BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

*** * * * ***

IN THE MATTER OF THE APPLICATION OF PUBLIC SERVICE COMPANY OF COLORADO FOR APPROVAL OF A NUMBER OF STRATEGIC ISSUES RELATING TO ITS ELECTRIC AND GAS DEMAND SIDE MANAGEMENT PLAN	**)** **)** **)** **)** **)** **)**	**PROCEEDING NO. 17A-____EG**

DIRECT TESTIMONY AND ATTACHMENTS OF SHAWN M. WHITE

ON

BEHALF OF

PUBLIC SERVICE COMPANY OF COLORADO

July 3, 2017

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO**

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IN THE MATTER OF THE APPLICATION OF PUBLIC SERVICE COMPANY OF COLORADO FOR APPROVAL OF A NUMBER OF STRATEGIC ISSUES RELATING TO ITS ELECTRIC AND GAS DEMAND SIDE MANAGEMENT PLAN	**)**	**PROCEEDING NO. 17A-____EG**

SUMMARY OF THE DIRECT TESTIMONY OF SHAWN M. WHITE

Mr. Shawn M. White is Manager, Demand Side Management ("DSM") and Renewable Regulatory Strategy & Planning of Xcel Energy Services Inc. In this position, he is responsible for ensuring Xcel Energy's energy efficiency (and demand response programs adhere to regulatory policies.

In his testimony, Mr. White explains how Public Service Company of Colorado ("Public Service" or the "Company") measures and reports energy savings and how it designs its energy efficiency portfolio. He also details how the Company ranks amongst its peer utilities in providing DSM programs.

Next, Mr. White presents the Company's 2016 Potential Study and the Company's 2019-2023 DSM forecasts. A potential study takes a high level view of the market to identify possible measures for inclusion in program design and implementation. The 2016 Potential Study suggests that the future potential from traditional energy efficiency is declining. This is generally driven by the expectation that

new codes and standards will increase naturally-occurring adoption of energy efficient technologies outside of utility DSM products and programs. A potential study is a useful input in developing an energy efficiency portfolio, but there are practical limitations in how it can be used to develop an energy efficiency portfolio, thus it is only one input of many that can be used to develop an energy efficiency portfolio.

Mr. White then explains that the Company's generation supply portfolio has changed and continues to change to integrate increasing amounts of renewable energy. The changes to the Company's generation portfolio had a number of effects on the Company's DSM programs, most notably in the cost-effectiveness of energy efficiency. The divergence of achievements and benefits had the unintended consequence of increasing volumetric rates to customers. This is because achievements in energy efficiency programs continue to reduce volumetric sales, while system benefits continue to decrease, creating upward pressure on volumetric rates.

Thus, to address the issue, the Company proposes a new path forward that will focus on achieving energy savings where the marginal costs and emissions reductions are greatest. The Company also plans to focus on peak demand reduction through energy efficiency, such as through adopting load shifting measures that move customer usage from high cost or constrained periods to periods of lower cost and constraint.

Mr. White presents several changes the Company is proposing to realign its delivery of energy efficiency and demand response programs to better reflect the current and future landscape for resource planning, renewable integration, and DSM.

First, the Company recommends that its energy efficiency goal be set to the following annual goals:

Table SMW-D-4: Proposed Annual Energy Savings (GWh) Goals

Year	2019	2020	2021	2022	2023	Total
GWh	350	350	325	325	325	1,675

Second, the Company recommends its energy efficiency demand reduction goal continue at the current levels to maintain focus on avoiding the most costly generation.

Table SMW-D-5: Proposed Annual Energy Efficiency Demand Reduction (MW) Goals

Year	2019	2020	2021	2022	2023	Total
MW	65	65	65	65	65	325

Mr. White then addresses avoided emissions from energy efficiency. The method used to determine the avoided emissions from energy efficiency has changed over time given the expected value of avoided emissions. In addition to using emissions in the Modified Total Resource Cost Test and estimating emissions from the DSM Portfolio, the Company proposes to use emissions data to determine the emissions avoidance of individual DSM measures. The Company recommends that new DSM measures that could cost-effectively shift usage be included in the Company's DSM portfolio.

In light of the increasing diversity of generation sources, the timing of the energy savings has a significant effect on the amount of emissions avoided by a DSM measure. Accordingly, to determine the emissions avoidance of individual DSM measures, Mr. White proposes using the hourly marginal energy price to determine the likely generation source of marginal energy each hour.

Mr. White then presents the Company's proposed demand response goals, which are:

Table SMW-D-8: Proposed Demand Response Goals

Year	2019	2020	2021	2022	2023
MW	465	476	489	503	520

These goals are based upon historic achievements and trends in demand response growth, and also reflect the state of the marketplace and make-up of the Company's residential, commercial, and industrial offerings.

Finally, Mr. White discusses several DSM policy issues. These include secondary site savings, commercial and industrial behavioral savings methodology, and the Company's reconsideration of its avoided transmission and distribution study.

In sum, Mr. White recommends that the Commission approve:

- Approval of the Company's proposed modifications to its electric Energy Efficiency goals for 2019 through 2023;
- Approval of the Company's proposed modifications to its Energy Efficiency Demand Reduction goals for 2019 through 2023;
- Approval of the Company's proposed methodology to determine avoided emissions;
- Approval of proposed dispatchable demand response goals for each of the years 2019 through 2023.
- Confirmation that Commission Rule 4750 does not preclude the Company from claiming secondary site savings in its energy, demand, and net benefit calculations; and
- Approval to use an incremental savings method instead of an average savings method to calculate behavioral energy efficiency savings.

**BEFORE THE PUBLIC UTILITIES COMMISSION
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DIRECT TESTIMONY AND ATTACHMENTS OF SHAWN M. WHITE

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Attachment SMW-1	ACEEE The 2017 Utility Energy Efficiency Scorecard
Attachment SMW-2	Xcel Energy 2016 DSM Potential Study Report
Attachment SMW-3	Xcel Energy “T&D” Study

GLOSSARY OF ACRONYMS AND DEFINED TERMS

Acronym/Defined Term	Meaning
ACCC	AC Contingency Calculation
ACEEE	American Council for an Energy Efficient Economy
CFL	Compact fluorescent lights
DSM	Demand side management
EIA	Energy Information Administration
EPA	U.S. Environmental Protection Agency
ERP	Electric resource plan
LED	Light-emitting diode
M&V	Measurement and verification
MTRC	Modified total resource cost test
NSP-MN	Northern States Power – Minnesota
NTG	Net-to-gross
Navigant	Navigant Consulting, Inc.
RMRG	Rocky Mountain Reserve Group
UCT	Utility cost test
VFD	Variable frequency drive
WACC	Weighted average cost of capital
XES	Xcel Energy Services Inc.
Xcel Energy	Xcel Energy Inc.

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DIRECT TESTIMONY AND ATTACHMENTS OF SHAWN M. WHITE

I. INTRODUCTION, QUALIFICATIONS, PURPOSE OF TESTIMONY, RECOMMENDATIONS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Shawn M. White. My business address is 401 Nicollet Mall, Minneapolis, Minnesota 55401.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT POSITION?

A. I am employed by Xcel Energy Services Inc. ("XES") as Manager, Demand Side Management ("DSM") and Renewable Regulatory Strategy & Planning. XES is a wholly-owned subsidiary of Xcel Energy Inc. ("Xcel Energy"), and provides an array of support services to Public Service Company of Colorado ("Public Service" or the "Company") and the other utility operating company subsidiaries of Xcel Energy on a coordinated basis.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THE PROCEEDING?

A. I am testifying on behalf of Public Service.

Q. PLEASE SUMMARIZE YOUR RESPONSIBILITIES AND QUALIFICATIONS.

A. As the Manager, DSM and Renewable Regulatory Strategy & Planning, I am responsible for ensuring Xcel Energy's energy efficiency and demand response programs adhere to regulatory policies. In this capacity, I provide strategic direction and oversee a team that: (i) develops long-range goals for the portfolio of programs for resource planning; (ii) tracks and reports energy efficiency achievements and financial operations; (iii) prepares DSM regulatory reports and filings; and (iv) analyzes the cost-effectiveness of energy efficiency and load management programs and portfolios in five of XES's state jurisdictions with active energy efficiency programs or pending legislation. A description of my qualifications, duties, and responsibilities is set forth after the conclusion of my Direct Testimony in my Statement of Qualifications.

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?

A. In my testimony, I first explain how the Company measures and reports energy savings and how it designs its energy efficiency portfolio.

Next, I present the Company's 2016 Potential Study and 2019-2023 DSM forecasts. As ordered in Decision No. C14-0731, Public Service retained Navigant Consulting, Inc. ("Navigant") to conduct its 2016 Potential Study in advance of this Strategic Issues filing. The 2016 Potential Study suggests that the future potential from traditional energy efficiency is declining. This is generally driven by the expectation that new codes and standards will increase naturally-occurring adoption of energy efficient technologies outside of utility DSM products and programs. I explain that although a potential study can be a useful

tool, there are practical limitations in how it can be used to develop an energy efficiency portfolio.

I next explain how the Company's generation system has changed and continues to change to integrate increasing amounts of renewable energy. These changes have had a number of effects on the Company's DSM programs, most notably in the cost-effectiveness of energy efficiency. The divergence of achievements and benefits has had the unintended consequence of increasing volumetric rates to customers. To address these issues, the Company proposes a new path forward that will focus on achieving energy savings where the marginal costs and emissions reductions are greatest.

Specifically, the Company will no longer value each kWh the same but instead will accurately value each kWh based upon the marginal type of avoided energy. The Company also plans to focus on peak demand reduction through energy efficiency, such as through adopting load shifting measures that move customer usage from high cost or constrained periods to periods of lower cost and constraint.

Next, I present the Company's proposed annual energy efficiency goals for 2019-2023, which would result in a total savings of 1,675 GWh over the five year period. The Company recommends its energy efficiency demand reduction goal continue at the current level of 65 MW per year to maintain focus on avoiding the most costly generation.

I then address avoided emissions from energy efficiency, and propose to use emissions data to determine the emissions avoidance of individual DSM measures. To determine the emissions avoidance of individual DSM measures, I recommend using the hourly marginal energy price to determine the likely generation source of marginal energy each hour.

Finally, I discuss several DSM policy issues. These include secondary site savings, commercial and industrial behavioral savings methodology, and the Company's reconsideration of its avoided transmission and distribution study.

