000	Water (Vessel) - electric water heating	\$0.00	0.00%	560	560	0.00%
Compressed Air Efficiency											
CO - Compressed Air Efficiency Study	CO - Compressed Air Efficiency Study	Level 1 & Level 2 Compressed Air	Level 1 & Level 2 Compressed Air	1.000	1.000	Level 1 & Level 2 Compressed Air	\$0.00	0.00%	10,120	9,970	2.00%
CO - Custom Efficiency - Compressed Air	CO - Custom Efficiency - Compressed Air	New Equipment	New Equipment	1.000	1.000	New Equipment	\$0.00	0.00%	10,120	9,970	2.00%
CO - Compressed Air Prescriptive	No Air Loss Drain	No Air Loss Drain	No Air Loss Drain	1.000	1.000	No Air Loss Drain	\$0.00	0.00%	5,000	5,000	0.00%
CO - Compressed Air Prescriptive	VFD Air Compressor New	VFD Compressor	VFD Compressor	1.000	1.000	VFD Compressor	\$0.00	0.00%	5,000	5,000	0.00%
CO - Compressed Air Prescriptive	VFD Air Compressor Upgrade	VFD Compressor	VFD Compressor	1.000	1.000	VFD Compressor	\$0.00	0.00%	5,000	5,000	0.00%
CO - Compressed Air Prescriptive	WPS Air Compressor w/ VFD Reduces	WPS Air Compressor w/ VFD Reduces	WPS Air Compressor w/ VFD Reduces	1.000	1.000	WPS Air Compressor w/ VFD Reduces	\$0.00	0.00%	5,000	5,000	0.00%
CO - Compressed Air Prescriptive	Cooling Dryer	Cooling Dryer	Cooling Dryer	1.000	1.000	Cooling Dryer	\$0.00	0.00%	5,000	5,000	0.00%
CO - Compressed Air Prescriptive	Desuper Controls	Desuper Controls	Desuper Controls	1.000	1.000	Desuper Controls	\$0.00	0.00%	5,000	5,000	0.00%
CO - Compressed Air Prescriptive	Mist Eliminators	Mist Eliminators	Mist Eliminators	1.000	1.000	Mist Eliminators	\$0.00	0.00%	5,000	5,000	0.00%
CO - Computer Efficiency - Upstream	Upstream Power Supply - Bronze	Upstream Power Supply - Bronze	Upstream Power Supply - Bronze	1.000	1.000	Upstream Power Supply - Bronze	\$0.00	0.00%	90	90	0.00%
CO - Computer Efficiency - Upstream	Upstream Power Supply - Silver	Upstream Power Supply - Silver	Upstream Power Supply - Silver	1.000	1.000	Upstream Power Supply - Silver	\$0.00	0.00%	90	90	0.00%
CO - Computer Efficiency - Upstream	Upstream Power Supply - Gold	Upstream Power Supply - Gold	Upstream Power Supply - Gold	1.000	1.000	Upstream Power Supply - Gold	\$0.00	0.00%	90	90	0.00%
CO - Computer Efficiency - Upstream	Upstream Power Supply - Platinum	Upstream Power Supply - Platinum	Upstream Power Supply - Platinum	1.000	1.000	Upstream Power Supply - Platinum	\$0.00	0.00%	90	90	0.00%
CO - Computer Efficiency - Prescriptive	Zero & Thin Client Installations	Zero & Thin Client Installations	Zero & Thin Client Installations	1.000	1.000	Zero & Thin Client Installations	\$0.00	0.00%	40	3,000	50.00%
CO - Computer Efficiency - Prescriptive	Network Based PC Management	Network Based PC Management	Network Based PC Management	1.000	1.000	Network Based PC Management	\$0.00	0.00%	40	3,000	50.00%
CO - Cooling											
CO - Cooling Efficiency - Prescriptive	Refrigerant Unit or Split System Units less than 4.0 tons	Refrigerant Unit or Split System Units less than 4.0 tons	Refrigerant Unit or Split System Units less than 4.0 tons	1.000	1.000	Refrigerant Unit or Split System Units less than 4.0 tons	\$0.00	0.00%	10,120	9,970	2.00%
CO - Cooling Efficiency - Prescriptive	Refrigerant Units / Condensing Units or Split System 5.5-12.0 tons	Refrigerant Units / Condensing Units or Split System 5.5-12.0 tons	Refrigerant Units / Condensing Units or Split System 5.5-12.0 tons	1.000	1.000	Refrigerant Units / Condensing Units or Split System 5.5-12.0 tons	\$0.00	0.00%	7,967	7,967	0.00%
CO - Cooling Efficiency - Prescriptive	Refrigerant Units or Split System 12.0 tons or Condensing Units > 14.0 tons	Refrigerant Units or Split System 12.0 tons or Condensing Units > 14.0 tons	Refrigerant Units or Split System 12.0 tons or Condensing Units > 14.0 tons	1.000	1.000	Refrigerant Units or Split System 12.0 tons or Condensing Units > 14.0 tons	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Refrigerant Units or Split System 20.0-33.0 tons	Refrigerant Units or Split System 20.0-33.0 tons	Refrigerant Units or Split System 20.0-33.0 tons	1.000	1.000	Refrigerant Units or Split System 20.0-33.0 tons	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Refrigerant Units or Split System greater than 33.0 tons	Refrigerant Units or Split System greater than 33.0 tons	Refrigerant Units or Split System greater than 33.0 tons	1.000	1.000	Refrigerant Units or Split System greater than 33.0 tons	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Water-cooled Heat Pump	Water-cooled Heat Pump	Water-cooled Heat Pump	1.000	1.000	Water-cooled Heat Pump	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	PTAC	PTAC	PTAC	1.000	1.000	PTAC	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Single-dwelling children < 75 tons	Single-dwelling children < 75 tons	Single-dwelling children < 75 tons	1.000	1.000	Single-dwelling children < 75 tons	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Single-dwelling children > 75 to < 100 tons	Single-dwelling children > 75 to < 100 tons	Single-dwelling children > 75 to < 100 tons	1.000	1.000	Single-dwelling children > 75 to < 100 tons	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Single-dwelling children > 100 to < 200 tons	Single-dwelling children > 100 to < 200 tons	Single-dwelling children > 100 to < 200 tons	1.000	1.000	Single-dwelling children > 100 to < 200 tons	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Single-dwelling children > 200 tons	Single-dwelling children > 200 tons	Single-dwelling children > 200 tons	1.000	1.000	Single-dwelling children > 200 tons	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Single-dwelling children > 200 to < 300 tons	Single-dwelling children > 200 to < 300 tons	Single-dwelling children > 200 to < 300 tons	1.000	1.000	Single-dwelling children > 200 to < 300 tons	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Single-dwelling children > 300 tons	Single-dwelling children > 300 tons	Single-dwelling children > 300 tons	1.000	1.000	Single-dwelling children > 300 tons	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Single-dwelling children > 300 to < 400 tons	Single-dwelling children > 300 to < 400 tons	Single-dwelling children > 300 to < 400 tons	1.000	1.000	Single-dwelling children > 300 to < 400 tons	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Single-dwelling children > 400 tons	Single-dwelling children > 400 tons	Single-dwelling children > 400 tons	1.000	1.000	Single-dwelling children > 400 tons	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Replace constant speed motor control with VSD motor control on existing chiller	Replace constant speed motor control with VSD motor control on existing chiller	Replace constant speed motor control with VSD motor control on existing chiller	1.000	1.000	Replace constant speed motor control with VSD motor control on existing chiller	\$0.00	0.00%	10,120	9,970	2.00%
CO - Cooling Efficiency - Prescriptive	Phase Change Heat Exchangers	Phase Change Heat Exchangers	Phase Change Heat Exchangers	1.000	1.000	Phase Change Heat Exchangers	\$0.00	0.00%	11,080	11,080	0.00%
CO - Cooling Efficiency - Prescriptive	Direct Evaporative Pre-cooling Technology for Air Cooled Condensers on DX units-TOTAL	Direct Evaporative Pre-cooling Technology for Air Cooled Condensers on DX units-TOTAL	Direct Evaporative Pre-cooling Technology for Air Cooled Condensers on DX units-TOTAL	1.000	1.000	Direct Evaporative Pre-cooling Technology for Air Cooled Condensers on DX units-TOTAL	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency Study	Customer Readiness	Customer Readiness	Customer Readiness	1.000	1.000	Customer Readiness	\$0.00	0.00%	5,000	5,000	0.00%
CO - Data Center	Data Center	Data Center	Data Center	1.000	1.000	Data Center	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Custom	Custom Cooling	Custom Cooling	Custom Cooling	1.000	1.000	Custom Cooling	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	ECD - Medium Temp Display Case	Electrolytic Compressor Model (ECD) Case	Medium Temp Display Case	1.000	1.000	Electrolytic Compressor Model (ECD) Case	\$0.00	0.00%	570	570	0.00%
CO - Cooling Efficiency - Prescriptive	ECD - Low Temp Walk-In, Evap Fan < 15° Diameter	Electrolytic Compressor Model (ECD) Case	Low Temp Walk-In, Evap Fan < 15° Diameter	1.000	1.000	Electrolytic Compressor Model (ECD) Case	\$0.00	0.00%	570	570	0.00%
CO - Cooling Efficiency - Prescriptive	ECD - Low Temp Walk-In, Evap Fan > 15° Diameter	Electrolytic Compressor Model (ECD) Case	Low Temp Walk-In, Evap Fan > 15° Diameter	1.000	1.000	Electrolytic Compressor Model (ECD) Case	\$0.00	0.00%	570	570	0.00%
CO - Cooling Efficiency - Prescriptive	Anti-Sweat Heater Controls	Anti-Sweat Heater Controls	Anti-Sweat Heater Controls	1.000	1.000	Anti-Sweat Heater Controls	\$0.00	0.00%	560	560	0.00%
CO - Cooling Efficiency - Prescriptive	Boiler Units or Split System Components from 2014	Boiler Units or Split System Components from 2014	Boiler Units or Split System Components from 2014	1.000	1.000	Boiler Units or Split System Components from 2014	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Water-cooled Heat Pump Components from 2014	Water-cooled Heat Pump Components from 2014	Water-cooled Heat Pump Components from 2014	1.000	1.000	Water-cooled Heat Pump Components from 2014	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Condensing Units from 2014	Condensing Units from 2014	Condensing Units from 2014	1.000	1.000	Condensing Units from 2014	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Refrigerant Components from 2014	Refrigerant Components from 2014	Refrigerant Components from 2014	1.000	1.000	Refrigerant Components from 2014	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Air-cooled Chiller Components from 2014	Air-cooled Chiller Components from 2014	Air-cooled Chiller Components from 2014	1.000	1.000	Air-cooled Chiller Components from 2014	\$0.00	0.00%	5,000	5,000	0.00%