Q. ARE YOU SPONSORING ANY ATTACHMENTS AS PART OF YOUR DIRECT TESTIMONY?

A. Yes, I am sponsoring Attachments SMW-1, SMW-2, and SMW-3, which were prepared by me or under my direct supervision. Attachment SMW-1 is the 2017 Utility Energy Efficiency Scorecard published by the American Council for an Energy Efficient Economy ("ACEEE"). Attachment SMW-2 is Xcel Energy's 2016 DSM Potential Study Report. Attachment SMW-3 is Xcel Energy's 2016 T&D Study.

Q. WHAT RECOMMENDATIONS ARE YOU MAKING IN YOUR TESTIMONY?

A. The Company recommends that the Commission issue an order granting the following relief:

- Approval of the Company's proposed modifications to its electric Energy Efficiency goals for 2019 through 2023;

Table SMW-D-4: Proposed Annual Energy Savings (GWh) Goals

Year	2019	2020	2021	2022	2023	Total
GWh	350	350	325	325	325	1,675

- Approval of the Company's proposed modifications to its Energy Efficiency Demand Reduction goals for 2019 through 2023;

Table SMW-D-5: Proposed Annual Energy Efficiency Demand Reduction (MW) Goals

Year	2019	2020	2021	2022	2023	Total
MW	65	65	65	65	65	325

- Approval of the Company's proposed methodology to determine avoided emissions;
- Approval of proposed dispatchable demand response goals for each of the years 2019 through 2023;

Table SMW-D-8: Proposed Demand Response Goals

Year	2019	2020	2021	2022	2023
MW	465	476	489	503	520

- Confirmation that Commission Rule 4750 does not preclude the Company from claiming secondary site savings in its energy, demand, and net benefit calculations; and
- Approval to use an incremental savings method instead of an average savings method to calculate behavioral energy efficiency savings.

II. ENERGY EFFICIENCY PORTFOLIO DESIGN AND DEVELOPMENT

Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR TESTIMONY?

A. In this section of my testimony, I explain how energy savings are measured and reported, how the Company designs and delivers its energy efficiency portfolio.

A. Energy and Demand Savings Calculations and Reporting

Q. BEFORE DISCUSSING THE POTENTIAL STUDY, CAN YOU PROVIDE SOME BACKGROUND ON HOW THE COMPANY CALCULATES AND REPORTS ENERGY AND DEMAND SAVINGS?

A. Yes. Energy and demand savings are first measured at the "gross level," which includes all savings that have been achieved through energy efficiency program[1] participation. This value does not take into account whether the utility influenced the customer to participate in a program, but only whether the customer participated. Therefore, an adjustment to net savings is necessary to more accurately report utility-influenced efficiency program savings.

Gross savings are then adjusted by a net-to-gross ratio ("NTG") that measures the utility's influence in getting a customer to participate in a DSM program. NTG consists of two components: free-ridership and spillover. Free-ridership accounts for participant activities that may not be directly influenced by an energy efficiency program. Spillover accounts for savings that are not

[1] As described by Company witness Mr. Brockett in Section III of his Direct Testimony, a Program is a collection of similar products targeted to a specific customer segment. The current programs in DSM Plans include Business, Residential, Low-Income, and Indirect.

captured in the gross savings achievement, but were directly influenced by an energy efficiency program.

Q. PLEASE DESCRIBE FREE RIDERSHIP IN MORE DETAIL.

A. A "free rider" is a participant who likely would have taken the same action in the absence of the program, but who nonetheless applies for a rebate. For example, a customer that purchases a high efficiency air conditioner but does not consider any alternative would be a “free rider” to the extent he or she applies for and receives a rebate because the utility’s rebate and marketing had no effect on the customer’s decision.

As part of the evaluation of an energy efficiency product[2], participating customers are asked how important the utility incentive or rebate was in their decision to purchase the energy efficiency measure[3]. When a customer responds that the incentive or rebate had no influence on their decision, the customer is defined as a free rider. For example, if 20% of customers said the utility program had no effect on their decision, the utility would only claim and report 80% of the gross savings.

[2] As described by Company witness Mr. Brockett in Section III of his Direct Testimony, a product is a collection of similar measures marketed individually or holistically to end-use residential, business, or low-income customers.

[3] As described by Company witness Mr. Brockett in Section III of his Direct Testimony, a measure is a technology, service, or device that enables the end-use customer to reduce their electric energy and peak demand. Examples include water heater blankets within the Home Energy Squad product or ground source heat pumps within the High Efficiency Air Conditioning product.

Q. PLEASE DESCRIBE SPILLOVER IN MORE DETAIL.

A. "Spillover" occurs when non-participants adopt an energy efficiency measure or practice but do not apply for an incentive or rebate. The influence for spillover may come from past experience with a DSM program or from the educational and marketing information provided by the utility. There can be both participant and non-participant spillover effects. For example, if a participating residential customer purchases and installs discounted high efficiency lighting through the Home Lighting and Recycling product and likes the equipment, the customer may look to install more of the same or similar equipment at a later date. However, the customer may go to a retailer that does not participate in the Home Lighting and Recycling product, or the product may not promote that equipment at the time of the follow-up visit. This would result in participant spillover because the product influenced the decision but did not directly account for the sale of efficient equipment.

Spillover may also account for a utility's effect on transforming the market for energy efficiency measures. Market transformation occurs when a measure or service moves from a marginal opportunity in the marketplace to the baseline product or service in the marketplace. A utility may influence market transformation by changing the attitudes and behaviors of market actors such as customers, contractors, distributors, or manufacturers. For example, in the mass market lighting market there has been significant transformation as incandescent bulbs have been replaced, first, by compact fluorescent lights ("CFL") and, most

recently, by light emitting diodes ("LED"). The utility has had some effect on this by driving the stocking habits of retailers through its programs and raising awareness with customers through outreach, promotion activities, and marketing.

Q. PLEASE DESCRIBE THE IMPACT OF THE SPILLOVER COMPONENT IN THE DETERMINATION OF THE COMPANY'S NTG RATIO.

A. The factor of spillover in the NTG ratio is best explained through adding spillover to the free-ridership example explained above. If the free ridership value of 20% is identified resulting in a NTG value of 80% and an evaluation identifies a spillover value of 10%, then the new NTG value would increase to 90% to reflect the balance of free ridership (-20%) and spillover (+10%).

B. Benchmarking Performance and Utility Program Delivery

Q. IS THE USE OF NTG ACCEPTED IN OTHER DSM PROGRAMS?

A. Yes, although the use of NTG can vary from state to state. For example, of the five states where Xcel Energy directly implements DSM programs (Minnesota, Colorado, South Dakota, Texas, and New Mexico), NTG is applied in two – Colorado and New Mexico. Therefore, the application of NTG and the factors included in the NTG value and varying DSM policies among states make it difficult to accurately track meaningful comparisons of the reported energy savings achievements of other utilities.

Q. ARE THERE DIFFICULTIES IN COMPARING THE ENERGY SAVINGS ACHIEVEMENTS AND GOALS BETWEEN STATES AND UTILITIES?

A. Yes. It is common for industry studies to attempt to compare different states and utilities in order to determine the "right" level of DSM. While this can be instructive, normalizing achievements across utilities and states is difficult. In addition to the effects of NTG on the savings of other utility programs, other characteristics make comparisons between states and utilities challenging. These characteristics include: state policies such as building codes and fuel switching; whether the goals are expressed at the generator level[4] (includes losses) or at the meter level; the service territory's mix of industrial, commercial, and residential population; energy intensity per square foot; climate differences; and the propensity of the population's acceptance and willingness to adopt energy efficiency opportunities.

For instance, savings achievements for Northern States Power – Minnesota ("NSP-MN") compared to Public Service are affected by differences in the size of each utility's industrial manufacturing sector, the difference in climate, and the application of NTG. Public Service's territory in Colorado has about 5,200 manufacturing customer accounts, whereas NSP-MN has approximately 5,900 accounts. While the number of accounts is only somewhat higher in Minnesota, the size of the accounts, and therefore the opportunity for large energy efficiency projects, is significantly larger, with 7,700 GWh in Minnesota

[4] Goals and savings in Colorado are measured at the generator level.

versus 2,200 GWh in Colorado. This is significant because industrial energy efficiency projects tend to result in large, cost-effective energy savings.

Climate also plays a factor because of the prevalence and run time of air conditioning in Minnesota. The Company's most recent Home Use Study indicates that 73% of NSP-MN customers have air conditioning, compared to only 60% of Public Service's customers. More importantly is the run time, which is a measure of the frequency with which the customer uses the air conditioner. For customers with existing air conditioning systems, the run times in NSP-MN are typically 20% higher than in Colorado.

Q. ARE THERE ANY COMPARISONS OF ENERGY EFFICIENCY PROGRAMS ACROSS STATES?

A. The ACEEE has attempted to normalize some of the key factors, and in those comparisons Public Service ranks very well. In its recently released study, "The 2017 Utility Energy Efficiency Scorecard," Attachment SMW-1, ACEEE compared 51 utilities. Xcel – Colorado (Public Service) was ranked in the top 10, as was Xcel – Minnesota (NSP-MN).

Q. ACCORDING TO ACEEE, WHAT CATEGORIES DID PUBLIC SERVICE RANK HIGH IN AGAINST ITS PEERS?

A. Public Service ranked in the top 10 in the categories of annual energy savings, lifetime energy savings, and deployment of pilots. Of the 51 utilities, Public Service ranked seventh in annual energy savings, fourth in lifetime energy savings, and tenth in pilots offered.

As I will discuss later in my testimony, lifetime energy savings is a strong measure of the value of energy efficiency because it represents the time over which the energy savings obtained in the first year will continue to deliver benefits. Longer lifetimes means customers save money over a longer period of time. Public Service also ranked high in peak demand reductions (eleventh) and energy efficiency programs diversity (thirteenth).

Q. PLEASE DESCRIBE THE PEER UTILITIES IN THE TOP 10 UTILITY PERFORMERS IN THE ACEE REPORT.

A. Beyond Xcel subsidiaries, the top 10 utility performers are primarily located on the east or west coast where energy costs are often higher. In addition, many of the utilities have a long history of delivering energy efficiency directly to their customers. No utility with a program entirely managed or delivered by a third party was included in the top performers. This reflects the importance of experience, continuity, and customer relationships to deliver strong DSM programs to customers. It further shows that Public Service is one of very few utilities in the central United States that has achieved such high performance.

Q. WHAT VALUE IS THE COMPANY BRINGING TO ITS ADMINISTRATION OF THE DSM PORTFOLIO?

A. The Company's administration of programs leverages four important efficiencies. First is context. The Company is able to recognize when a customer is at risk for a higher bill and help them find solutions to save energy in a much faster and

less administratively burdensome fashion as handling this data as part of the normal course of business for the utility.

Second is data security. The Company is bound by strict requirements to protect customer data and minimize exposure to potential breaches; it is also subject to the Public Utilities Commission's ("the Commission") data privacy rules and general oversight. Adding non-regulated third parties to the administration of DSM programs creates data security concerns and potential customer data privacy issues.

Third, the Company provides for a more streamlined customer experience because a single point of contact can answer customer questions. Whether it is an account manager for an industrial customer or a residential customer care representative, a customer is more likely to achieve first call resolution when the number of redirections in order to find an answer is minimized.

Fourth, the Company acts as an administrator to ensure maximum cost-effectiveness of its DSM programs. Ultimately, no other party is directly accountable to customers for bill impacts other than Public Service. That provides Public Service with the unique position of having to balance the full costs and benefits to customers.

Q. WHAT EVIDENCE DOES THE COMPANY HAVE THAT CUSTOMERS VALUE THE ENERGY EFFICIENCY PROGRAMS IT DELIVERS?

The Company continuously monitors the factors that drive customer satisfaction related to energy supply and use. Market research shows that DSM aligns with

two high priority customer demands: keeping energy costs low and giving them the opportunity to control their bills. More specifically, controlling energy bills is an area where customer demands are rapidly increasing. Nationwide trends show that awareness of DSM and billing options is increasing and, where customers are aware of programs, their engagement and satisfaction with energy providers is higher than those customers who are unaware of choices. Customers that actively opt in to DSM and other programs show even further satisfaction with the energy services they receive.

III. PUBLIC SERVICE'S 2016 POTENTIAL STUDY AND FUTURE FORECAST

Q. WHAT IS A POTENTIAL STUDY?

A. A "potential study" is a market analysis of current and future technologies, performed by an independent third party that examines how customers currently use energy, and how those energy end uses may be made more efficient in the future. Utilities and stakeholders use this tool to identify potential energy savings levels.

A potential study typically includes assumptions such as NTG, but does not take into account the delivery method or the policies associated with energy efficiency implementation. Instead, a potential study takes a higher-level view of the market to identify possible measures for inclusion in program design and implementation.

A potential study follows a three-stage screening process to remove measures that are not feasible for customers. The first is a technical screen that eliminates measures that will not physically work for a specific customer and end use.[5] The second is an economic screen that reduces the savings estimates to reflect measures that are not economically feasible for the customer or utility to implement when compared to other energy generation supply options. As explained below, the Company's most recent 2016 Potential Study used the

[5] End use is a DSM industry term for the final application of a DSM measure. For example, an air conditioner is a measure utilized by the consumer to cool air.

Modified Total Resource Cost ("MTRC")[6] cost-effectiveness test, consistent with Commission decisions. The third screen evaluates "achievable potential. This program screen evaluates past program effectiveness and technology adoption analyses to predict how other barriers, such as customer financial limitations, lack of customer knowledge, and customer preferences, will impact program participation.

Q. WHAT ROLE DOES THE ENERGY EFFICIENCY POTENTIAL STUDY PLAY IN THE COMPANY'S DSM PORTFOLIO?

A. Because it is prepared by an independent, third-party, the author of the Company's Potential Study does not have a vested interest in the outcome, the Potential Study is an unbiased, evidence-based estimate of the market potential for energy efficiency measures.

Historically, the potential study has been used as a foundational tool to determine appropriate energy efficiency goals for the Company. However, when considering study results, it is also important to consider the level at which savings are shown (i.e., net savings at the generator level) and the policy context in which the study was developed (i.e. a traditional focus on energy savings). These basic assumptions can influence the study outcome. As I discuss in

[6] The MTRC is a test to determine the cost-effectiveness of a DSM measure, product, or program by comparing the utility's administrative and rebate costs plus the customers implementation costs against the avoided costs to the utility in the form of future revenue requirements and customer rebate costs. Colorado statute defines cost-effectiveness of DSM at C.R.S. § 40-1-102(5)(a). In applying the statutory cost-effectiveness requirements, the Commission-approved standard for cost-effectiveness is encapsulated in the MTRC test, as commonly applied in the regulation of utility DSM. Decision No. C08-0560, at pp. 24-27, Decision No. C11-0442 at p. 7, footnote 7.

Section IV of my testimony below, the Company proposes to shift the policy context of energy efficiency in order to better align the value to customers.

Q. PLEASE SUMMARIZE THE RESULTS OF THE COMPANY'S MOST RECENT POTENTIAL STUDY.

A. As ordered in Decision No. C14-0731, Public Service conducted its most recent Potential Study in 2016 in advance of this Strategic Issues filing. The Company contracted with an experienced third-party consulting firm, Navigant Consulting, Inc., to conduct the study, which is contained in Attachment SMW-2. In addition to utilizing the three screening processes as described above, the Potential Study evaluates Public Service's technical, economic, and achievable potential results under four scenarios. Each scenario uses different variables, such as increased adoption rates of certain technologies, or increased rebates or incentives to forecast the potential energy savings within the Company's service territory. These four scenarios include the Reference case, Alternative Lighting, Max Benefits, and Low Benefits scenarios, as described below.

Reference Case: The Reference or Base Case starts with the Company's Colorado sales and customer long-term forecasts without factoring in the impact of existing DSM products. Navigant used this data, as well as other primary and secondary data from other sources, such as the Energy Information Administration ("EIA"), to project what new and existing housing and commercial building technologies should be modeled to estimate what potential exists for

future energy and demand savings that could result if such technologies were adopted.

Alternative Lighting: The Alternative Lighting scenario reflects an accelerated introduction of LED lighting measures into the marketplace compared to the assumption made by Navigant in the Reference Case that CFL measures will retain a larger portion of the market during the beginning of the forecast period due to Navigant's CFL cost-effectiveness estimates.

Max Benefits: This scenario reflects increases in customer incentive spend that would optimize customer participation, which would then also maximize net benefits according to the Utility Cost Test ("UCT").

Low Benefits: The Low Benefits case is essentially the opposite of the Max Benefits case, i.e., this scenario assumes a minimum level of incentive spend to determine a portfolio that is minimally cost-effective under the UCT.

Q. DO THE ACHIEVABLE POTENTIAL SAVINGS REFLECTED IN THE SCENARIOS VARY OVER TIME?

A. Yes. Each scenario forecasts that the annual achievable potential savings from traditional electric energy efficiency products and programs in the Company's service territory vary over time, but are expected to decline between 2019 and 2028.

Q. HOW DO THE RESULTS OF THE 2016 POTENTIAL STUDY COMPARE TO PUBLIC SERVICE'S MOST RECENT COMMISSION-APPROVED GOALS AND PROPOSED GOALS?

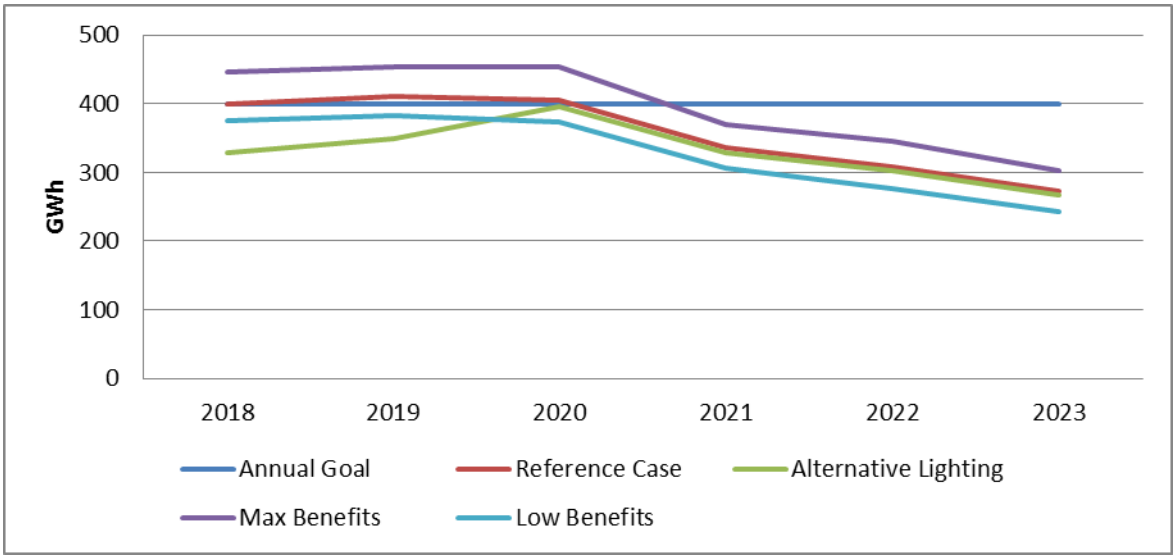
A. The table and chart below show the comparison of the achievable potential savings identified in the 2016 Potential Study against the 2018 goal approved in Proceeding No. 13A-686EG, and the Company's 2019-2023 proposed goals contained in this Strategic Issues filing:

Table SMW-D-1: Market Potential Assessment comparison to Proceeding No. 13A-0686EG Goals

		Achievable Potential			
YEAR	Annual GWh Goals[7]	Reference Case	Alternative Lighting	Max Benefits	Low Benefits
2018	400	399	328	447	374
2019	400	410	348	454	383
2020	400	405	395	453	374
2021	400	336	329	369	306
2022	400	308	302	345	277
2023	400	272	267	303	243

[7] As set in Proceeding No. 13A-0686EG.

Figure SMW-D-1: DSM Market Potential Assessment Study & Erosion of Energy Savings



As the above diagrams show, the goals established in Proceeding No. 13A-0686EG reflect a consistent level of achievement, whereas the Potential Study indicates a diminishing amount of energy savings in the future.

Q. WHAT TRENDS DO THESE UPDATED POTENTIAL ESTIMATES SUGGEST?

A. The estimates in the 2016 Potential Study suggest that the future potential from traditional energy efficiency is declining. This is due, in part, to increasing "organic" energy efficiency, which is the result of increasing codes, standards, and market conditions.

Q. WHAT ARE THE SOURCES OF VARIATION OVER THE 2019-2023 TIME PERIOD THAT MAY IMPACT THE COMPANY'S ABILITY TO ATTAIN ITS ENERGY SAVINGS GOALS?

A. Generally, newly enacted codes and standards will lead to increases in naturally-occurring adoption of energy efficient technologies outside of utility DSM products and programs. This, in turn, will lead to two results. First, it will reduce how often an energy efficiency technology is adopted because of a utility DSM product or program. Second, even if the energy efficiency technology is adopted through a utility DSM program, it will reduce the amount of energy savings attributable to the energy efficiency technology.