CO - Cooling Efficiency - Prescriptive	Refrigerant Components from 2014	Refrigerant Components from 2014	Refrigerant Components from 2014	1.000	1.000	Refrigerant Components from 2014	\$0.00	0.00%	5,000	5,000	0.00%
CO - Custom Efficiency - Electric	CO - Custom Efficiency - Electric	None	None	1.000	1.000	None	\$0.00	0.00%	5,000	5,000	0.00%
Data Center Efficiency											
CO - Data Center IP Study	Data Center Efficiency Study == 5000 sq ft	Data Center Efficiency Study == 5000 sq ft	Data Center Efficiency Study == 5000 sq ft	0	0	0	\$0.00	0.00%	1,000	1,000	0.00%
CO - Data Center IP Study	Data Center Efficiency Study == 5000 sq ft	Data Center Efficiency Study == 5000 sq ft	Data Center Efficiency Study == 5000 sq ft	0	0	0	\$0.00	0.00%	1,000	1,000	0.00%
CO - Data Center IP Implementation	Data Center Baseline Project	Data Center Baseline Project	Data Center Baseline Project	1,000	1,000	Existing Data Center Facility or New Facility With Baseline	\$0,000	-75%	1,000	1,000	0.00%
CO - Data Center IP Implementation	Data Center Custom Project	Data Center Custom Project	Data Center Custom Project	1,000	1,000	Existing Data Center Facility or New Facility With Baseline	\$0,000	-75%	1,000	1,000	0.00%
CO - Data Center IP Holistic	Data Center Prescriptive Project	Data Center Prescriptive Project	Data Center Prescriptive Project	1,000	1,000	Existing Data Center Facility or New Facility With Baseline	\$0,000	-75%	1,000	1,000	0.00%

Measure Description		High Efficiency Product Assumptions				Baseline Product Assumptions				Economic Assumptions				Regional Output				Economic Assumptions				Technical Assumptions		Program Impact Indicators		Regional Forecast Details					
Electric Measure Group	Electric Measure Description	Efficient Product Description / Rating	Efficient Product Consumption (watts)	Efficient Hours of Operation (hours/year)	Baseline Product Description Rating	Baseline Product Consumption (watts)	Baseline Hours of Operation (hours/year)	Measure Type (years)	Baseline Amount (\$)	Average Baseline Product Cost (\$/kWh)	Incremental Cost (\$)	Assumed Energy Cost (\$/kWh)	Relative as a % of Incremental Cost (%)	Present Value of Payback Period (years)	Incremental Cost of Generating kWh Served (\$/kWh)	Annual Customer kWh Served (GWh/yr)	Customer kW Served (GW)	Generator Peak Demand (kW)	Generator Peak Demand (kW)	Non-Energy O&M Savings (\$/kWh)	Energy O&M Savings (\$)	Colocation Factor (%)	2015 Participants (C)	2015 Units (U)	2016 Participants (C)	2016 Units (U)	NTG (%)	Installation Rate (%)			
CO - Data Center IT Prescriptive	Phase & Frame Heat Exchangers	Phase 1 & Phase 2 Heat Exchangers - 2016 Savings	1000	20,000	1000	20,000	1000	1000	\$10,000	\$0.00	\$0.00	\$0.00	0%	10	\$0.00	10,000	10	10	\$0.00	\$0.00	100%	2	2	2	2	100%	100%				
CO - Data Center IT Prescriptive	Refrigerant - EC Plug Fans In-Unit	EC Plug Fans	2,100	21,600	Refrigerant - EC Fans - 2016 Savings	2,100	21,600	Refrigerant	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	\$0.00	0	0	0	0	0	0	0	0	0	0	0	0	100%	100%		
CO - Data Center IT Prescriptive	Refrigerant - EC Plug Fans Below-Floor	EC Plug Fans	1,150	21,600	Refrigerant - EC Fans Below-Floor - 2016 Savings	1,150	21,600	Refrigerant	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	\$0.00	0	0	0	0	0	0	0	0	0	0	0	0	100%	100%		
CO - Data Center IT Prescriptive	New Construction - EC Plug Fans In-Unit	EC Plug Fans	2,100	21,600	New Construction - EC Fans In-Unit - 2016 Savings	2,100	21,600	Refrigerant	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	\$0.00	0	0	0	0	0	0	0	0	0	0	0	0	100%	100%		
CO - Data Center IT Prescriptive	New Construction - EC Plug Fans Below-Floor	EC Plug Fans	1,150	21,600	New Construction - EC Fans Below-Floor - 2016 Savings	1,150	21,600	Refrigerant	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	\$0.00	0	0	0	0	0	0	0	0	0	0	0	0	100%	100%		
Energy Feedback Business		Electricity Price - combo customers - 2016 Savings				Thermostatic				Baseline Product Description Rating				Economic Assumptions				Regional Output				Economic Assumptions				Technical Assumptions		Program Impact Indicators		Regional Forecast Details	
Energy Feedback Program	Electricity Price - combo customers - 2016 Savings	Thermostatic	0.004	7,760	Control	0.000	0.000	\$0	\$0	\$0	\$0	0%	10	\$0.00	0.00	\$0.00	\$0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100%	100%			
Energy Feedback Program	2016 Price Expansion - combo customers - 2016 Savings	Thermostatic	0.005	7,760	Control	0.000	0.000	\$0	\$0	\$0	\$0	0%	10	\$0.00	0.00	\$0.00	\$0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100%	100%			
Energy Feedback Program	Behavioral adjustment - Existing Price - 2016 Savings	Thermostatic	-0.005	7,760	Control	-0.005	0.000	\$0	\$0	\$0	\$0	0%	10	\$0.00	0.00	\$0.00	\$0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100%	100%			
Energy Feedback Program	Behavioral adjustment - 2016 Price Expansion - 2016 Savings	Thermostatic	-0.004	7,760	Control	-0.004	0.000	\$0	\$0	\$0	\$0	0%	10	\$0.00	0.00	\$0.00	\$0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100%	100%			
Energy Management Systems		New Energy Management System				Over 200k sq ft Office/Commercial				New or Major Upgrades				Regional Output				Electricity Price - 2016 Savings				Economic Assumptions				Technical Assumptions		Program Impact Indicators		Regional Forecast Details	
Energy Information Systems	New Energy Information System for Whole-Building and Sub-System Energy Use Visualization and Monitoring	200	0	0	Yes EIS	0	0	0	\$7,375	\$0	\$11,413	\$0	0%	60%	-0.30	-0.24	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	100%	100%			
Energy Information Systems	Implementing Recommissioning Measures	Implementation Recommissioning Measures	470,363	7,365	Implementing	470,363	7,365	Implementing	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	\$0.00	0.00	\$0.00	\$0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100%	100%			
Energy Information Systems	2015 Implemented Behavioral Measures	2015 Implemented Behavioral Measures	470,363	7,365	Yes EIS	470,363	7,365	Yes EIS	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	\$0.00	0.00	\$0.00	\$0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100%	100%			
Energy Information Systems	2016 Implemented Behavioral Measures	2016 Implemented Behavioral Measures	470,363	7,365	Yes EIS	470,363	7,365	Yes EIS	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	\$0.00	0.00	\$0.00	\$0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100%	100%			
Energy Information Systems	2016 Behavioral Correction Measure	2016 Behavioral Correction Measure	470,363	7,365	Yes EIS	470,363	7,365	Yes EIS	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	\$0.00	0.00	\$0.00	\$0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100%	100%			
Energy Information Systems	2016 Behavioral Correction Measure	2016 Behavioral Correction Measure	470,363	7,365	Yes EIS	470,363	7,365	Yes EIS	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	\$0.00	0.00	\$0.00	\$0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100%	100%			
LED Street Lights		LED Street Lighting - Retrofit				LED Street Lighting - New Construction				LED Street Lighting - 2016 Savings				Regional Output				Economic Assumptions				Technical Assumptions		Program Impact Indicators		Regional Forecast Details					
CO - Company Owned Street Lighting	LED Street Lighting - Retrofit	LED Fixtures	100	2,000	LED Fixtures	200	4,000	LED Fixtures	\$0	\$0	\$0	\$0	0%	0%	0.82	0.82	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
CO - Company Owned Street Lighting	LED Street Lighting - New Construction	LED Fixtures	50	2,000	LED Fixtures	200	4,000	LED Fixtures	\$0	\$0	\$0	\$0	0%	0%	1.20	1.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Ledging Efficiency		Lighting Efficiency				Lighting Efficiency - 2016 Savings				Lighting Efficiency - New Construction				Regional Output				Economic Assumptions				Technical Assumptions		Program Impact Indicators		Regional Forecast Details					
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	100%	100%			
Prescriptive Retail Lighting	Lighting Efficiency - 2016 Upgrades	Lighting Fixtures	100	2,000	Lighting Fixtures	100	2,000	Lighting Fixtures	\$0.00	\$0.00	\$0.00	\$0.00	0%	10	1.00	1.00	\$0.00	\$0.00	\$0.00												

Measure Description		High Efficiency Product Assumptions				Baseline Product Assumptions				Economic Assumptions				Regional Output				Economic Assumptions				Technical Assumptions		Program Impact Inputs		Simplified Forecast Inputs			
Electric Measure Group	Electric Measure Description	Efficient Product Description / Rating	Efficient Product Consumption (watts)	Efficient Hours of Operation (hrs/year)	Baseline Product Description / Rating	Baseline Product Consumption (watts)	Baseline Hours of Operation (hrs/year)	Measure Type (year)	Baseline Amount (\$)	Average Cost of Efficient Product (\$/year)	Incremental Cost of Efficient Product (\$/year)	Assumed Energy Cost (\$/kWh)	Relative as a % of Baseline Energy Cost (%)	Present Value of Payback Period (years)	Incremental Cost of Efficient Product (\$/year)	Annual Customer kWh Served (MWh/year)	Customer kW Served (kW)	Retained Lifetime cost (\$/kWh)	Generation Peak Demand (kW)	Non-Energy Demand (\$/year)	Energy OEM Savings (\$)	Coherence Factor (%)	2015 Participants (C)	2015 Units (C)	2016 Units (C)	NTG (%)	Installation Rate (%)		