For example, the residential and business lighting markets have been affected by rapid technological advances in LED lighting. This has led to reductions in the cost of LED technology, which in turn, has driven greater adoption of LED technology, as evidenced by the success of the lighting measures in the Company's DSM portfolio. In 2016, lighting measures accounted for approximately 269 GWh of achievement, or 66% of the total portfolio achievement. LED technologies made up approximately 154 GWh of this achievement, or 38% of the total portfolio achievement. These levels of achievement are much higher than the 32 GWh of forecasted annual LED technology achievement identified in the prior 2009 DSM potential study that was updated in 2013. This level of achievement has been important in driving customers to realize energy savings opportunities. However, it is not sustainable.

As the lighting options in the marketplace increasingly move toward LEDs, the Company will need to focus efforts on specific customer segments that have not adopted LEDs. Simply put, a mass-market LED program has too much potential to give rebates to free riders while missing those customers who are not well served by the instant-markdown program format that has allowed such large achievements in prior years. Company witness Ms. Donna Beaman discusses changes to codes and standards, particularly with respect to lighting, in Section V of her direct testimony.

Q. WHAT ASSUMPTIONS DOES THE COMPANY'S 2016 POTENTIAL STUDY INCLUDE FOR RESIDENTIAL LIGHTING?

A. The Potential Study uses the following assumptions to evaluate the potential savings that can be achieved from Residential Lighting:

2018-2023: Energy savings for residential lighting measures appear to increase from 2018 to 2020, due to CFLs replacing the baseline incandescent bulbs before they become the baseline after 2020 due to anticipated changes to EISA standards at that time. After the standard change, the incremental potential from lighting is greatly reduced. Using these assumptions, the Potential Study estimates the Residential Lighting achievable potential savings from the Potential Study Reference Case shows the following:

Table SMW-D-2: Net Energy Savings potential for Residential Lighting – Reference Case

	LED (GWh)	CFL (GWh)	LED Specialty (GWh)	CFL Specialty (GWh)	TOTAL
2019	0	37.7	0.3	28.2	66.2
2020	0	5.9	0.3	16.1	22.3
2021	0	4.9	0.3	10.3	15.5
2022	0	3.8	0.3	6.9	11.0
2023	0	2.8	0.3	2.6	5.7

Q. HOW DOES THE ALTERNANTIVE LIGHTING SCENARIO ALTER THESE ASSUMPTIONS?

A. The Alternative Lighting Scenario estimates the achievable potential if LEDs are more established in the market than the assumptions were made in the Reference Case. The updated assessment estimated the Residential Lighting achievable potential savings from the Potential Study Alternative Case shows the following:

Table SMW-D-3: Net Energy Savings potential for Residential Lighting – Reference Case

Year	LED (GWh)	CFL (GWh)	LED Specialty (GWh)	CFL Specialty (GWh)	Total
2019	14.4	0.3	5.2	0.9	20.8
2020	4.0	0	4.0	0.7	8.7
2021	3.2	0	3.1	0.5	6.8
2022	2.6	0	2.5	0.4	5.5
2023	2.0	0	2.1	0.3	4.4

The Alternative Lighting scenario also confirms the incremental potential for Residential lighting savings is reduced over the planning horizon.

Q. DOES THE COMPANY BELIEVE THAT THE ALTERNATIVE LIGHTING SCENARIO BETTER REFLECTS WHAT IS ANTICIPATED IN THE LED LIGHTING MARKET FOR THE COMPANY'S SERVICE TERRITORY?

A. Yes. The Alternative Lighting scenario assumptions include some potential savings from CFLs early in the time period, but assume that the Company will make a responsible exit from the CFL market once the market is transformed. This approach is similar to the assumptions concerning CFLs that have been used in other states.

Q. HAVE EMERGING TECHNOLOGIES BEEN INCLUDED IN THE 2016 POTENTIAL STUDY?

A. No. According to the Potential Study:

> …there is always the possibility that emerging technologies may arise that could increase savings opportunities over the forecast horizon, and broader societal changes may impact levels of energy use in ways not anticipated in the study. Due to the significant uncertainty associated with emerging technologies, this study reflects the best available view of what is currently available on the market and does not make assumptions about emerging technologies beyond capturing a range of potential uncertainty through scenario analysis (see Section 5.3). Similarly, this study does not make assumptions about future code and standard changes beyond those already planned for the study period.[8]

[8] See Attachment SMW-2, page 17.

Q. IS IT REASONABLE FOR THE POTENTIAL STUDY TO EXCLUDE EMERGING TECHNOLOGIES?

A. Yes, it is reasonable for a potential study to not factor in emerging technologies. A potential study relies on widely available assumptions about the type and amount of savings a measure can provide. These assumptions are generally not available or verifiable for emerging technologies. Therefore, it would be difficult to include these technologies and rely on them for the presumption of savings.

This reinforces why potential studies must be viewed as one tool of many in developing an energy efficiency portfolio. Nonetheless, the following section of my testimony I present the Company's proposed goals for energy efficiency as well as the implementation strategies to achieve those goals. As part of that, I identify emerging and existing technologies not considered in the 2016 Potential Study that the Company plans to pursue, along with our projected increase in forecasted energy savings.

IV. ADAPTING THE COMPANY'S DSM PORTFOLIO TO THE EVOLVING DSM LANDSCAPE

Q. PLEASE DISCUSS HOW THE EVOLVING NATURE OF ENERGY EFFICIENCY FITS INTO THE COMPANY'S DSM PORTFOLIO?

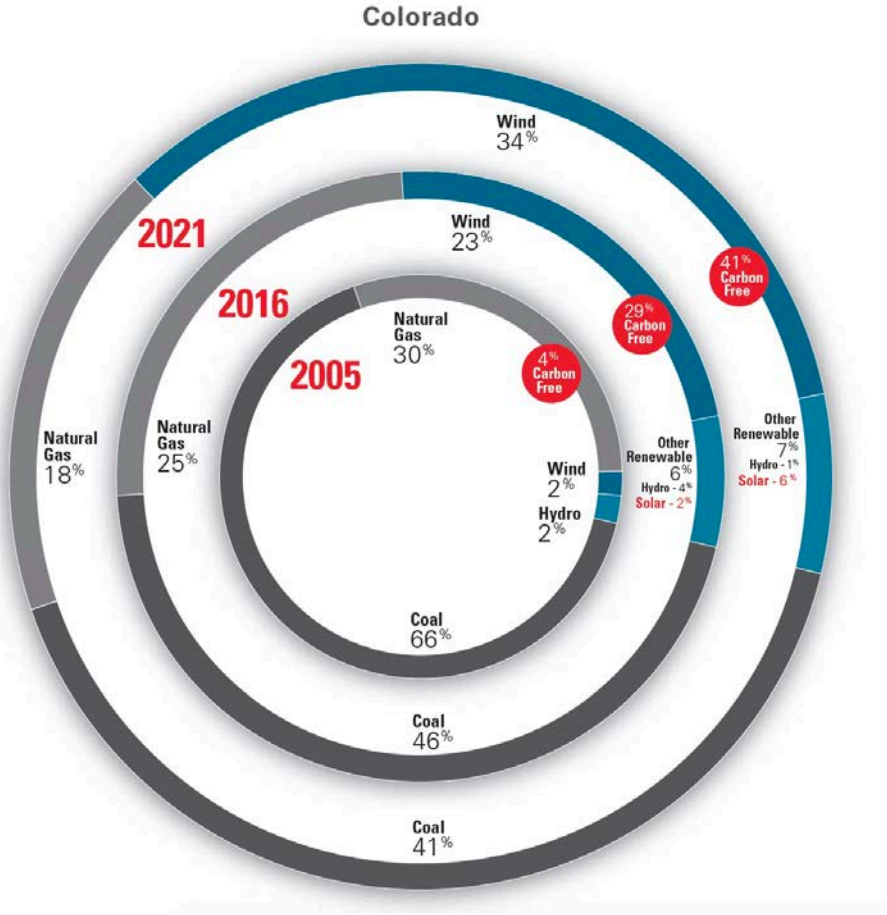
A. The Company's generation system has changed and continues to change to integrate increasing amounts of renewable energy. This change in the generation mix impacts energy efficiency, both economically (cost-effectiveness) and environmentally (emissions benefits). However, the Company is confident energy efficiency remains and will continue to be a valuable system resource when deployed correctly. The Company proposes incremental adjustments to the valuation and delivery of energy efficiency in order to unlock these value streams and provide better value to customers that the current energy efficiency policies allow.

A. Our Changing Generation System

Q. HOW HAS THE COMPANY'S SYSTEM CHANGED SINCE THE 2013 STRATEGIC ISSUES PROCEEDING?

A. Since that proceeding, Public Service's system has evolved to include an increasing amount of renewable and natural gas resources while decreasing the reliance on coal resources, as reflected in Figure SMW-D-2 below.

Figure SMW-D-2: Composition of Public Service Generation Fleet



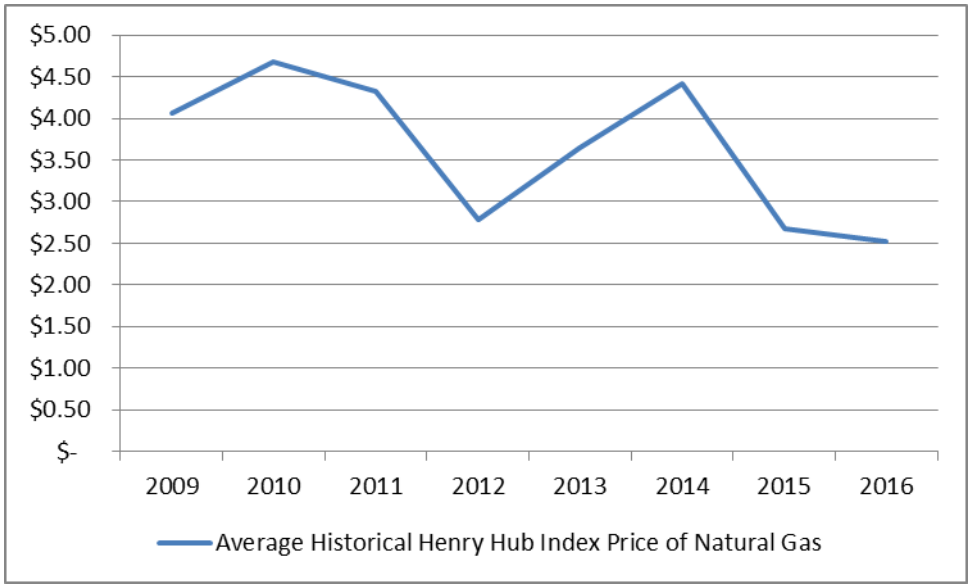
The Company expects this trend to continue or even accelerate in the future. First, the Commission has recently approved a substantial number of new wind projects to where the current system now consists of more than 2,500 MW of wind. This includes the recently approved Rush Creek proceeding (Proceeding No. 16A-0117E), which resulted in the addition of 600 MW of wind generation to the Company's portfolio.[9] Second, Phase II of the Company's Electric Resource

[9] In the 2013 All Source Solicitation the Company was approved to add 500 MW of wind. See Proceeding No. 11A-069E.

plan (Proceeding No. 16A-0396E) is currently underway and will result in the solicitation of new generation resources. The Company expects the Phase II process will result in additional renewable resources on Public Service's system. Regardless of the ongoing ERP, the Company expects the amount of coal generation in its portfolio to continue to decrease.[10]

Additionally, natural gas has increased as a percentage of electric generation on the Company's system. The price of natural gas has declined over time. As shown in Figure SMW-D-3 below:

Figure SMW-D-3: Average Historical Henry Hub Index of Natural Gas



Going forward, the Company's shift to a cleaner, more renewable-based fleet will create new challenges in utility system planning. One challenge we must

[10] See Section 1.6 of the 2016 ERP (Proceeding No. 16A-0396E), in which the Company stated: "All generation technologies with the exception of coal-fired generation would be deemed eligible technologies."

navigate is the continued erosion of avoided energy costs due to low fuel prices and zero fuel cost renewables. Another change is in system peaks through phenomena such as the "duck curve",[11] when variations in supply and net load are expected to cause a division in value between energy efficiency measures that are passive versus "smart" technologies that can react to electric grid conditions. It is prudent to adjust the Company's energy efficiency programs to address these challenges in system planning now, before the changes are fully ingrained in the system. Once these conditions are embedded in the system, the transition and adjustment will be more difficult and costly for customers, stakeholders, and the Company.

Q. HOW IS THE COMPANY'S PLAN FOR A CLEANER, GREENER FLEET IMPACTED BY THE CURRENT ENERGY SAVINGS GOALS?

A. The Company's strategy is not significantly impacted by its current energy savings goals. However, we anticipate some impacts that will be more pronounced in the future as additional renewable resources, especially wind, are added to the system.

The primary benefit of energy savings is to reduce the fuel costs customers must pay for. However, because the Company's recovery of renewable energy resource investments is spread out over a long period of time with no incremental fuel costs, the avoided energy cost moves closer to zero as

[11] "In certain times of the year, these curves produce a "belly" appearance in the mid-afternoon that quickly ramps up to produce an "arch" similar to the neck of a duck—hence the industry moniker of "The Duck Chart". *See,* https://www.caiso.com/Documents/FlexibleResourcesHelpRenewables_FastFacts.pdf

the amount of renewable energy on the system increases. At certain periods, this can result in the Company curtailing wind energy, which conflicts with the goal of a cleaner and greener fleet and stands to increase customers' energy bills. It may not benefit the system and customer to promote energy efficiency that produces savings during these high renewable production times.

Q. DOESN'T THE COMPANY ALWAYS HAVE BASELOAD, FOSSIL FUEL GENERATION RUNNING?

A. At this time the Company must always have fossil fuel generating units on line to ensure reliability and cost-effectively serve our customers. During periods of significant renewable generation, the Company minimizes fossil unit production to avoid curtailment of renewable generation. However, the Company does not shut down its fossil units for two reasons: renewable intermittency, and anticipated next day loads (shut down requires multiple hours to restart). Additionally, the Company is required by the Rocky Mountain Reserve Group ("RMRG") to carry Spinning Reserves in the form of curtailed fossil generation to respond to the sudden loss of generators in the group. However, in the event the Company must curtail wind resources, its base load fossil fuel generation has already been curtailed to the lowest possible level and additional DSM will not result in reducing this base load generation further. Thus, reducing energy consumption at these points will only result in further reductions in wind energy. Company witness Mr. David Horneck illustrates this effect further in his

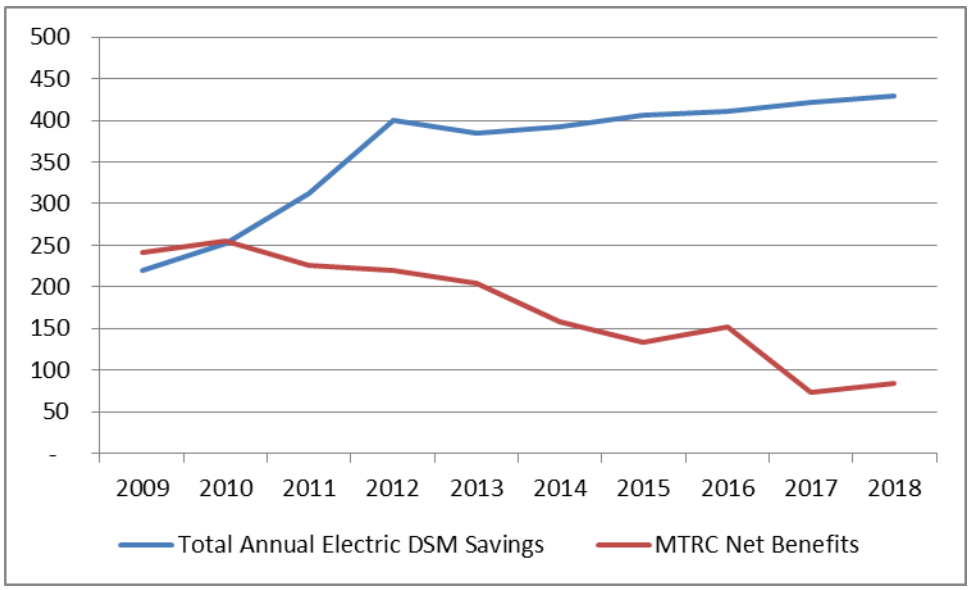
analysis of the marginal energy costs identified by the Company's PLEXOS® modelling software in Section III of his Direct Testimony.

B. The Effect and Opportunity of Generation Transformation on Energy Efficiency

Q. WHAT ARE THE EFFECTS OF THE CHANGES YOU MENTIONED ABOVE ON THE COMPANY'S DSM PROGRAMS?

A. The changes to the Company's generation portfolio have had a number of effects on the Company's DSM programs, most notably in the cost-effectiveness of energy efficiency. The chart below shows the historical MTRC Net Benefits from the Public Service energy efficiency portfolio.

Figure SMW-D-4: Comparison of Energy Savings (kWh) to MTRC Net Benefits ($mm)



As the chart shows, over time, net benefits have significantly decreased while achievements have mostly increased. This is the result of increasing amounts of less cost-effective energy efficiency being included in order to

maintain ambitious energy savings targets, as well as the reduction in avoided costs.

Q. HOW DOES THE COMPANY FORESEE FACTORS SUCH AS CHANGING ENERGY COSTS AND SYSTEM PEAKS INFLUENCING ENERGY EFFICIENCY?

A. The erosion of avoided energy costs has the effect of reducing the benefits to energy efficiency. Historically, we have seen this impact through lower natural gas prices. As the cost for natural gas has declined, we have seen a corresponding decline in the fuel cost, which is a significant component of the avoided energy cost, as well as a shift away from coal generation to gas generation. Furthermore, a shift to wind and solar generation, which has no associated fuel cost, will continue to drive the downward pressure on avoided energy values.

Systems peaks are also likely to change. While Public Service's system is not experiencing issues like the "duck curve," increasing amounts of wind and solar will begin to shift when the system experiences peaking conditions. Increasing renewable penetration may shift those peaks to those periods when wind and solar are alternatively increasing or decreasing on the system. Energy efficiency that targets minimizing these peak impacts will be increasingly important just as addressing traditional, summer afternoon peaks is important today. This change will also encourage more dynamic signaling from the Company, which will require the tools and services to help customers understand

these shifts, take actions to adjust to pricing and system need changes, and optimize customer business operations.

Energy efficiency is also moving away from the traditional, static concept of "install and forget" process to one that is more active. Services such as smart home systems or business optimization are becoming more prevalent as a result of increased customer engagement and new utility rate designs. With these changes will come a need for deeper education by the utility and continual involvement from the customer. Utilities must make sure their signaling and messaging are understandable so that customers take the right actions to reduce system impacts and customers must be continually engaged to ensure they are taking the right actions to control their energy costs. This is quite different from today when utilities have standard, inflexible rate designs and customers are primarily incentivized to install a measure, rather than optimize the value that new measure provides.

Q. HOW DOES THE ENERGY EFFICIENCY SAVINGS GOAL IMPACT SYSTEM PLANNING?

A. Energy efficiency, whether cost-effective or not, reduces the fuel consumption on the Company's system, which results in a lower energy requirement when conducting system planning. In addition, many energy efficiency measures include peak coincident demand reductions, which help reduce the need for peak capacity – often the most expensive type of capacity for the Company to acquire. However, not all measures have a significant peak coincidence. For example,

LED street lighting has minimal peak impact because the measures are generally utilized off peak at night. Similarly, residential home lighting measures have a lower demand to energy savings ratio because much of the impact from home lighting measures occurs off peak at night. Alternatively, cooling measures such as residential and commercial heating, ventilation, and air conditioning have better demand to energy savings ratios because much of the savings occur during the peak period – i.e. summer weekdays from 2 – 6 p.m.

Q. HOW ARE CUSTOMERS AFFECTED BY THE DIVERGENCE OF ENERGY EFFICIENCY ACHIEVEMENTS AND NET BENEFITS?

A. This divergence of achievements and benefits had the unintended consequence of increasing volumetric rates.[12] This is because energy efficiency programs continue to reduce volumetric sales, while system benefits continue to decrease, thus creating upward pressure on volumetric rates. The end result is that while participating customers realize bill savings by reducing their energy usage, participants and non-participants alike see increased rates which offset some of the bill savings delivered by the programs.

Increasing rates is not consistent with the intent of Colorado's DSM statute. C.R.S. § 40-3.2-101 states, in part: "[C]ost-effective natural gas and electricity demand side management programs will save money for consumers and utilities and protect Colorado's environment." Today's energy efficiency

[12] Volumetric rates are those based upon the amount of energy (kWh) used and not on a fixed value (such as a service and facilities charge) or a demand value that is set monthly.

trajectory increasingly does not result in savings for customers and is less effective at protecting Colorado's environment through the reduction of emissions.