Residential Home Lighting-Residential Customers 2015	Average CFL Wattage Purchased in program	Average US Residential Average	1,000	2,000	Average US Residential Average	1,000	2,000	\$/year	\$1	\$1	\$1	40%	-0.45	23	\$0.05	\$0.030	\$0.000	\$0.00	\$0.00	\$0.00	\$0.00	1,000,000	0	0	0	100%	100%		
Residential Home Lighting - Business Customers 2015	Average CFL Wattage Purchased in program	Average US Residential Average	1,000	2,000	Average US Residential Average	1,000	2,000	\$/year	\$1	\$1	\$1	40%	-0.30	10	\$0.01	\$0.000	\$0.000	\$0.00	\$0.00	\$0.00	\$0.00	1,000,000	0	0	0	100%	100%		
Residential Home Lighting-Residential Customers 2015	LED Bulb	LED Bulb Purchase	1,000	2,000	Average US Residential Average	1,000	2,000	\$/year	\$1	\$1	\$1	40%	-0.12	3.05	\$0.01	\$0.034	\$0.000	\$0.00	\$0.00	\$0.00	\$0.00	1,000,000	0	0	0	100%	100%		
Residential Home Lighting - Business Customers 2015	LED Bulb Purchase	LED Bulb Purchase	1,000	2,000	Average US Residential Average	1,000	2,000	\$/year	\$1	\$1	\$1	40%	-0.12	2.34	\$0.01	\$0.027	\$0.000	\$0.00	\$0.00	\$0.00	\$0.00	1,000,000	0	0	0	100%	100%		
Residential Home Lighting-Residential Customers 2015	Average CFL Wattage Purchased in program	Average US Residential Average	1,000	2,000	Average US Residential Average	1,000	2,000	\$/year	\$1	\$1	\$1	40%	-0.05	22	\$0.05	\$0.020	\$0.000	\$0.00	\$0.00	\$0.00	\$0.00	0	0	162,368	2,500,000	0	0	100%	100%
Residential Home Lighting - Business Customers 2015	Average CFL Wattage Purchased in program	Average US Residential Average	1,000	2,000	Average US Residential Average	1,000	2,000	\$/year	\$1	\$1	\$1	40%	-0.05	60	\$0.01	\$0.000	\$0.000	\$0.00	\$0.00	\$0.00	\$0.00	1,000,000	0	0	0	100%	100%		
Residential Home Lighting-Residential Customers 2016	LED Bulb	LED Bulb Purchase	1,000	2,000	Average US Residential Average	1,000	2,000	\$/year	\$1	\$1	\$1	40%	-0.05	44	\$0.04	\$0.020	\$0.000	\$0.00	\$0.00	\$0.00	\$0.00	70,250	0	0	0	100%	100%		
Residential Home Lighting - Business Customers 2016	LED Bulb Purchase	LED Bulb Purchase	1,000	2,000	Average US Residential Average	1,000	2,000	\$/year	\$1	\$1	\$1	40%	-0.05	44	\$0.04	\$0.020	\$0.000	\$0.00	\$0.00	\$0.00	\$0.00	70,250	0	0	0	100%	100%		
Residential Home Lighting-Residential Customers 2016	LED Bulb	LED Bulb Purchase	1,000	2,000	Average US Residential Average	1,000	2,000	\$/year	\$1	\$1	\$1	40%	-0.05	44	\$0.04	\$0.020	\$0.000	\$0.00	\$0.00	\$0.00	\$0.00	70,250	0	0	0	100%	100%		
Residential Water Conservation																													
CO - Res Home Performance - Prescriptive	Addt. Insulation Heating Effects from R-15 to R-20 in Electric Heated and non-cooled Home	Existing Home with R-15 Insulation	400	1,000	Existing Home with R-15 Insulation	400	1,000	\$/year	\$1	\$1	\$1	10%	-14.80	11	\$0.01	\$0.022	\$0.000	\$0.00	\$0.00	\$0.00	\$0.00	1	10	10	10	100%	100%		
CO - Res Home Performance - Prescriptive	Addt. Insulation Heating and Cooling Effects from R-15 to R-20 in Electric Heated and Cooled Home	Existing Home with R-15 Insulation	381	1,000	Existing Home with R-15 Insulation and Existing Cooling	381	1,000	\$/year	\$1	\$1	\$1	10%	-12.60	10.28	\$0.02	\$0.027	\$0.001	\$0.00	\$0.00	\$0.00	\$0.00	2	31	2	31	100%	100%		
CO - Res Home Performance - Prescriptive	Addt. Insulation Cooling Effects from R-15 to R-20 in Natural Gas Heated and Electric Cooled Home	Existing Home with R-15 Insulation	381	1,000	Existing Home with R-15 Insulation and Existing Cooling	381	1,000	\$/year	\$1	\$1	\$1	50%	-35.84	18.09	\$12	\$0.09	\$0.159	\$0.154	\$0.00	\$0.00	\$0.00	16	285	16	285	100%	100%		
CO - Res Home Performance - Prescriptive	Tier 2 & Sealing & Dypass Sealing Heating Effects for minimum 25% ACH Reduction in Electric Heated and non-cooled Home	Existing home with CTM80 rating of 2,000	4,400	8,800	Existing home with CTM80 rating of 2,000	4,300	8,700	\$/year	\$1	\$1	\$1	10%	-9.7	7.43	\$0.01	\$0.17	\$0.02	\$0.00	\$0.00	\$0.00	\$0.00	0	0	0	0	100%	100%		
CO - Res Home Performance - Prescriptive	Tier 2 & Sealing & Dypass Sealing Heating Effects for minimum 25% ACH Reduction in Electric Heated and Cooled Home	Existing home with CTM80 rating of 2,000	4,281	8,581	Existing home with CTM80 rating of 2,000	4,181	8,481	\$/year	\$1	\$1	\$1	10%	-2.95	2.49	\$1.38	\$0.06	\$0.175	\$0.215	\$0.00	\$0.00	\$0.00	12	12	12	12	100%	100%		
CO - Res Home Performance - Prescriptive	Tier 2 & Sealing & Dypass Sealing Cooling Effects for minimum 25% ACH Reduction in Natural Gas Heated and Electric Cooled Home	Existing home with CTM80 rating of 2,000	4,281	8,581	Existing home with CTM80 rating of 2,000	4,181	8,481	\$/year	\$1	\$1	\$1	10%	-16.47	8.98	123	\$0.02	\$0.020	\$0.031	\$0.00	\$0.00	\$0.00	6	99	6	99	100%	100%		
CO - Res Home Performance - Prescriptive	Tier 2 & Sealing & Dypass Sealing Heating Effects for minimum 35% ACH Reduction in Electric Heated and non-cooled Home	Existing home with CTM80 rating of 2,000	2,184	4,368	Existing home with CTM80 rating of 2,000	2,084	4,268	\$/year	\$1	\$1	\$1	10%	-2.36	1.32	\$0.06	\$0.01	\$1.63	\$0.000	\$0.00	\$0.00	\$0.00	1	9	1	9	100%	100%		
CO - Res Home Performance - Prescriptive	Tier 2 & Sealing & Dypass Sealing Heating and Cooling Effects for minimum 35% ACH Reduction in Electric Heated and Cooled Home	Existing home with CTM80 rating of 2,000	2,184	4,368	Existing home with CTM80 rating of 2,000	2,084	4,268	\$/year	\$1	\$1	\$1	10%	-2.95	1.44	\$0.01	\$0.017	\$0.033	\$0.00	\$0.00	\$0.00	4	4	4	4	100%	100%			
CO - Res Home Performance - Prescriptive	2015 - provide CFLs to achieve at least 20 total (existing plus new) CFLs in the home	minimum increase CTI coverage	15	384	minimum average installation latency coverage	47	438	\$/year	\$1	\$1	\$1	10%	-7.4	0.26	23	\$0.09	\$0.011	\$0.003	\$0.00	\$0.00	\$0.00	467	8,100	0	0	100%	100%		
CO - Res Home Performance - Prescriptive	2016 - provide CFLs to achieve at least 20 total (existing plus new) CFLs in the home	minimum increase CTI coverage	15	384	minimum average installation latency coverage	47	438	\$/year	\$1	\$1	\$1	10%	-7.4	0.26	23	\$0.09	\$0.011	\$0.003	\$0.00	\$0.00	\$0.00	0	0	0	0	100%	100%		
CO - Res Home Performance - Prescriptive	Refrigerator	Refrigerator	0	1,000	Existing refrigerator from R-15 to R-20	100	1,000	\$/year	\$1	\$1	\$1	0%	-0.00	0.00	889	\$0.00	\$0.034	\$0.146	\$0.00	\$0.00	\$0.00	0	0	0	0	100%	100%		
CO - Res Home Performance - Prescriptive	Energy Star Refrigerator	Energy Star Refrigerator	0	1,000	Existing Refrigerator	0	1,000	\$/year	\$1	\$1	\$1	30%	-21.10	13.19	16	\$0.93	\$0.028	\$0.000	\$0.00	\$0.00	\$0.00	1	26	1	26	100%	100%		
CO - Res Home Performance - Prescriptive	CWV Fanless Fan	CWV Fanless Fan	400	800	PSC Model	400	800	\$/year	\$1	\$1	\$1	40%	-12.00	6.66	327	\$0.01	\$0.013	\$0.000	\$0.00	\$0.00	\$0.00	1	25	1	25	100%	100%		
CO - Res Home Performance - Prescriptive	Energy Star Ductless with Electric DHW	Energy Star Ductless with Electric DHW	1,000	2,000	Existing Home Standard Ductless	1,000	2,000	\$/year	\$1	\$1	\$1	100%	-4.26	0.00	12	\$0.66	\$0.029	\$0.004	\$0.00	\$0.00	\$0.00	2,000	1	0	1	0	100%	100%	
CO - Res Home Performance - Prescriptive	Energy Star Ductless with Gas DHW 2015	Energy Star Ductless with Gas DHW 2015	1,000	2,000	Existing Home Standard Ductless	1,000	2,000	\$/year	\$1	\$1	\$1	100%	-5.00	0.00	0	\$0.16	\$0.124	\$0.000	\$0.00	\$0.00	\$0.00	1,000	1	0	1	0	100%	100%	
CO - Res Home Performance - Prescriptive	Energy Star Clothes Washer with Electric DHW	Energy Star Clothes Washer with Electric DHW	100	200	Existing Home Standard clothes washer	100	200	\$/year	\$1	\$1	\$1	100%	-1.44	0.00	184	\$0.02	\$0.089	\$0.223	\$0.00	\$0.00	\$0.00	0	0	1	0	100%	100%		
CO - Res Home Performance - Prescriptive	Energy Star Clothes Washer with Electric DHW	Energy Star Clothes Washer with Electric DHW	100	200	Existing Home Standard clothes washer	100	200	\$/year	\$1	\$1	\$1	100%	-1.44	0.00	184	\$0.02	\$0.089	\$0.223	\$0.00	\$0.00	\$0.00	0	0	1	0	100%	100%		
CO - Res Home Performance - Prescriptive	Subbase Thermostatic 2015	Energy Star Program Thermostatic Heated and Cooled Home	3,070	7,140	Existing Home with R-15 insulation	3,000	6,900	\$/year	\$1	\$1	\$1	50%	-0.48	0.04	121	\$0.03	\$0.011	\$0.144	\$0.00	\$0.00	\$0.00	100	3	44	0	0	100%	100%	
CO - Res Home Performance - Prescriptive	Heat Pump Water Heater in a home with natural gas heat 2015 & 2016	Heat pump water heater with electric power factor 0.95	4,177	8,353	Existing Home with Natural Gas Heat	4,000	8,000	\$/year	\$1	\$1	\$1	50%	-1.77	1.77	2,070	\$0.19	\$0.019	\$0.443	\$0.00	\$0.00	\$0.00	0	2	0	2	100%	100%		
CO - Res Home Performance - Prescriptive	Heat Pump Water Heater in a home with electric resistance heat 2015 & 2016	Heat pump water heater with electric power factor 0.95	4,177	8,353	Existing Home with Natural Gas Heat	4,000	8,000	\$/year	\$1	\$1	\$1	50%	-1.77	1.77	2,070	\$0.19	\$0.019	\$0.443	\$0.00	\$0.00	\$0.00	0	2	0	2	100%	100%		
CO - Res Home Performance - Prescriptive	Heat pump water heater in a home with electric pump heat 2015 & 2016	Heat pump water heater with electric power factor 0.95	4,177	8,353	Existing Home with Natural Gas Heat	4,000	8,000	\$/year	\$1	\$1	\$1	50%	-1.77	1.77	2,070	\$0.19	\$0.019	\$0.443	\$0.00	\$0.00	\$0.00	0	2	0	2	100%	100%		