Q. HOW IS THE COMPANY PROPOSING TO ENSURE ENERGY EFFICIENCY PROGRAMS REMAIN VALUABLE TO CUSTOMERS AND THE COMPANY?

A. The Company proposes a new path forward for energy efficiency within a changing generation system. This path will focus on achieving energy savings where the marginal costs and emissions reductions are greatest. In order to do so, the Company will no longer value each kWh the same but instead will accurately value each kWh based upon the marginal type of avoided energy. To make this change, the Company is proposing to realign its energy and demand savings goals to provide more benefits to all customers.

C. How to Realign Energy Efficiency Programs to Maximize Benefits

Q. HOW CAN THE COMPANY EFFECT THIS CHANGE FROM AN OPERATIONAL PERSPECTIVE?

A. The Company can effect this change through a focus on peak demand reduction through energy efficiency, such as the adoption of load shifting measures that moves customer energy usage from high cost or constrained periods on the system to periods of lower cost and constraint. For example, ice storage[13] for cooling increases energy usage relative to traditional air conditioning systems by

[13] Ice storage is the process of using off-peak energy to freeze water that is melted during peak conditions to cool buildings, reducing a customer's usage on peak and over system load.

leveraging low-cost, low-emission off-peak energy to avoid higher-cost and higher emission resources more commonly associated with peak hours. The customer benefit from this is a reduction in peak demand charges that are often a significant factor in commercial and industrial customers' bills. The utility benefit from this action comes from a reduction in on-peak energy usage, which is often the most costly period. Overall, ice storage is one load shifting measure that stands to provide significant net benefits to customers because it is relatively low cost but delivers high savings at critical times.

Q. HOW DOES PUBLIC SERVICE MANAGE ITS CURRENT ENERGY EFFICIENCY PORTFOLIO?

A. The current portfolio is designed to: 1) cost-effectively achieve the annual energy savings goal of 400 GWh while also striving to meet the targets for energy efficiency demand reduction (65 MW); 2) maintain the Low-Income program spend; and, 3) remain within the Commission-approved budget cap of $85 million per year.

Historically, the Company has maintained a cost-effective energy efficiency portfolio while exceeding its goals and remaining under budget. Unfortunately, this has increasingly required the tradeoff of implementing less cost-effective (and sometimes non-cost-effective) energy efficiency products and measures in order to achieve all three targets. This is essentially the law of diminishing returns at work.

Q. HOW IS THE COMPANY PROPOSING TO REALIGN ITS ENERGY EFFICIENCY PORTFOLIO TO BETTER DRIVE VALUE IN THIS STRATEGIC ISSUES PROCEEDING?

A. The Company is proposing a number of changes to realign its delivery of energy efficiency and demand response programs to better reflect the current and future landscape for resource planning, renewable integration, and DSM.

First, the Company recommends that its energy efficiency goal be set to the following annual goals:

Table SMW-D-4: Proposed Annual Energy Savings (GWh) Goals

Year	2019	2020	2021	2022	2023	Total
GWh	350	350	325	325	325	1,675

Second, the Company recommends that its energy efficiency demand reduction goal, currently set at 65 MW per year, continue at the current levels to maintain focus on avoiding the most costly generation.

Table SMW-D-5: Proposed Annual Energy Efficiency Demand Reduction (MW) Goals

Year	2019	2020	2021	2022	2023	Total
MW	65	65	65	65	65	325

Q. PLEASE EXPLAIN THE COMPANY'S RECOMMENDED ENERGY EFFICIENCY GOALS IN GREATER DETAIL.

A. The proposed goals rely first upon the 2016 Potential Study to identify benchmarks for possible savings. The Company considered the "Alternative Lighting" scenario to be the most realistic reflection of the current energy

efficiency marketplace in the Company's electric service territory as it did not consider potential savings associated with CFLs, which have been phased out of the Company's energy efficiency portfolio. Next, the Company applied its knowledge of the Colorado marketplace, such as increasing building codes in the Denver metro area, transformation of the mass market lighting market, and non-cost-effective measures to identify a goal of approximately 325 GWh per year in 2019 and 2020. The Company assumed that an additional 25 GWh should be added to the portfolio in order to account for emerging technologies and potential savings from measures such as ice storage.

In later years, the Company forecasts 325 GWh as an annual achievement to reflect changes in the areas such as the mass market lighting, residential heating and cooling, and commercial new construction markets not considered in the 2019 and 2020 goals. This assumption of declining savings is further reflected in the later years of the 2016 Potential Study where the Company's proposed goals actually exceed the 2016 Potential Study's forecast. Ms. Beaman discusses some of these factors in her Direct Testimony.

Q. DID THE COMPANY INCREASE ITS GOALS TO ACCOUNT FOR ITS HISTORIC GOAL ACHIEVEMENTS?

A. No. As I discuss later in my testimony, past achievements do not necessarily reflect future potential.

Q. WHAT ARE THE CONSEQUENCES OF SAVINGS GOALS THAT ARE SET INCORRECTLY?

A. When goals are too aggressive, the utility is placed in a position that, over the long run, will result in detrimental outcomes for customers. Either the Company can choose to add savings that have diminishing value or are not cost-effective, or it can achieve less savings than the goal and forego the DSM incentive. Examples of actions that would add savings, but are not in the customer interest include:

(1) Including less-cost-effective or non-cost-effective measures and products in the energy efficiency portfolio. These may provide energy savings, but diminish the overall benefits realized for all customers.

(2) Implementing programs on larger populations of customers that are incrementally not cost-effective, even when the program may still be cost effective overall. An example of this would be increasing the number of customers participating in the Energy Feedback product. There are diminishing returns to increasing the level of participation as each incremental customer is more likely to have reduced energy savings potential.

(3) Defining product baselines based on building codes or energy efficiency standards rather than the market baseline of equipment typically sold to customers in Colorado.

Q. SHOULD THE COMPANY'S ENERGY EFFICIENCY GOALS BE BINDING IN ORDER TO EVALUATE ACHIEVEMENT?

A. No. Binding goals remove the flexibility for the Company and stakeholders to prioritize the strategies and tactics in DSM Plans to drive the most benefit to customers. As we have seen with recent DSM Plans, the binding 400 GWh goal drives unintended consequences like the increase in less-cost-effective and non-cost-effective measures and products, and a focus on measures and products with limited persistence. Instead, non-binding goals should be identified to give the Company, stakeholders, and the Commission flexibility to optimize the implementation strategies periodically to reflect the most value for customers.

Furthermore, the Commission has historically approved non-binding goals, and the Company has nonetheless consistently achieved if not exceeded these non-binding goals. During the last DSM Strategic Issues proceeding, the Commission ordered the Company to achieve a non-binding goal, referred to as a target, of 65 MW of energy efficiency demand reduction. However, the Company's performance incentive and disincentive were not based upon achievement of this 65 MW and there was no punitive mechanism for the Company if it did not achieve this level of savings. Ultimately, the Company has consistently exceeded this level each year without a binding requirement or punitive action.

Q. HOW DOES COST-EFFECTIVENESS IMPROVE BY ACHIEVING LESS ENERGY SAVINGS?

A. As discussed above, achieving lower energy savings would mean removing non-cost-effective measures and products from the DSM portfolio and targeting energy efficiency savings to the times of highest values. This has the effect of increasing the net benefits through better evaluation and eliminating measures that reduce cost-effectiveness.

Q. HOW HAS MARKET TRANSFORMATION BEEN TAKEN INTO ACCOUNT BY THE COMPANY IN ITS PROPOSED ENERGY EFFICIENCY GOAL TO MAXIMIZE THE DELIVERY OF ENERGY EFFICIENCY?

A. As discussed in Section VII of the Direct Testimony of Company witness Mr. Brockett, the Company has a decades-long history of delivering energy efficiency programs. During this time, the Company has focused on not only achieving its goals but also transforming the marketplace to maximize the sustainability of energy efficiency and minimize the role of the utility where it is no longer needed.

The proposed goal reflects those learnings by recognizing that the marketplace, with the Company's help, has quickly evolved. This is especially pronounced in the mass market lighting sector where the transition from incandescent to CFL to LED has occurred quickly and now the Company is proposing to scale back its involvement in this area. As discussed in Section V of the Direct Testimony of Company witness Ms. Beaman discusses the lighting

market has changed our programs and our delivery method for lighting will change in the future.

The new goal also reflects a stronger investment by the Company in areas where market transformation and support is still needed. As Ms. Beaman discusses further, the Company has helped transform the lighting market and is proposing to step back from much of this market.

Q. BASED ON THE CHANGES THE COMPANY IS PROPOSING IS IT FAIR TO SAY THE COMPANY IS REDUCING ITS GOAL?

A. Not significantly. As illustrated above, the Company is discussing the removal of hundreds of GWh of energy savings that are not cost-effective or are achieved in transformed markets. Yet, the Company proposes an energy savings goal that is only 50 GWh less than its current goal. This leaves a substantial gap for the Company to make up for by reinvesting in other areas and driving more cost-effective savings into the portfolio.

Q. CAN YOU DISCUSS IN MORE DETAIL SOME OF THE AREAS THE COMPANY IS REINVESTING IN ENERGY EFFICIENCY?

A. Yes. First, it is important to be clear that the Company is already investing in many of these areas. The reinvestment is only shifting funding from areas where the utility's impact is diminishing to areas where the utility's impact is more valuable.

Looking at the small business lighting sector, the Company plays an important role in coordinating a trade market to deliver solutions to these

customers. Without the Company's implementation and coordination in this sector, it is unlikely that any market driven force would provide an adequate substitution. Small business customers typically require more direct attention and have lower capital budgets, which increases contractor administrative costs and reduces the potential margins for serving this sector. Without the assistance provided through its existing Small Business Lighting product, it is unlikely this class of customer would participate in energy efficiency.

Turning to the customer behavioral segment, there are existing products like the Residential Feedback product that fill this need; however, as residential rate designs advance and new technologies enter the market, it will be important to ensure customers are aware of and participating in these changes. For residential customers, this may mean educating on how to reduce peak demand and shift energy consumption.

In addition, Ms. Beaman discusses in her Direct Testimony, there are significant efforts to be made in the midstream sector (e.g., distributors). In the field of energy efficiency, distribution is considered midstream because it falls between the manufacturer and the end use customer. Often, significant efforts are needed to ensure distributors actively stock high efficiency inventory. We believe there continues to be a role for the utility to transform this segment by encouraging distributors to maintain inventory of energy efficiency measures, and to provide education to and "upsell" residential and business customers on energy efficiency inventory when possible.

Q. WOULD AN ALTERNATIVE STRATEGY BE TO INCREASE THE COMPANY'S ENERGY EFFICIENCY BUDGET SO IT CAN DO MORE?

A. No. Increasing the energy efficiency budget to maintain unnecessarily high energy efficiency goals will only maintain or increase the level of non-cost-effective energy efficiency measures implemented through DSM plans. It is not a strategy that delivers the best value to customers. It also would have the effect of increasing customer costs and spending more customer funding than otherwise necessary to achieve optimal results.

Q. WHAT IS THE COMPANY PROPOSING AS A BUDGET FOR ENERGY EFFICIENCY?

A. The Company proposes a budget of $70 million per year with the flexibility to exceed the budget by 10% per year. This budget generally maintains the spending ratio present in previous Commission orders and provides a reasonable level of spending to achieve the Company's proposed energy efficiency goals. In addition, the flexibility to exceed the budget will allow the Company the ability to make strategic investments in new products and services or valuable platforms to deliver energy efficiency programs to customers. The Commission allowed for budget flexibility in the Company's operation of its energy efficiency programs from 2009 through 2013.

Q. WILL THE COMPANY'S ADVANCED GRID INTELLIGENCE AND SECURITY PROJECT IMPACT THE COMPANY'S REALIGNMENT OF ENERGY EFFICIENCY?

A. Yes. The advanced grid project will have an impact on how the Company delivers both energy efficiency and demand response programs by increasing the amount and granularity of data to the Company and customers. For example, the advanced grid will give the Company more insight into customer energy usage habits, which allow it to better tailor offerings, and targets customers with energy efficient products and services that maximize their participation benefit. This effort is also likely to offer positive benefits towards the Company's geo-targeting proposal discussed by Ms. Beaman.

Similarly, "smarter" pricing programs for demand response will be enabled. For example, Baltimore Gas and Electric Company offers a demand response program called "Smart Energy Rewards." The program is a behavioral-based demand response program that encourages customers to reduce peak demand by offering bill credits to customers.

The Company will propose appropriate products enabled by the advanced grid as part of future demand side management plans.

D. Better Aligning the Customer and Company Financial Compact

Q. WHAT DOES THE CURRENT ENERGY EFFICIENCY PERFORMANCE INCENTIVE MECHANISM ENCOURAGE THE COMPANY TO ACHIEVE?

A. The current mechanism authorizes the Company to earn five percent of net benefits upon achieving 100 percent of the Company's energy efficiency goal. This places the Company on a single-minded track to achieve energy savings at all costs. This creates a perverse incentive for the Company to implement non cost-effective measures and products to achieve its single energy savings goal to earn its incentive.

The existing incentive mechanism worked well when avoided costs were greater, renewable energy penetration was lower, and the system was growing at a level that minimized lost fixed costs. However, this reality has changed and it is reasonable the incentive mechanism also change.

Q. HOW DOES THE COMPANY'S PROPOSAL REFLECT A CHANGING SYSTEM AND BETTER INCENTIVIZE CUSTOMER VALUE?

A. As discussed in the Direct Testimony of Mr. Steve Wishart, the Company is proposing to implement a new energy efficiency Scorecard, which accounts for the changing system and better incentivize customer value. The energy efficiency Scorecard is a multi-metric performance incentive that reflects multiple mechanisms that drive customer value. The new metrics include:

(1) Energy Savings (kWh);

(2) Energy Efficiency Demand Reductions (kW);

(3) Low-Income Bill Reductions (participant net benefits);

(4) Utility Cost Test (ratio); and

(5) Lifetime Energy Savings (kWh).

The proposed Scorecard encourages the Company to balance its efforts across its portfolio and make investments where value can be maximized and the state and Commission policy goals can be best achieved. This incentivizes the Company to focus on maximizing net benefits from the energy efficiency portfolio. For example, if incremental energy savings are not cost-effective, the Company could forgo an incremental kWh in lieu of an incremental kW and still maintain earnings. Alternatively, if incremental energy and demand savings were unlikely to be cost-effective, the Company would have pathways to reduce costs in delivering low-income programs or reduce overall costs to energy efficiency programs and improve its Utility Cost Test results. Today, the Company does not have these pathways and is instead incentivized to include non-cost-effective energy efficiency in its portfolio, thereby reducing customer value.

Mr. Wishart discusses the mechanics of the Company's proposed DSM performance incentives in more detail.

Q. HOW WILL THE USE OF MARGINAL ENERGY-BASED AVOIDED COSTS IMPACT THE COMPANY'S ENERGY EFFICIENCY PERFORMANCE INCENTIVE?

A. The use of marginal energy costs will inform the Company's entire energy efficiency strategy as it identifies where the Company should target its efforts to

achieve the maximum return for customers – that is, reducing energy and demand when it is most costly and reducing emissions when they are greatest. Under the current methodology of avoided energy costs, this is not the case as every kWh is effectively treated the same, meaning an avoided kWh of coal generation is treated the same as an avoided kWh of wind generation.

Furthermore, because the Company's proposed energy efficiency performance incentive is based on net benefits, the Company will have a direct financial incentive to focus on periods where it can maximize benefits.

V. AVOIDED EMISSIONS FROM ENERGY EFFICIENCY

Q. WHAT ROLE DO EMISSIONS AND THE AVOIDANCE OF EMISSIONS PLAY IN THE COMPANY'S ENERGY EFFICIENCY PORTFOLIO?

A. As discussed above, Colorado's DSM statute specifically recognizes the importance of using energy efficiency to protect the Colorado environment. Historically, that task was easy to accomplish when the generation system was heavily weighted toward coal-fired generation. However, increasingly the system is powered by wind generation and in the future will be even more renewable focused with wind and solar. Therefore, it is becoming more difficult to avoid emissions. As discussed earlier, this is part of the reason the Company is proposing a new strategy to deliver energy efficiency.

Q. PLEASE DEFINE THE AVOIDED EMISSIONS FROM ENERGY EFFICIENCY.

A. Avoided emissions from energy efficiency is the magnitude of emissions not produced at an electrical energy generation source associated with the reduced energy production necessary to serve customers due to customer participation in energy efficiency programs.

Q. HOW HAS EMISSIONS DATA BEEN USED IN THE PAST?

A. The primary use of the emissions data has been to provide estimates of the value of the avoided emissions ($/kWh) that could be applied in the MTRC as Avoided Emissions. In addition, the data has been used to estimate the emissions avoided – specifically CO2 (carbon) – by the DSM portfolio in previous DSM status reports.

Q. PLEASE DESCRIBE THE METHODS USED IN PAST FILINGS TO DETERMINE THE AVOIDED EMISSIONS FROM THE COMPANY'S ENERGY EFFICIENCY PROGRAMS.

A. The method used to determine the avoided emissions from energy efficiency has changed over time given the expected value of avoided emissions. In the DSM Plans covering the program years 2009-2011, an avoided emissions intensity ($/kWh) was determined for each future year by calculating the expected emissions with and without future DSM using the Strategist® software product. The difference in emissions and energy produced between these two runs each year was used to calculate the avoided emissions intensity for that year. These intensities were then applied to an assumed cost per pound ($/lb) for each emission to determine the $/kWh each year, which in turn were applied to each energy efficiency measure in the portfolio to determine the avoided emissions each year. In the DSM plans covering program years 2012-2018 the emissions intensity (lb/kWh) was based on the average emissions intensity of the electric generation portfolio as a whole. The assumed cost value for all avoided emissions was set to $0/lb.

Q. HOW IS THE COMPANY PROPOSING TO USE EMISSIONS DATA IN THE FUTURE?

A. In addition to using emissions in the MTRC test and estimating emissions from the DSM Portfolio, the Company proposes to use emissions data to determine the emissions avoidance of individual DSM measures. The Company is

recommending that new DSM measures that may shift usage cost-effectively should be included in the DSM Portfolio. If these measures can be shown to meet the state objectives of being cost-effective and reducing emissions, the measures should be pursued through the DSM Portfolio. This is true even if the measure produces a net increase in energy usage.

Q. DOES THE FORM OF THE EMISSIONS DATA NEED TO CHANGE TO PERFORM AN ANALYSIS FOR EACH DSM MEASURE?

A. Yes. The Company's historical emissions data has been determined on a DSM Portfolio basis, but does not accurately determine the emissions of each individual measure. The methods did not consider the pattern of energy impacts throughout the year of the individual DSM measures. With the increasing diversity of generation sources described above, the timing of the energy savings has a significant effect on the amount of emissions avoided by a DSM measure. Analysis may show that measures that have a net increase in energy usage over a year may still result in emissions reductions. This may be the case if a measure produces a shifting of energy usage from high emissions hours (fossil-fuel generation) to low-emissions hours (renewable generation). To perform this analysis, it is necessary to have hourly marginal emissions data.

Q. HOW DOES THE COMPANY PROPOSE TO ESTIMATE HOURLY MARGINAL EMISSIONS?

A. The Company proposes a method that uses the hourly marginal energy price to determine the likely generation source of marginal energy each hour. An

emissions rate for the generation source is then applied to this data to determine the marginal emissions rate (lb/MWh) for each hour.

Q. PLEASE EXPLAIN THE METHOD TO DETERMINE THE LIKELY GENERATION SOURCE AND ASSOCIATED EMISSIONS RATE FROM THE MARGINAL ENERGY PRICE.

A. The marginal energy price is a good indication of the marginal generation source, but it is not a perfect indicator. In most price ranges there is a mix of generation sources of marginal energy. Only at a few price levels is there a clear single source of generation of marginal energy. At other price ranges there is a mix of generation sources of marginal energy. The Company proposes that the method uses the system average emissions rate for the hour when there is a mix of generation sources of marginal energy.

Q. YOUR TESTIMONY ON EMISSIONS HAS BEEN LIMITED TO CO2 EMISSIONS. HAVE OTHER TYPES OF EMISSIONS BEEN CONSIDERED?

A. Yes, other emissions including sulfur dioxide (SO2) and mercury (Hg) have been considered. CO2 emissions are believed to serve as a fair proxy of those other emissions, especially considering the emergence of marginal energy from wind that produces no emissions, and that those other emissions have not been the main focus in the past. For these reasons, the proposed criteria that individual measures avoid emissions to be included in the portfolio should be based solely on the estimated avoided CO2 emissions.

Q. DOES THIS PROPOSED METHOD INCLUDE A VALUE OF AVOIDED EMISSIONS?

A. No. This proposed method only determines the rate of marginal emissions (lb/kWh) that can be applied to hourly energy savings or increases in hourly energy consumption. It does not include the value of avoided emissions ($/lbs). It does provide a more accurate measure of the emissions effect by individual DSM measure.