CO - Res Home Performance - Prescriptive	Excessive Sealing & Dypass Cooling Effects for Tier 1	Excessive Sealing & Dypass Cooling Effects for Tier 1	2,000	4,000	Existing Home with R-15 Insulation	2,000	4,000	\$/year	\$1	\$1	\$1	10%	-21.20	18.00	1,200	\$0.02	\$0.025	\$0.000	\$0.00	\$0.00	\$0.00	0	0	0	0	100%	100%		
CO - Res Home Performance - Prescriptive	Excessive Sealing & Dypass Cooling Effects for Tier 2	Excessive Sealing & Dypass Cooling Effects for Tier 2	2,000	4,000	Existing Home with R-15 Insulation	2,000	4,000	\$/year	\$1	\$1	\$1	10%	-21.20	18.00	1,200	\$0.02	\$0.025	\$0.000	\$0.00	\$0.00	\$0.00	0	0	0	0	100%	100%		
CO - Res Home Performance - Prescriptive	Excessive Cooling Reducing 12 SEER AC 3 Ton - (Tier 2) Replacement (Grand Junction/Western Slope)	Excessive Cooling Reducing 12 SEER AC 3 Ton - (Tier 2) Replacement (Grand Junction/Western Slope)	2,000	4,000	Existing Home with R-15 Insulation	2,000	4,000	\$/year	\$1	\$1	\$1	10%	-15.40	10.00	1,200	\$0.02	\$0.025	\$0.000	\$0.00	\$0.00	\$0.00	0	0	0	0	100%	100%		
CO - Res Home Performance - Prescriptive	Excessive Cooling Reducing 12 SEER AC 3 Ton - (Tier 2) Replacement (Grand Junction/Western Slope)	Excessive Cooling Reducing 12 SEER AC 3 Ton - (Tier 2) Replacement (Grand Junction/Western Slope)	2,000	4,000	Existing Home with R-15 Insulation	2,000	4,000	\$/year	\$1	\$1	\$1	10%	-15.40	10.00	1,200	\$0.02	\$0.025	\$0.000	\$0.00	\$0.00	\$0.00	0	0	0	0	100%	100%		
CO - Res Home Performance - Prescriptive	Excessive Cooling Reducing 12 SEER AC 3 Ton - (Tier 2) Replacement (Grand Junction/Western Slope)	Excessive Cooling Reducing 12 SEER AC 3 Ton - (Tier 2) Replacement (Grand Junction/Western Slope)	2,000	4,000	Existing Home with R-15 Insulation	2,000	4,000	\$/year	\$1	\$1	\$1	10%	-15.40	10.00	1,200	\$0.02	\$0.025	\$0.000	\$0.00	\$0.00	\$0.00	0	0	0	0	100%	100%		
CO - Res Home Performance - Prescriptive	Excessive Cooling Reducing 12 SEER AC 3 Ton - (Tier 2) Replacement (Grand Junction/Western Slope)	Excessive Cooling Reducing 12 SEER AC 3 Ton - (Tier 2) Replacement (Grand Junction/Western Slope)	2,000	4,000	Existing Home with R-15 Insulation	2,000	4,000	\$/year	\$1	\$1	\$1	10%	-15.40	10.00	1,200	\$0.02	\$0.025	\$0.000	\$0.00	\$0.00	\$0.00	0	0	0	0	100%	100%		
CO - Res Home Performance - Prescriptive	Excessive Cooling Reducing 12 SEER AC 3 Ton - (Tier 2) Replacement (Grand Junction/Western Slope)	Excessive Cooling Reducing 12 SEER AC 3 Ton - (Tier 2) Replacement (Grand Junction/Western Slope)	2,000	4,000	Existing Home with R-15 Insulation	2,000	4,000	\$/year	\$1	\$1	\$1	10%	-15.40	10.00	1,200	\$0.02	\$0.025	\$0.000	\$0.00	\$0.00									

Measure Description	Electric Measure Description	High Efficiency Product Assumptions				Baseline Product Assumptions				Economic Assumptions				Regional Output				Economic Assumptions				Technical Assumptions		Program Financial Inputs		Regional Financial Inputs				
		Efficient Product Description / Rating	Efficient Product Consumption (watts)	Efficient Hours of Operation (Hourly)	Baseline Product Description / Rating	Baseline Product Consumption (watts)	Baseline Hours of Operation (Hourly)	Measure Type (years)	Baseline Amount (\$)	Rabate Amount (\$)	Incremental Cost of Efficient Product (\$)	Assumed Energy Cost (\$/kWh)	Relative as a % of Baseline Product (\$)	Assume 100% of Release (yrns)	Incremental Cost of Efficient Product (\$)	Customer kWh (WMMR)	Retained Cost of Efficient Product (\$)	Retained Lifetime cost of Efficient Product (\$)	Customer kWh (WMMR)	Generator Peak kWh (WMMR)	Non-Energy O&M Savings (\$)	Energy O&M Savings (\$)	Coincidence Factor (%)	2015 Participants (#)	2016 Units (#)	NTG (#)	Installation Rate (%)			
CO - Single Family Weatherization - Prescriptive	Provide Efficient Bath Faucet Aerator - Electric Water Heater	1.0 GPM Non-test fixture	0	0.161	Provide Minimum Demand flow less than 1.0 GPM	11	0.161	1600	\$3	\$0	\$0	\$0.11	100%	0.20	0.00	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	0	0	100%	100%		
CO - Single Family Weatherization - Prescriptive	EC Motor Furnace Fan In-house without central AC	EC Motor Furnace Fan	100	0.04	EC Motor Furnace Fan	100	0.04	16,000	\$100	\$0	\$0	\$0.11	100%	0.18	0.00	\$27	\$0.61	\$0.03	\$0.40	\$0.00	\$0.00	\$0.00	60	1,049	60	1,049	100%	100%		
Building Products & Services																														
Energy Feedback Pilot	Custom Print - combi customers - 2015 savings	Unknown	0.000	0.000	Unknown	0.000	0.000	100	\$0	\$0	\$0	\$0.11	0.00	0.00	0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	10,000	9,312	10	0	100%	100%		
Commercial equipment - Cladding - 2015 savings	Unknown	Unknown	0.000	0.000	Unknown	0.000	0.000	100	\$0	\$0	\$0	\$0.11	0.00	0.00	0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	0	0	100%	100%		
Multi-family Buildings Pilot																														
Direct Install - CFL	Replace incandescent lamps with CFLs	1.025x 2.0 x 1.0 W 2700 x 1.0 C	20	0.044	2 Replace Minimum Demand fixture	205	0.044	14,410	\$9	\$0	\$0	\$0.11	100%	0.64	0.00	115	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	363	2,231	121	744	100%	100%	
Direct Install - LED	Replace incandescent lamps with LEDs	1.025x 2.0 x 1.0	11	0.044	2 Replace Minimum Demand fixture	21	0.044	20,000	\$10	\$0	\$0	\$0.11	100%	2.17	0.00	21	\$0.00	\$0.02	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	363	2,231	121	744	100%	100%	
Direct Install - Low-Flow Showerhead	Provide Efficient Showerhead	Low Flow Shower Head - 1.2 GPM	79	0.760	Provide Minimum Demand flow less than 1.2 GPM	123	0.760	16,000	\$3	\$0	\$0	\$0.11	100%	0.04	0.00	403	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	5	30	2	10	100%	100%	
Direct Install - Kitchen Faucet Aerator	Provide Efficient Kitchen Faucet Aerator	1.0 GPM Hot & cold faucet	13	0.760	Provide Minimum Demand flow less than 1.2 GPM	13	0.760	16,000	\$1	\$0	\$0	\$0.11	100%	0.12	0.00	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	3	20	1	7	100%	100%	
Direct Install - Bathroom Faucet Aerator	Provide Efficient Bath Faucet Aerator	1.0 GPM Hot & cold faucet	8	0.760	Provide Minimum Demand flow less than 1.2 GPM	13	0.760	16,000	\$1	\$0	\$0	\$0.11	100%	0.11	0.00	60	\$0.02	\$0.00	\$0.07	\$0.00	\$0.00	\$0.00	\$0.00	4	37	2	12	100%	100%	
Direct Install - Electric Water Heater Blanket	Water Heater Blanket	Anti-condensation wrap fit around Water Heater Tank	102	0.760	No External insulation on water heater	110	0.760	17,000	\$22	\$0	\$0	\$0.11	100%	0.15	0.00	503	\$0.04	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	7	42	0	14	100%	100%	
Direct Install - LED Exit Sign	Exit sign retrofit and replacement	LED	0	0.160	Unknown	0	0.160	1600	\$0	\$0	\$0	\$0.11	100%	0.09	0.00	360	\$0.21	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	3	17	1	6	100%	100%	
Energy Efficient Building	Energy ESB Project	None	0.000	0.000	Unknown	0.000	0.000	10,000	\$1,000	\$0	\$0	\$0.11	21%	0.07	0.00	10,000	\$0.13	\$0.01	\$44,876	\$0.00	\$0.00	\$0.00	\$0.00	1	1	4	4	100%	100%	
Smart Thermostats Pilot																														
Smart Thermostat	Smart Thermostat - CE Only	New Smart Thermostat	2,000	0.000	Stringent Demand Control Requirements	2,000	0.000	1600	\$0	\$0	\$0	\$0.11	25%	0.04	4.49	167	\$0.18	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	0	4,000	4,000	100%	100%
Smart Thermostat	Smart Thermostat - DE Only	Offices, Commercial & Public Thermostats	2,000	0.000	Stringent Demand Control Requirements	2,000	0.000	1600	\$0	\$0	\$0	\$0.11	0.00	0.00	0.00	11	\$0.00	\$0.00	\$0.01	\$0.01	\$0.00	\$0.00	\$0.00	700	700	0	0	100%	100%	
Building Optimization DE Pilot																														
DEG	Building Optimization DE - EE	Productivity Energy Conservation Initiative	870,000	-1.00	W-2013 Controls	870,000	-0.00	16,000	\$13,000	\$0	\$0	\$0.11	0	50%	1.36	0.08	243,750	\$0.05	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	0	10	100%	100%
DEG	Building Optimization DE - CR	Productivity Energy Conservation Initiative	870,000	-1.00	W-2013 Controls	870,000	-0.00	16,000	\$13,000	\$0	\$0	\$0.11	0	0%	493,31	2,495	\$0.00	\$0.02	19,000	\$0.01	\$0.00	\$0.00	\$0.00	10	10	0	0	100%	100%	
CO - IDC Residential	CO - IDC Residential	Residential Energy Conservation Program	1,000,000	0.000	Residential Energy Conservation Program	1,000,000	0.000	16,000	\$0	\$0	\$0	\$0.11	0	0.00	0.00	3,000	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0	1	1	100%	100%	
CO - Smart Thermostats	Residential AC Switch	AC Switch	1,000,000	0.000	Residential AC Switch	1,000,000	0.000	16,000	\$0	\$0	\$0	\$0.11	0	0.00	0.00	12	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	12,000	12,000	0	12,000	100%	100%	
Business Smart Thermostats Pilot																														
CO - Business Smart Thermostat	Business Smart Thermostats (cycle)	Business Smart Thermostats	0	0	Residential AC Switch	0	0	0	\$0	\$0	\$0	\$0.11	-	0.00	0.00	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	100	0	0	100%	100%	
CO - Business Smart Thermostat	Business Smart Thermostats (group or precooling)	Business Smart Thermostats	0	0	Residential AC Switch	0	0	0	\$0	\$0	\$0	\$0.11	-	0.00	0.00	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	50	100	0	0	100%	100%	

Measure Description		Gas Product Detailed Technical Assumptions												Program Forecast Inputs						Stipulated Forecast Inputs Valid Throughout Filing Period					
		High Efficiency Product Assumptions			Baseline Product Assumptions			Economic Assumptions			Stipulated Output			Economic Assumptions			2015	2015 Units	2016	2016 Units	NTG (%)	Installation Rate (%)			
Natural Gas Measure Group	Natural Gas Measure Description	High Efficiency Product Description / Rating	High Efficiency Product Consumption (Dth/yr)	Baseline Product Description / Rating	Baseline Product Consumption (Dth/yr)	Life of Product (years)	Average Rebate Amount	Average Baseline Product Cost	Average Incremental Cost of Efficient Product	Assumed Energy Cost (\$/M)	Rebate as a % of Incremental Cost	Increment Cost Payback Period w/o Rebate	Average Annual Customer Dth Savings	Average rebated cost per Dth Saved	Lifetime cost per Dth Saved	Non-Energy O&M Savings	Energy O&M Savings	2015 Participants (-)	2015 Units (-)	2016 Participants (-)	2016 Units (-)	NTG (%)	Installation Rate (%)		
Business Program																									
Commercial Refrigeration Efficiency	CW Pre-Rinse Sprayer - gas water heating	1.26 gallons per minute sprayer	7	1.40 gallons per minute sprayer	0	0	\$40	\$0	\$40	\$6.46	100%	1.611754536	0	1.66	\$24.16	\$4.94	\$0	\$0	16	32	18	35	100%	100%	
Prescriptive	Faucet Aerator (Restroom), gas water heating	5 gallons per minute kitchen faucet aerator	2	2.2 gallons per minute faucet	7	0	\$7	\$0	\$7	\$6.46	100%	0.067241313	0	5.26	\$1.27	\$0.14	\$0	132	404	145	444	100%	100%		
Prescriptive	Faucet Aerator (Kitchen), gas water heating	1.5 gallons per minute kitchen faucet aerator	2	2.2 gallons per minute faucet	2	0	\$7	\$0	\$7	\$6.46	100%	0.461083286	0	0.77	\$8.74	\$0.97	\$0	\$0	44	66	48	73	100%	100%	
Custom/Efficiency	CO - Custom Efficiency - Gas	CO - Custom Efficiency - Gas	Varies by project	11,646	Varies by project	12,048	20	\$1,562	\$0	\$16,000	\$6.46	10%	5.620271151	5.07153064	422.17	\$3.70	\$0.19	\$118	\$0	5	13	5	13	87%	100%
Energy Feedback Business																									
Energy Feedback Program	Existing Print - 2016 Savings	Treatment	201	Control	205	1	\$0	0	0	\$6.46	-	0	0	3.56	\$0.00	\$0.00	0	0	0	10,000	8,986	100%	100%		
Energy Feedback Program	2016 Print Expansion - 2016 Savings	Treatment	203	Control	205	1	\$0	0	0	\$6.46	-	0	0	2.40	\$0.00	\$0.00	0	0	0	10,000	9,650	100%	100%		
Energy Feedback Program	Behavioral adjustment - Existing Print - 2016 Savings	Treatment	-134	Control	-137	1	\$0	0	0	\$6.46	-	0	0	-2.37	\$0.00	\$0.00	0	0	0	0	8,986	100%	100%		
Energy Feedback Program	Behavioral adjustment - 2016 Print Expansion - 2016 Savings	Treatment	-136	Control	-137	1	\$0	0	0	\$6.46	-	0	0	-1.60	\$0.00	\$0.00	0	0	0	9,650	100%	100%			
Energy Management Systems																									
Energy Management System	New Energy Management System	New EMS for HVAC control	1,510	obsolete EMS	1,639	10	\$344	0	\$724	\$6.46	4%	2.974189273	2.856867268	328.89	\$1.05	\$0.07	\$0	0	10	10	10	10	99%	100%	
Energy Information Systems	New Energy Information System for Whole-Building and Sub-System Energy Use Visualization and Monitoring	EIS	0	No EIS	0	0	\$2,825	0	4188	\$6.46	68%	-0.8	-0.26	0.00	-	-	-2232	0	2	3	4	6	100%	100%	
Energy Information Systems	Implemented Recommissioning Measures	Implemented recommissioning measure	2,315	existing system	2,032	7	\$0	0	0	\$6.46	-	0	0	16.93	\$0.00	\$0.00	0	0	1	5	4	6	100%	100%	
Energy Information Systems	2015 Behavioral Measures	EIS	2,015	No EIS	2,032	1	\$0	0	0	\$6.46	-	0	0	16.93	\$0.00	\$0.00	0	0	0	0	0	0	100%	100%	
Energy Information Systems	2016 Behavioral Measures	EIS	2,015	No EIS	2,032	1	\$0	0	0	\$6.46	-	0	0	16.93	\$0.00	\$0.00	0	0	0	0	2	4	100%	100%	
Energy Information Systems	2015 Behavioral Correction Measure	EIS	-1,612	No EIS	-1,626	0	\$0	0	0	\$6.46	-	0	0	-13.55	\$0.00	-	0	0	0	0	0	0	100%	100%	
Energy Information Systems	2016 Behavioral Correction Measure	EIS	-1,612	No EIS	-1,626	0	\$0	0	0	\$6.46	-	0	0	-13.55	\$0.00	-	0	0	0	0	0	4	100%	100%	
Heating Efficiency																									
New Boiler - Plan A-1	Non-condensing Hot Water Boiler, New 75 MBTUH; for space heating only	85% Efficient Boiler	115	85% Efficient Boiler	122	20	\$151	\$800	\$800	\$6.46	26%	10.4087394	7.92194620	7.20	\$18.22	\$0.91	0	0	2	2	2	2	86%	100%	
New Boiler - Plan A-1	Non-condensing Hot Water Boiler, New 500 MBTUH; for space heating only	85% Efficient Boiler	320	85% Efficient Boiler	305	20	\$375	\$500	\$400	\$6.46	9%	30.07444702	27.25496761	20.58	\$18.22	\$0.91	0	0	2	2	2	2	86%	100%	
New Boiler - Plan A-1	Non-condensing Hot Water Boiler, New 1 MBTUH; for space and domestic water heating	85% Efficient Boiler	1,443	85% Efficient Boiler	1,533	20	\$750	\$700	\$440	\$6.46	17%	7.54906171	6.262288551	90.19	\$8.32	\$0.42	0	0	2	3	2	3	86%	100%	
New Boiler - Plan A-1	Non-condensing Hot Water Boiler, New 2 MBTUH; for space and domestic water heating	85% Efficient Boiler	2,886	85% Efficient Boiler	3,068	20	\$1,500	12000	5000	\$6.46	30%	4.289238733	3.002467113	180.37	\$8.32	\$0.42	0	0	2	2	2	2	86%	100%	
New Boiler - Plan A-1	Non-condensing Hot Water Boiler, New 4 MBTUH; for space and domestic water heating	85% Efficient Boiler	5,772	85% Efficient Boiler	6,133	20	\$3,000	24000	18000	\$6.46	30%	4.289238733	3.002467113	360.74	\$8.32	\$0.42	0	0	1	1	1	1	86%	100%	
New Boiler - Plan A-2	Condensing Hot Water Boiler, New 175 MBTUH; for space heating only	92% Efficient Boiler	115	85% Efficient Boiler	115	20	\$813	3000	1400	\$6.46	38%	12.2752845	7.576152152	20.17	\$30.37	\$1.52	0	0	15	15	15	15	86%	100%	
New Boiler - Plan A-2	Condensing Hot Water Boiler, New 500 MBTUH; for space heating only	92% Efficient Boiler	320	85% Efficient Boiler	387	20	\$1,750	\$800	\$200	\$6.46	28%	16.6483546	11.9492225	57.62	\$30.37	\$1.52	0	0	8	8	8	8	86%	100%	
New Boiler - Plan A-2	Condensing Hot Water Boiler, New 1 MBTUH; for space and domestic water heating	92% Efficient Boiler	1,443	85% Efficient Boiler	1,605	20	\$3,500	7000	7000	\$6.46	45%	4.718162607	2.573545234	252.52	\$13.86	\$0.69	0	0	10	10	10	10	86%	100%	
New Boiler - Plan A-2	Condensing Hot Water Boiler, New 2 MBTUH; for space and domestic water heating	92% Efficient Boiler	2,886	85% Efficient Boiler	3,301	20	\$7,000	12000	14000	\$6.46	48%	4.442425831	2.297906464	505.04	\$13.86	\$0.69	0	0	2	2	2	2	86%	100%	
New Boiler - Plan A-2	Condensing Hot Water Boiler, New 4 MBTUH; for space and domestic water heating	92% Efficient Boiler	5,772	85% Efficient Boiler	6,762	20	\$14,000	24000	20000	\$6.46	48%	4.442425831	2.297906464	101.08	\$13.86	\$0.69	0	0	1	1	1	1	86%	100%	
Water Heater	Commercial Hot Water Heater Condensing; 160 MBTUH	95% Efficient Water Heater	181	85% Efficient Water Heater	220	10	\$320	3613	1018	\$6.46	31%	4.508811491	3.092139054	34.95	\$9.16	\$0.61	0	0	2	2	2	2	86%	100%	
Water Heater	Commercial Hot Water Heater Condensing; 199.9 MBTUH	95% Efficient Water Heater	238	85% Efficient Water Heater	271	10	\$400	3400	1000	\$6.46	40%	3.960769627	2.137690129	43.47	\$9.20	\$0.61	0	0	2	2	2	2	86%	100%	
Water Heater	Commercial Hot Water Heater Condensing; 360 MBTUH	95% Efficient Water Heater	358	85% Efficient Water Heater	404	10	\$800	5809	1720	\$6.46	35%	4.080276543	2.58.3636906	65.53	\$9.16	\$0.61	0	0	1	1	1	1	86%	100%	
Water Heater	Commercial Tankless Water Heater - Condensing; 150 MBTUH	95% Efficient Water Heater	164	85% Efficient Storage Water Heater	205	10	\$300	4384	1347	\$6.46	24%	4.66236206	3.536514437	41.23	\$7.26	\$0.49	0	0	2	2	2	2	86%	100%	
Water Heater	Commercial Tankless Water Heater - Condensing; 199.9 MBTUH	95% Efficient Water Heater	218	85% Efficient Storage Water Heater	275	10	\$400	3400	1000	\$6.46	40%	2.7199592	1.632913819	56.91	\$7.03	\$0.47	0	0	1	1	1	1	86%	100%	
Pipe Insulation	Pipe insulation Hot Water System	Pipe with new insulation	87	Pipe with or old insulation	542	10	\$5,742	0	7400	\$6.46	77%	2.548619844	0.596604117	405.11	\$12.62	\$0.84	0	0	20	22	20	22	86%	100%	
Pipe Insulation	Pipe insulation Steam System	Pipe with new insulation	121	Pipe with or old insulation	649	10	\$4,311	0	19818	\$6.46	40%	3.052832927	1.836026743	548.19	\$7.86	\$0.52	0	0	0	0	0	0	86%	100%	
Tune-up	CAB Gas Boiler - Tune-Up assumed on 1-HW boiler at 80% eff 175 MBtu	Basis Tune-up - 2% additive improvement in efficiency; Boiler now at 80%	253	Existing boiler at 70% efficiency	259	2	\$44	0	1600	\$6.46	4%	23.89718723	22.85168629	6.47	\$6.76	\$3.58	0	0	8	14	8	14	86%	100%	
Tune-up	CAB Gas Boiler - Tune-Up assumed on 1-HW boiler at 80% eff 500 MBtu	Basis Tune-up - 2% additive improvement in efficiency; Boiler now at 80%	721	Existing boiler at 70% efficiency	740	2	\$125	0	1600	\$6.46	13%	8.36401553	7.318513899	18.50	\$6.76	\$3.58	0	0	12	26	12	26	86%	100%	

Gas Product Detailed Technical Assumptions																Program Forecast Inputs				Suggested Forecast Inputs				
Time-up	C&I Gas Boiler - Tune-Up assumed on 1-HW boiler at 80% eff 1 MMBtu/h	Bolier Tune-up - 2% additive improvement in efficiency. Boiler now at 80% efficiency	1,443	Existing boiler at 78% efficiency	1,480	2	\$250	0	\$100	\$6.46	25%	4.182007765	3.136505624	37.00	\$6.76	\$3.38	0	0	15	36	15	36	86%	100%
Time-up	C&I Gas Boiler - Tune-Up assumed on 1-HW boiler at 80% eff 2 MMBtu/h	Bolier Tune-up - 2% additive improvement in efficiency. Boiler now at 80% efficiency	2,886	Existing boiler at 78% efficiency	2,960	2	\$500	0	\$100	\$6.46	50%	2.091003883	1.045010141	74.00	\$6.76	\$3.38	0	0	10	12	10	12	86%	100%
Outdoor Air Reset	C&I Gas Boiler - Outdoor Air Reset assumed on 1-HW boiler at 80% eff 175 Mbtuh	83% Efficient Boiler	243	80% Efficient existing boiler	263	20	\$44	0	\$100	\$6.46	4%	16.95270547	16.21102461	9.13	\$4.79	\$0.24	0	0	1	1	1	1	86%	100%
Outdoor Air Reset	C&I Gas Boiler - Outdoor Air Reset assumed on 1-HW boiler at 80% eff 500 Mbtuh	83% Efficient Boiler	895	80% Efficient existing boiler	721	20	\$125	0	\$100	\$6.46	13%	5.933446915	5.19176605	26.08	\$4.79	\$0.24	0	0	1	1	1	1	86%	100%
Outdoor Air Reset	C&I Gas Boiler - Outdoor Air Reset assumed on 1-HW boiler at 80% eff 1 MMBtu/h	83% Efficient Boiler	1,391	80% Efficient existing boiler	1,443	20	\$250	0	\$100	\$6.46	25%	2.966723457	2.225042593	52.16	\$4.79	\$0.24	0	0	1	1	1	1	86%	100%
Outdoor Air Reset	C&I Gas Boiler - Outdoor Air Reset assumed on 1-HW boiler at 80% eff 2 MMBtu/h	83% Efficient Boiler	2,782	80% Efficient existing boiler	2,898	20	\$500	0	\$100	\$6.46	50%	1.483361729	0.741680664	104.31	\$4.79	\$0.24	0	0	1	1	1	1	86%	100%
Stack Damper	C&I Gas Boiler - Stack Dampers assumed on 1-HW boiler at 80% eff 175 Mbtuh	81% Efficient Boiler	249	80% Efficient existing boiler	263	12	\$44	0	\$80	\$6.46	9%	24.81630982	22.6486271	3.12	\$14.03	\$1.17	0	0	0	0	0	0	86%	100%
Stack Damper	C&I Gas Boiler - Stack Dampers assumed on 1-HW boiler at 80% eff 500 Mbtuh	81% Efficient Boiler	713	80% Efficient existing boiler	721	12	\$125	0	\$80	\$6.46	25%	8.685708435	6.514281126	8.91	\$14.03	\$1.17	0	0	0	0	0	0	86%	100%
Stack Damper	C&I Gas Boiler - Stack Dampers assumed on 1-HW boiler at 80% eff 1 MMBtu/h	81% Efficient Boiler	1,425	80% Efficient existing boiler	1,443	12	\$250	0	\$100	\$6.46	25%	8.685708435	6.514281126	17.81	\$14.03	\$1.17	0	0	0	0	0	0	86%	100%
Stack Damper	C&I Gas Boiler - Stack Dampers assumed on 1-HW boiler at 80% eff 2 MMBtu/h	81% Efficient Boiler	2,850	80% Efficient existing boiler	2,898	12	\$500	0	\$100	\$6.46	50%	4.342854218	2.171427109	35.63	\$14.03	\$1.17	0	0	0	0	0	0	86%	100%
Modulating Burner	C&I Gas Boiler - Modulating Burner Controls, >=5 to 1 turn down assumed on 1-HW boiler at 80% eff 175 Mbtuh	83% Efficient Boiler	243	80% Efficient existing boiler	263	20	\$131	0	\$800	\$6.46	3%	6.455590243	6.233085084	9.13	\$14.38	\$0.72	0	0	0	0	0	0	86%	100%
Modulating Burner	C&I Gas Boiler - Modulating Burner Controls, >=5 to 1 turn down assumed on 1-HW boiler at 80% eff 500 Mbtuh	83% Efficient Boiler	895	80% Efficient existing boiler	721	20	\$375	0	\$800	\$6.46	10%	22.59456588	20.36952128	26.08	\$14.38	\$0.72	0	0	0	0	0	0	86%	100%
Modulating Burner	C&I Gas Boiler - Modulating Burner Controls, >=5 to 1 turn down assumed on 1-HW boiler at 80% eff 1 MMBtu/h	83% Efficient Boiler	1,391	80% Efficient existing boiler	1,443	20	\$750	0	\$800	\$6.46	9%	24.98574496	22.76070236	52.16	\$14.38	\$0.72	0	0	0	0	0	0	86%	100%
Modulating Burner	C&I Gas Boiler - Modulating Burner Controls, >=5 to 1 turn down assumed on 1-HW boiler at 80% eff 2 MMbuh	83% Efficient Boiler	2,782	80% Efficient existing boiler	2,898	20	\$1,500	0	\$800	\$6.46	18%	12.49287248	10.26782989	104.31	\$14.38	\$0.72	0	0	0	0	0	0	86%	100%
C&I Gas Boiler - Steam Traps	C&I Gas Boiler - Steam Traps Low Pressure - average of 10 and 15 PSI	New Steam Trap	2,441	Existing Boiler, malfunctioning steam trap	2,481	10	\$50	0	\$200	\$6.46	25%	0.775595172	0.581696379	39.90	\$1.25	\$0.13	0	0	0	0	0	0	86%	100%
C&I Gas Boiler - Steam Traps	C&I Gas Boiler - Steam Traps High Pressure - average of 50 PSI and 65 PSI	New Steam Trap	2,362	Existing Boiler, malfunctioning steam trap	2,481	4	\$50	0	\$200	\$6.46	25%	0.346999101	0.260249326	89.18	\$0.56	\$0.14	0	0	0	0	0	0	86%	100%
Furnaces	Furnaces (avg size=90,000 Btu/h)	93% Efficient Furnace	69	80% Efficient Furnace	79	15	\$84	0	\$200	\$6.46	10%	11.50657216	10.33846984	11.11	\$7.55	\$0.50	0	0	25	25	25	25	86%	100%
Lighting - Small Business																								
Prescriptive	Faucet Aerator (Restroom), gas water heating	0 gallons per minute maximum faucet sensor	2	2.2 gallons per minute faucet	7	0	\$7	\$0	\$7	\$6.46	100%	0.067241313	0	5.26	\$1.27	\$0.14	\$0	\$0	132	404	132	404	100%	100%
Prescriptive	Faucet Aerator (Kitchen), gas water heating	1.5 gallons per minute kitchen faucet sensor	2	2.2 gallons per minute faucet	2	0	\$7	\$0	\$7	\$6.46	100%	0.461083286	0	0.77	\$8.74	\$0.97	\$0	\$0	44	66	44	66	100%	100%
New Construction	Energy Design Assurance																							
Energy Design Assurance	Standard Track	More Efficient than Code Building	4,971	Code-Compliant Building	8,673	20	\$6,808	0	\$8773	\$6.46	8%	8.070851637	7.45192669	1701.89	\$4.00	\$0.20	0	0	78	78	80	80	99%	100%
Energy Efficient Buildings	Average EEE Project	More Efficient than Code Building	2,323	Code-Compliant Building	2,896	20	\$3,045	0	\$2040	\$6.46	15%	4.25634136	3.637423191	761.23	\$4.00	\$0.20	0	0	31	31	48	48	97%	100%
Recommissioning																								
CO - Recommissioning Study - E/G	Study	Existing Facility	11,938	Existing Facility	11,938	7	\$1,109	0	\$100	\$6.46	65%	-	-	0.00	-	-	0	0	8	8	8	8	90%	100%
CO - Recommissioning Measure - E/G	Implementation	Implemented Measures	11,162	Existing Facility	11,938	7	\$1,324	0	\$100	\$6.46	13%	2,166919719	1.892885966	776.00	\$1.71	\$0.24	\$0	\$0	4	4	4	4	90%	100%
CO - Small Building Tune-up Study - E/G	Building Tune-up Study	Existing Facility	4,761	Existing systems	4,761	7	\$513	0	\$207	\$6.46	88%	-	-	0.00	-	-	0	0	4	4	4	4	90%	100%
CO - Small Building Tune-up Measure - E/G	Building Tune-up Implementation	Implemented Measures	4,452	Existing systems	4,761	7	\$216	0	\$107	\$6.46	21%	0.503539116	0.395578756	309.47	\$0.70	\$0.10	0	0	2	2	2	2	90%	100%
Residential Program																								
Energy Efficient Showerhead																								
Showerhead 2015	Provide new 1.5 gpm showerhead to replace existing 2.5 gpm showerhead in natural gas DHW unit home	1.5 GPM Showerhead	3	2.5 GPM Showerhead	5	10	\$3	\$0	\$3	\$6.15	100%	0.085031904	0	1.98	\$1.48	\$0.15	\$22	\$0	3,571	13,285	0	0	99%	55%
Showerhead 2nd 2015	Provide new 1.5 gpm showerhead for second shower to replace existing 2.5 gpm showerhead in natural gas DHW unit home	1.5 GPM Showerhead	3	2.5 GPM Showerhead	4	10	\$3	\$0	\$3	\$6.15	100%	0.097597085	0	1.71	\$1.70	\$0.17	\$19	\$0	11,160	41,516	0	0	99%	30%
Aerators - Kitchen 2015	Provide Energy Efficient Kitchen Aerator - 1.5 GPM to replace existing 2.2 gpm aerator in home with natural gas DHW heater	1.5 GPM Kitchen Faucet Aerator	0	2.2 GPM Kitchen Faucet Aerator	1	10	\$1	\$0	\$1	\$6.15	100%	0.362793946	0	0.22	\$6.35	\$0.63	\$21	\$0	7,812	29,061	0	0	99%	40%
Aerators - Bathroom 2015	Provide Energy Efficient Bath Faucet Aerator - 1.0 GPM to replace existing 2.2 gpm aerator in home with natural gas DHW heater	1.0 GPM Bathroom Faucet Aerator	0	2.2 GPM Bathroom Faucet Aerator	0	10	\$0	\$0	\$0	\$6.15	100%	0.093850363	0	0.26	\$1.63	\$0.16	\$21	\$0	11,160	41,516	0	0	99%	40%
Aerators - Bathroom 2nd 2015	Provide Energy Efficient Bath Faucet Aerator - 1.0 GPM for second faucet to replace existing 2.2 gpm aerator in home with natural gas DHW heater	1.0 GPM Bathroom Faucet Aerator	0	2.2 GPM Bathroom Faucet Aerator	0	10	\$0	\$0	\$0	\$6.15	100%	0.093850363	0	0.26	\$1.63	\$0.16	\$21	\$0	7,812	29,061	0	0	99%	20%
Showerhead 2106	Provide new 1.5 gpm showerhead to replace existing 2.5 gpm showerhead in natural gas DHW unit home	1.5 GPM Showerhead	3	2.5 GPM Showerhead	5	10	\$3	\$0	\$3	\$6.15	100%	0.087964038	0	1.98	\$1.53	\$0.15	\$22	\$0	0	0	3,571	13,285	99%	55%
Showerhead 2nd 2106	Provide new 1.5 gpm showerhead for second shower to replace existing 2.5 gpm showerhead in natural gas DHW unit home	1.5 GPM Showerhead	3	2.5 GPM Showerhead	4	10	\$3	\$0	\$3	\$6.15	100%	0.100962502	0	1.71	\$1.75	\$0.18	\$19	\$0	0	0	11,160	41,516	99%	30%

Gas Product Detailed Technical Assumptions																	Program Forecast Inputs				Stipulated Forecast Inputs				
Aerators - Kitchen 2016	Provide Energy Efficient Kitchen Aerator - 1.5 GPM to replace existing 2.2 gpm aerator in home with natural gas DHW heater	1.5 GPM Kitchen Faucet Aerator	0	2.2 GPM Kitchen Faucet Aerator	1	10	\$1	\$0	\$1	\$6.15	100%	0.396465158	0	0.22	\$6.58	\$0.66	\$2	\$0	0	0	7,812	29,061	99% 40%		
Aerators - Bathroom 2016	Provide Energy Efficient Bath Faucet Aerator - 1.0 GPM to replace existing 2.2 gpm aerator in home with natural gas DHW heater	1.0 GPM Bathroom Faucet Aerator	0	2.2 GPM Bathroom Faucet Aerator	0	10	\$0	\$0	\$0	\$6.15	100%	0.100553961	0	0.26	\$1.75	\$0.17	\$3	\$0	0	0	11,160	41,516	99% 40%		
Aerators - Bathroom 2nd 2016	Provide Energy Efficient Bath Faucet Aerator - 1.0 GPM for second faucet to replace existing 2.2 gpm aerator in home with natural gas DHW heater	1.0 GPM Bathroom Faucet Aerator	0	2.2 GPM Bathroom Faucet Aerator	0	10	\$0	\$0	\$0	\$6.15	100%	0.100553961	0	0.26	\$1.75	\$0.17	\$3	\$0	0	0	7,812	29,061	99% 20%		
Energy Feedback Residential																									
Residential Energy Feedback	Online Energy Feedback & Tools	Treatment	70	Control	70	1	\$0	\$0	\$0	\$6.15	-	0	0	0.27	\$0.00	\$0	\$0	21,823	21,823	21,823	100%	100%			
Residential Energy Feedback	ROLL-UP: Existing Participant - 2015 Savings	Treatment	100	Control	107	1	\$0	\$0	\$0	\$6.15	-	0	0	0.53	\$0.00	\$0	\$0	92,769	89,343	0	0	100%	100%		
Residential Energy Feedback	ROLL-UP: Existing Participant - 2016 Savings	Treatment	108	Control	107	1	\$0	\$0	\$0	\$6.15	-	0	0	0.73	\$0.00	\$0	\$0	83,987	81,503	100%	100%	100%			
Residential Energy Feedback	ROLL-UP: New Participant - 2015 Savings	Treatment	100	Control	100	1	\$0	\$0	\$0	\$6.15	-	0	0	0.53	\$0.00	\$0	\$0	337,600	325,465	0	0	100%	100%		
Residential Energy Feedback	ROLL-UP: New Participant - 2016 Savings	Treatment	75	Control	77	1	\$0	\$0	\$0	\$6.15	-	0	0	0.47	\$0.00	\$0	\$0	0	0	347,036	334,897	100%	100%	100%	
Residential Energy Feedback	Behavioral Adjustment-Online Energy Feedback & Tools	Treatment	40	Control	47	1	\$0	\$0	\$0	\$6.15	-	0	0	0.18	\$0.00	\$0	\$0	0	0	21,823	0	100%	100%	100%	
Residential Energy Feedback	Behavioral Adjustment-ROLL-UP: Existing Participant - 2015 Savings	Treatment	71	Control	21	1	\$0	\$0	\$0	\$6.15	-	0	0	0.38	\$0.00	\$0	\$0	0	0	89,343	0	100%	100%	100%	
Residential Energy Feedback	Behavioral Adjustment-ROLL-UP: Existing Participant - 2016 Savings	Treatment	71	Control	21	1	\$0	\$0	\$0	\$6.15	-	0	0	0.38	\$0.00	\$0	\$0	0	0	81,503	0	100%	100%	100%	
Residential Energy Feedback	Behavioral Adjustment-ROLL-UP: New Participant - 2015 Savings	Treatment	50	Control	50	1	\$0	\$0	\$0	\$6.15	-	0	0	0.20	\$0.00	\$0	\$0	0	0	325,465	0	100%	100%	100%	
Residential Energy Feedback	Behavioral Adjustment-ROLL-UP: New Participant - 2016 Savings	Treatment	61	Control	61	1	\$0	\$0	\$0	\$6.15	-	0	0	0.31	\$0.00	\$0	\$0	0	0	0	334,897	100%	100%	100%	100%
ENERGY STAR New Homes																									
CO - Res Energy Star New Home - Prescriptive	Envelope Measures with 10% improvement over local code - Combo Customers 2015	Envelope Measures with 10% improvement over local code - Combo Customers 2015	80	Reference Home Based Upon REMIATE model by House Rater with Average Size 3130 and Final HERIS 61	96	20	\$121	\$0	\$320	\$6.15	23%	5.59	4.29	15.12	\$7.99	\$0.40	\$0	\$0	110	195	113	203	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Envelope Measures with 15% improvement over local code - Combo Customers 2015	Envelope Measures with 15% improvement over local code - Combo Customers 2015	79	Reference Home Based upon REMIATE model by House Rater with Average Size 3133 and Final HERIS 62	101	20	\$252	\$0	\$936	\$6.15	27%	7.14	5.22	21.38	\$11.77	\$0.59	\$0	\$0	309	546	318	571	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Envelope Measures with 20% improvement over local code - Combo Customers 2015	Envelope Measures with 20% improvement over local code - Combo Customers 2015	84	Reference Home Based Upon Local Code with Baseline HERIS 77	114	20	\$367	\$0	\$1,397	\$6.15	28%	6.91	4.96	30.51	\$12.02	\$0.60	\$0	\$0	544	962	561	1,007	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Envelope Measures with 25% improvement over local code - Combo Customers 2015	Envelope Measures with 25% improvement over local code - Combo Customers 2015	83	Reference Home Based Upon REMIATE model by House Rater with Average Size 3174 and Final HERIS 51	123	20	\$495	\$0	\$1,806	\$6.15	31%	6.51	4.51	40.10	\$12.33	\$0.62	\$0	\$0	464	821	478	857	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Envelope Measures with 30% improvement over local code - Combo Customers 2015	Envelope Measures with 30% improvement over local code - Combo Customers 2015	80	Reference Home Based Upon REMIATE model by House Rater with Average Size 3176 and Final HERIS 54	129	20	\$652	\$0	\$1,977	\$6.15	33%	6.48	4.34	49.63	\$13.14	\$0.66	\$0	\$0	130	230	134	240	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Envelope Measures with 35% improvement over local code - Combo Customers 2015	Envelope Measures with 35% improvement over local code - Combo Customers 2015	74	Reference Home Based Upon REMIATE model by House Rater with Average Size 3178 and Final HERIS 48	126	20	\$819	\$0	\$2,225	\$6.15	37%	6.50	4.10	55.65	\$14.72	\$0.74	\$0	\$0	27	48	30	54	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Envelope Measures with 40% improvement over local code - Combo Customers 2015	Envelope Measures with 40% improvement over local code - Combo Customers 2015	47	Reference Home Based Upon Local Code with Baseline HERIS 71	96	20	\$898	\$0	\$2,197	\$6.15	41%	7.36	4.35	48.50	\$18.52	\$0.93	\$0	\$0	5	8	2	4	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Envelope Measures with 10% improvement over local code - Gas Only Customers 2015	Envelope Measures with 10% improvement over local code - Gas Only Customers 2015	80	Reference Home Based Upon REMIATE model by House Rater with Average Size 3184 and Final HERIS 50	104	20	\$200	\$0	\$311	\$6.15	39%	5.47	3.33	15.20	\$13.16	\$0.66	\$0	\$0	91	161	93	166	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Envelope Measures with 15% improvement over local code - Gas Only Customers 2015	Envelope Measures with 15% improvement over local code - Gas Only Customers 2015	88	Reference Home Based Upon Local Code with Baseline HERIS 69	130	20	\$650	\$0	\$1,500	\$6.15	43%	5.62	3.19	43.38	\$14.98	\$0.75	\$0	\$0	185	227	191	342	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Envelope Measures with 20% improvement over local code - Gas Only Customers 2015	Envelope Measures with 20% improvement over local code - Gas Only Customers 2015	88	Reference Home Based Upon REMIATE model by House Rater with Average Size 3177 and Final HERIS 69	112	20	\$350	\$0	\$738	\$6.15	47%	5.19	2.73	23.16	\$15.11	\$0.76	\$0	\$0	122	216	125	225	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Envelope Measures with 25% improvement over local code - Gas Only Customers 2015	Envelope Measures with 25% improvement over local code - Gas Only Customers 2015	82	Reference Home Based Upon REMIATE model by House Rater with Average Size 3180 and Final HERIS 53	113	20	\$500	\$0	\$1,121	\$6.15	45%	5.94	3.29	30.68	\$18.30	\$0.81	\$0	\$0	226	399	233	418	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Envelope Measures with 30% improvement over local code - Gas Only Customers 2015	Envelope Measures with 30% improvement over local code - Gas Only Customers 2015	89	Reference Home Based Upon Local Code with Baseline HERIS 79	130	20	\$650	\$0	\$1,500	\$6.15	43%	5.62	3.19	43.38	\$14.98	\$0.75	\$0	\$0	185	227	191	342	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Envelope Measures with 35% improvement over local code - Gas Only Customers 2015	Envelope Measures with 35% improvement over local code - Gas Only Customers 2015	84	Reference Home Based Upon REMIATE model by House Rater with Average Size 4144 and Final HERIS 55	137	20	\$800	\$0	\$1,836	\$6.15	44%	5.66	3.19	52.78	\$15.16	\$0.76	\$0	\$0	53	93	54	97	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Envelope Measures with 35% improvement over local code - Gas Only Customers 2015	Envelope Measures with 35% improvement over local code - Gas Only Customers 2015	83	Reference Home Based Upon REMIATE model by House Rater with Average Size 4177 and Final HERIS 53	120	20	\$1,000	\$0	\$2,333	\$6.15	43%	5.52	3.15	68.75	\$14.55	\$0.73	\$0	\$0	8	5	11	2	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Envelope Measures with 40% improvement over local code - Gas Only Customers 2015	Envelope Measures with 40% improvement over local code - Gas Only Customers 2015	87	Reference Home Based Upon Local Code with Baseline HERIS 79	121	20	\$1,400	\$0	\$3,142	\$6.15	45%	8.02	4.45	63.70	\$21.98	\$1.10	\$0	\$0	3	6	2	4	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Energy Star Dishwasher - Combo Customers w/ Gas DHW 2015	Energy Star Dishwasher	1	Standard Dishwasher	1	11	\$4	\$0	\$4	\$6.15	100%	3.40	0.00	0.03	\$133.28	\$12.12	\$1	\$0	1,103	1,952	1,173	2,104	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Energy Star Dishwasher - Gas Only Customers w/ Gas DHW 2015	Energy Star Dishwasher	1	Standard Dishwasher	1	11	\$10	\$0	\$4	\$6.15	254%	3.40	-5.23	0.03	\$338.11	\$30.74	\$1	\$0	472	836	503	901	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Energy Star Clothes Washer - Combo Customers w/ Gas DHW 2015	Energy Star Clothes Washer	1	Standard Clothes Washer	1	11	\$34	\$0	\$34	\$6.15	100%	1.33	0.00	0.67	\$50.18	\$4.56	\$21	\$0	122	216	131	235	92% 100%		
CO - Res Energy Star New Home - Prescriptive	Energy Star Clothes Washer - Gas Only Customers w/ Gas DHW 2015	Energy Star Clothes Washer	1	Standard Clothes Washer	1	11	\$50	\$0	\$34	\$6.15	149%	1.33	-0.65	0.67	\$74.72	\$9.79	\$21	\$0	53	93	56	100	92% 100%		
Home Energy Squad																									
Home Energy Squad Service 2015	Home Energy Squad Service 2015	Weighted average - Energy Efficient Gas	60	Weighted average - Energy Efficient Gas measures by participant	11	10	\$21	\$0	\$21	\$6.15	100%	1,343,372,399	0	1.78	\$11.71	\$1.12	\$0	\$0	1,175	3,005	0	0	100% 100%		
Home Energy Squad Service 2016	Home Energy Squad Service 2016	Weighted average - Energy Efficient Gas	7	Weighted average - Energy Efficient Gas measures by participant	9	10	\$18	\$0	\$18	\$6.15	100%	1,267,917,087	0	1.59	\$11.09	\$1.08	\$0	\$0	0	0	1,578	4,638	100% 100%		
Home Energy Squad A La Carte Measures	Weatherstripping additional door	1	Baseline door w/ CPMSI rating of 1.0	2	10	\$0	\$0	\$4	\$6.15	0%	0.45158449	0.451556449	1.59	\$0.00	\$0.00	\$0	\$0	21	53	18	53	100% 100%			
Home Energy Squad A La Carte Measures	Install Second Programmable Thermostat	2	Existing non-programmable thermostat	33	15	\$0	\$0	\$10	\$6.15	0%	0.636856346	0.636856346	2.63	\$0.00	\$0.00	\$0	\$0	4	10	4	14	100% 100%			
Home Performance with ENERGY STAR																									
CO - Res Home Performance - Prescriptive	Attic Insulation Heating Effects from R-15 to R53 in Natural Gas Heated and non-cooled Home	Existing Home with R-15 Attic Insul	4	Existing home w/ R-15 attic insulation and average heating efficiency of 80% AFUE	12	20	\$255	0	\$385	\$6.15	18%	26.77507745	21,846,1167	8.41	\$30.31	\$1.52	\$0	\$0	96	211	96	211	116% 100%		
CO - Res Home Performance - Prescriptive	Attic Insulation Heating Effects from R-15 to R53 in Natural Gas Heated and Electric Cooled Home 2015	Existing Home with R-15 Attic Insul	4	Existing home w/ R-15 attic insulation and average heating efficiency of 80% AFUE and cooling efficiency of 2.04 COP	12	20	\$160	0	\$70	\$6.15	18%	16.82010865	13,723,72735	8.41	\$19.04	\$0.95	\$0	\$0	115	254	115	254	116% 100%		
CO - Res Home Performance - Prescriptive	Tier 2 Air Sealing & Bypass Sealing Heating Effects for minimum 25% ACH Reduction in Natural Gas Heated and non-cooled Home	Baseline home with CFMSI rating of 3005	44	10	\$85	0	\$36	\$6.15	16%	7.041415626	5,926,713,172	12.38	\$6.88	\$0.69	\$0	\$0	30	68	30	68	116% 100%				
CO - Res Home Performance - Prescriptive	Tier 2 Air Sealing & Bypass Sealing Heating Effects for minimum 25% ACH Reduction in Natural Gas Heated and Electric Cooled Home 2015	Baseline home with CFMSI rating of 3005	44	10	\$60	0	\$41	\$6.15	16%	5.008568395	4,215,671,079	12.38	\$4.88	\$0.49	\$0	\$0	44	99	44	99	116% 100%				

Gas Product Detailed Technical Assumptions																			Program Forecast Inputs					Suggested Forecast Inputs		
CO - Res Home Performance - Prescriptive	Tier 3 Air Sealing & Bypass Sealing Heating Effects for minimum 33% ACH Reduction in Natural Gas Heated and non-cooled Home	Baseline home with CFM50 rating of 1998		23	Baseline home with CFM50 rating of 3360		41	10	\$85	0	\$36	\$6.15	16%	4.912486979	4.134807189	17.75	\$4.78	\$0.48	0	0	49	109	49	109	116%	100%
CO - Res Home Performance - Prescriptive	Tier 3 Air Sealing & Bypass Sealing Heating Effects for minimum 33% ACH Reduction in Natural Gas Heated and Electric Cooled Home 2015	Baseline home with CFM50 rating of 1998		23	Baseline home with CFM50 rating of 3360		41	10	\$59	0	\$34	\$6.15	16%	3.425967791	2.883614533	17.75	\$3.34	\$0.33	0	0	4	9	4	9	116%	100%
CO - Res Home Performance - Prescriptive	Wall Insulation Heating Effects from R-0 to R11 in Natural Gas Heated and non-cooled Home	R-11 insulation in wall cavity		11	Empty Wall Cavity		34	20	\$800	0	2001	\$6.15	38%	15.1761511	9.370875644	22.41	\$35.70	\$1.79	0	0	53	117	53	117	116%	100%
CO - Res Home Performance - Prescriptive	Wall Insulation Heating Effects from R-0 to R11 in Natural Gas Heated and Electric Cooled Home 2015	R-11 insulation in wall cavity		11	Empty Wall Cavity		34	20	\$727	0	1800	\$6.15	38%	13.78905089	8.514377611	22.41	\$32.44	\$1.62	0	0	51	112	51	112	116%	100%
CO - Res Home Performance - Prescriptive	Setback Thermostat 2015	Energy Star Programmable thermostat (gains net back during heating per 2006 RES25 Data Analysis)		82	standard thermostat manually adjusted		66	5	\$22	0	43	\$6.15	50%	1.675309258	0.837654629	4.19	\$5.15	\$1.03	0	0	39	85	39	85	116%	100%
CO - Res Home Performance - Prescriptive	High Efficiency Furnace 2015	96% AFUE		53	78% AFUE Federal Standard Efficiency Furnace		66	18	\$200	2078	520	\$6.15	38%	7.325074084	4.507475599	11.54	\$17.33	\$0.96	0	0	11	25	0	0	116%	100%
CO - Res Home Performance - Prescriptive	High Efficiency Furnace 2016	96% AFUE		53	80% AFUE Federal Standard Efficiency Furnace (98% AFUE gas furnace)		63	18	\$200	2078	520	\$6.15	38%	8.514616029	5.239458616	9.93	\$20.14	\$1.12	0	0	0	0	11	25	116%	100%
CO - Res Home Performance - Prescriptive	90% EF Tankless Water Heater 2015	90% EF Tankless Water Heater		18	40 gallon tank code minimum 59.4% Storage Water Heater		28	20	\$200	865	1748	\$6.15	11%	30.23631325	28.76418707	9.37	\$21.35	\$1.07	0	0	4	8	0	0	116%	100%
CO - Res Home Performance - Prescriptive	90% EF Tankless Water Heater 2016	90% EF Tankless Water Heater		16	40 gallon tank code minimum 61.0% Storage Water Heater		23	20	\$200	865	1672	\$6.15	12%	36.64435716	32.260166886	7.42	\$26.96	\$1.35	0	0	0	0	4	8	116%	100%
CO - Res Home Performance - Prescriptive	47% EF Storage Water Heater 2015	40 gallon tank 67% EF Storage Water Heater		24	40 gallon tank code minimum 59.4% Storage Water Heater		28	13	\$100	865	403	\$6.15	25%	20.81448268	15.61086201	3.12	\$32.00	\$2.46	0	0	1	2	0	0	116%	100%
CO - Res Home Performance - Prescriptive	47% EF Storage Water Heater 2016	40 gallon tank 67% EF Storage Water Heater		22	40 gallon tank code minimum 61.0% Storage Water Heater		23	13	\$100	865	339	\$6.15	30%	27.00535882	19.44918927	1.92	\$52.00	\$4.00	0	0	0	0	1	2	116%	100%
CO - Res Home Performance - Prescriptive	Energy Star Dishwasher 2015	Energy Star Dishwasher - w/ Gas DW		1	Federal Minimum Standard Dishwasher		1	10	\$4	0	4	\$6.15	100%	7.0153368833	0	0.03	\$137.00	\$13.70	0	0	9	19	9	19	116%	100%
CO - Res Home Performance - Prescriptive	Energy Star Clothes Washer 2015	Energy Star Clothes washer w/ gas water heater		1	Federal Minimum standard clothes washer		1	11	\$34	0	34	\$6.15	100%	1.834070313	0	0.67	\$50.85	\$4.60	14	0	9	19	9	19	116%	100%
Insulation & Air Sealing																										
Attic Insulation	Air Sealing Insulation Heating Effects from R-12 to R52 in Natural Gas Heated and non-cooled Home	R-12 insulation		4	Baseline assumes R-0 existing insulation		19	20	\$234	0	\$1,072	\$6.15	15%	17.70141585	15.06403736	14.44	\$16.22	\$0.81	0	0	504	504	504	504	89%	100%
Air Sealing & Weather-stripping T1	Tier 1 Air Sealing & Bypass Sealing Heating Effects for minimum 10% ACH Reduction in Natural Gas Heated and non-cooled Home	Baseline home with CFM50 rating of 2446		32	Baseline home with CFM50 rating of 2367		38	10	\$84	0	\$376	\$6.15	15%	15.23829653	13.02034063	6.15	\$13.64	\$1.36	0	0	52	52	52	52	89%	100%
Air Sealing & Weather-stripping T2	Tier 2 Air Sealing & Bypass Sealing Heating Effects for minimum 25% ACH Reduction in Natural Gas Heated and non-cooled Home	Baseline home with CFM50 rating of 2390		32	Baseline home with CFM50 rating of 3343		44	10	\$102	0	\$1,070	\$6.15	15%	9.724548923	8.414885475	12.67	\$8.05	\$0.81	0	0	12	12	12	12	89%	100%
Air Sealing & Weather-stripping T3	Tier 3 Air Sealing & Bypass Sealing Heating Effects for minimum 33% ACH Reduction in Natural Gas Heated and non-cooled Home	Baseline home with CFM50 rating of 2036		26	Baseline home with CFM50 rating of 3704		48	10	\$88	51	\$829	\$6.15	14%	4.762789436	4.098540466	21.47	\$4.09	\$0.41	51	51	16	16	16	16	89%	100%
Wall Insulation	Wall Insulation Heating Effects from R-0 to R11 in Natural Gas Heated and non-cooled Home	R-11 insulation		12	Baseline assumes R-0 in wall cavity at existing level		37	20	\$164	0	\$1,263	\$6.15	13%	8.421131828	7.325848092	24.38	\$6.74	\$0.34	0	0	43	43	43	43	89%	100%
Attic Insulation	Air Sealing Insulation Heating Effects from R-12 to R52 in Natural Gas Heated and Electric Cooled Home	R-12 insulation		4	Baseline assumes R-0 existing insulation		19	20	\$147	0	\$989	\$6.15	15%	11.13596071	9.476785902	14.44	\$10.20	\$0.51	0	0	419	419	419	419	89%	100%
Air Sealing & Weather-stripping T1	Tier 1 Air Sealing & Bypass Sealing Heating Effects for minimum 10% ACH Reduction in Natural Gas Heated and Electric Cooled Home	Baseline home with CFM50 rating of 2446		32	Baseline home with CFM50 rating of 2367		38	10	\$59	0	\$405	\$6.15	15%	10.71861778	9.158509708	6.15	\$9.59	\$0.96	0	0	44	44	44	44	89%	100%
Air Sealing & Weather-stripping T2	Tier 2 Air Sealing & Bypass Sealing Heating Effects for minimum 25% ACH Reduction in Natural Gas Heated and Electric Cooled Home	Baseline home with CFM50 rating of 2390		32	Baseline home with CFM50 rating of 3343		44	10	\$72	0	\$536	\$6.15	13%	6.879145908	5.952689985	12.67	\$5.70	\$0.57	0	0	12	12	12	12	89%	100%
Air Sealing & Weather-stripping T3	Tier 3 Air Sealing & Bypass Sealing Heating Effects for minimum 33% ACH Reduction in Natural Gas Heated and Electric Cooled Home	Baseline home with CFM50 rating of 2036		26	Baseline home with CFM50 rating of 3704		48	10	\$62	0	\$442	\$6.15	14%	3.345859579	2.872924678	21.47	\$2.87	\$0.29	0	0	12	12	12	12	89%	100%
Wall Insulation	Wall Insulation Heating Effects from R-0 to R11 in Natural Gas Heated and Electric Cooled Home	R-11 insulation		12	Baseline assumes R-0 in wall cavity at existing level		37	20	\$103	0	\$714	\$6.15	13%	5.292681354	4.604295526	24.38	\$4.23	\$0.21	0	0	24	24	24	24	89%	100%
Attic Insulation	Air Sealing Insulation Heating Effects from R-12 to R52 in Natural Gas Heated and Electric Cooled Home for Gas Only Customers	R-12 insulation		4	Baseline assumes R-0 existing insulation		19	20	\$234	0	\$989	\$6.15	24%	8.16223511	6.229137117	14.44	\$16.22	\$0.81	52	52	104	104	104	104	89%	100%
Air Sealing & Weather-stripping T1	Tier 1 Air Sealing & Bypass Sealing Heating Effects for minimum 10% ACH Reduction in Natural Gas Heated and Electric Cooled Home for Gas Only Customers	Baseline home with CFM50 rating of 2446		32	Baseline home with CFM50 rating of 2367		38	10	\$84	0	\$405	\$6.15	21%	8.502147201	6.742838079	6.15	\$13.64	\$1.36	0	0	2	2	2	2	89%	100%
Air Sealing & Weather-stripping T2	Tier 2 Air Sealing & Bypass Sealing Heating Effects for minimum 25% ACH Reduction in Natural Gas Heated and Electric Cooled Home for Gas Only Customers	Baseline home with CFM50 rating of 2390		32	Baseline home with CFM50 rating of 3343		44	10	\$102	51	\$536	\$6.15	19%	5.478578995	4.435576005	12.67	\$8.05	\$0.81	52	52	2	2	2	2	89%	100%
Air Sealing & Weather-stripping T3	Tier 3 Air Sealing & Bypass Sealing Heating Effects for minimum 33% ACH Reduction in Natural Gas Heated and Electric Cooled Home for Gas Only Customers	Baseline home with CFM50 rating of 2036		26	Baseline home with CFM50 rating of 3704		48	10	\$88	50	\$442	\$6.15	20%	2.651616558	2.125194715	21.47	\$4.09	\$0.41	52	52	2	2	2	2	89%	100%
Wall Insulation	Wall Insulation Heating Effects from R-0 to R11 in Natural Gas Heated and Electric Cooled Home for Gas Only Customers	R-11 insulation		12	Baseline assumes R-0 in wall cavity at existing level		37	20	\$164	0	\$714	\$6.15	21%	3.87633902	3.074157517	24.38	\$6.74	\$0.34	0	0	2	2	2	2	89%	100%
Residential Heating	95% AFUE Boiler - 2014 **	95% AFUE Boiler - 2014 **		0	0		0	0	0	0	0	\$6.15	-	-	-	0.00	-	-	0	0	0	0	0	0	89%	89%