Q. DOES THE COMPANY BELIEVE THE PROPOSED METHOD IS SOUND AND REASONABLE?

A. Yes. The Company believes that the proposed methodology is sound and reasonably estimates the emissions avoidance from current and potential future DSM measures. As such, the Company believes this method is crucial in furthering the stated goal of achieving cost-effective emissions reductions.

Q. IS THE COMPANY PROPOSING AVOIDED EMISSIONS ESTIMATES BE APPROVED IN THIS FILING?

A. No. The Company is only asking for approval of a methodology to reasonably estimate the avoided emissions of individual DSM measures. This methodology would be applied in subsequent DSM Plan filings with the avoided emissions based on the data available at the time of the filing.

VI. DEMAND RESPONSE

Q. HOW DOES DEMAND RESPONSE FIT INTO THE COMPANY'S DSM PORTFOLIO?

A. As Company witness Mr. Brockett explains in Section VI of his Direct Testimony, DSM is composed of energy efficiency and demand response. Whereas energy efficiency is focused on reducing energy sales, demand response is focused on reducing peak demands. Both components of DSM provide significant value to customers and the utility, and the policies and goals for demand response are just as important to ensure a sustainable, cost-effective DSM portfolio in the future.

Q. IS THE COMPANY PROPOSING ANY CHANGES TO ITS DEMAND RESPONSE GOALS AND PROGRAMS FOR 2019 THROUGH 2023?

A. Yes, the Company proposes to realign the goals for 2019 through 2023 as follows:

Table SMW-D-6: Proposed Demand Response Goals

Year	2019	2020	2021	2022	2023
MW	465	476	489	503	520

Q. HOW DID THE COMPANY DEVELOP THESE GOALS?

A. The proposed goals are based upon historic achievements and trends in demand response growth as well as a reflection upon the state of the marketplace and the make-up of the Company's residential, commercial, and industrial offerings.

Company witness Mr. Brian Doyle discusses the state of the marketplace and the make-up of offerings in Section III of his Direct Testimony.

Q. HOW HAS THE COMPANY'S PAST PERFORMANCE COMPARED WITH ITS GOALS?

A. The 2013 Strategic Issues proceeding was the first which ordered the Company to achieve specific cumulative demand reduction goals.[14] The Company was ordered to achieve cumulative goals of 601 MW in 2015 and 606 MW in 2016. The Company's actual achievement for these years was 568 MW and 578 MW, respectively.

One reason for the shortfall in achievement is the Company's 2013 forecast included assumptions that one large industrial customer would begin participating in the interruptible service option credit ("ISOC") program in 2013 but subsequently decided not to participate in demand response.

Also, there has been a decline in the level of participation within existing programs. For example, Saver's Switch® – a residential demand response option – experiences approximately 7% attrition per year. Factors causing attrition include customers leaving from the program, disconnected switches, or non-responsive switches.

Additionally, there are limits to demand response such as market potential (the amount of customers already participating in demand response, technology constraints); the availability of cost-effective demand response programs; and

customer satisfaction (the impact demand response has on the customers' business or lifestyle priorities). Mr. Doyle discusses these three limits further in his Direct Testimony.

Q. HOW DO THE GOALS COMPARE WITH THE LEVEL OF DEMAND REDUCTION ASSUMED FOR PURPOSES OF THE CURRENT ELECTRIC RESOURCE PLAN (PROCEEDING NO. 16A-0396E)?

A. The table below shows the level of cumulative demand reduction[15] (MW per year) the Company is proposing in this proceeding in comparison to the level of demand reduction assumed for purposes of the 2016 Electric Resource Plan.

Table SMW-D-8: Cumulative Demand Response Goal vs. 2011 Resource Plan

MW	2019	2020	2021	2022	2023
DR in 2016 ERP	598	623	623	623	623
Total Demand Reduction	530	541	554	568	585
Proposed Demand Response Goal	465	476	489	503	520
Energy Efficiency Demand Reduction Goal	65	65	65	65	65

Q. WHEN DOES THE COMPANY FORECAST ITS NEXT RESOURCE NEED?

A. Based upon the demand response assumptions included in the ERP, the next resource need is not until 2023. However, since the Company has achieved less than its forecasted goals, this need is somewhat greater than reflected in the ERP. Furthermore, just because the Company does not have an immediate need does not mean the Company should not invest in demand response programs.

[14] The cumulative demand reduction goal was inclusive of the energy efficiency demand reduction achievement and the dispatchable demand response achievement.
[15] Total demand reduction includes the demand response goal and the energy efficiency demand reduction goal.

Q. WHY SHOULD THE COMPANY INVEST IN DEMAND RESPONSE IF THERE IS NO IMMEDIATE RESOURCE NEED?

A. Demand response, like generation supply investments, requires time to develop and deploy. Demand response requires customers to voluntarily agree to curtail their usage, which requires the Company to identify and recruit customers to participate. Prior to recruiting, the Company must design the financial and behavioral incentives to provide customers the reason to change their behavior by interrupting their comfort or business processes. None of these actions can be undertaken overnight and often require years to scale up. For example, the Company's ISOC and Saver's Switch® programs have grown to their current levels over the last decade of utility implementation.

Furthermore, the Company's system is changing for energy efficiency and this same change may offer increasing opportunities for demand response. It is in the best interest of customers and the Company to continue to investigate these new sources of value and provide products and services to meet these needs. Focusing solely on the need for peak capacity understates the value demand response may be able to provide.

Q. WHAT OPPORTUNITIES ARE THERE TO EXPAND THE SCOPE OF DEMAND RESPONSE ACHIEVEMENTS?

A. The Company's primary focus is on growing its existing offerings – primarily the smart thermostat offering to residential customers and the Peak Partner Rewards[16] program to commercial customers – but also expects new technologies and services to add additional scope to the future.

As home and workplace automation grows, the Company may also integrate strategies such as load shifting into its demand response portfolio to shift on peak consumption to shoulder and off peak periods as necessary. Load shifting allows for increased participant satisfaction (such as participant comfort or reduced operational interruptions) while gaining the benefit of reduced peak loads.

Q. IS THE COMPANY SEEKING APPROVAL TO IMPLEMENT ANY TECHNOLOGY OR SERVICE SPECIFIC PROGRAMS FOR DEMAND RESPONSE IN THIS PROCEEDING?

A. No. Any specific programs will be proposed in the Company's periodic DSM Plan filings.

[16] The Peak Partner Rewards program is a demand response program for commercial and industrial customers to voluntarily reduce energy and peak demand during periods of system constraint in exchange for a financial incentive.

VII. DSM POLICY ISSUES

Q. WHAT DO YOU ADDRESS IN THIS SECTION OF TESTIMONY AND HOW DOES IT CONNECT TO THE COMPANY'S DSM PORTFOLIO?

A. In this section I will address policy questions regarding the claiming of savings in energy efficiency programs and a number of policies the Company agreed to identify and discuss in its 2017/2018 DSM Plan Settlement. Each of these policies has an effect on the implementation of DSM and the value provided to customers.

A. Secondary Site Savings

Q. WHAT ARE SECONDARY SITE SAVINGS?

A. Secondary site savings occur when an energy efficiency measure is installed with the intent to reduce electric usage but has a similar reduction to consumption from a secondary Company site such as a chilled water facility or steam heating facility.

Q. CAN YOU PROVIDE AN EXAMPLE OF HOW THIS CLAIMED SAVINGS PROCESS WORKS?

A. If a customer installs an energy-efficient variable frequency drive[17] ("VFD") at its primary location whose thermal energy source is the Company's chilled-water system, the Company currently only claims any energy efficiency savings achieved at that primary location. It does not claim any energy savings that may

[17] A variable-frequency drive ; is a device used to reduce the energy usage of a motor by varying the frequency and voltage to the motor.

have materialized at the chilled-water facility (secondary site) due to any reduced consumption at the primary site because of the installation of the energy efficient equipment. In this example, the Company is seeking approval to claim any energy and demand savings achieved from the installation of the VFD and the related energy savings at the chilled-water facility. By being able to identify and claim the savings from the chilled-water facility, the Company would also be able to determine and recognize the associated reduction in related emissions and savings in utility and customer costs.

Q. DOES THE COMPANY CURRENTLY CLAIM SECONDARY SITE SAVINGS?

A. No. Prior to 2015, the Company claimed secondary site savings as an indirect impact of energy efficiency actions. However, beginning in 2015, after conferring with the Commission Staff, the Company ceased claiming these savings.

The decision to stop claiming these savings stems from the interpretation of Commission Rule 4750, which states (emphasis added):

> These rules implement § § 40-1-102, 40-3.2-101, 40-3.2-103, and 40-3.2-105, C.R.S. for gas utilities required by statute to be rate-regulated. Consistent with statutory requirements, the purpose of these Demand Side Management (DSM) rules is **to reduce end-use natural gas consumption** in a cost effective manner, in order to save money for consumers and utilities, and protect the environment by encouraging the reduction of emissions and air pollutants.

Because the installed measures are reducing natural gas or electric consumption as the end-use consumption, this specific language could be read to imply secondary site savings should not be considered. However, when considering the rule and the referenced statutes in their entirety, the intent also

includes the goal to "save money for consumers and utilities, and protect the environment by encouraging the reduction of emissions and air pollutants." The Company believes the latter interpretation is more consistent with the whole of the Colorado DSM statute and Commission rules.

Q. WHY IS THE COMPANY REQUESTING TO ACCOUNT FOR SECONDARY SITE SAVINGS?

A. Savings from secondary sites will result in saving money for consumers and utilities, and can help in the reduction of emissions by reducing the use of the fossil fuels used to supply chilled water cooling and steam heating.

Q. WHAT IS THE COMPANY'S SPECIFIC REQUEST REGARDING SECONDARY SITE SAVINGS?

A. The Company seeks clarification from the Commission that Rule 4750 does not preclude the Company from claiming secondary site savings in its energy, demand, and net benefit calculations.

B. Commercial and Industrial Behavioral Savings Methodology

Q. AS DISCUSSED IN MR. BROCKETT'S TESTIMONY, THE 2017/2018 DSM PLAN SETTLEMENT REQUIRES THE COMPANY TO PROPOSE AN ALTERNANTIVE METHODOLOGY FOR CLAIMING BEHAVIORAL SAVINGS. HOW HAS THE COMPANY COMPLIED WITH THIS REQUIREMENT?

A. The Company developed a new methodology to claim incremental electric and gas energy efficiency savings from business customers engaged in products with behavioral savings components and solicited input from the parties to the

2017/2018 DSM Plan.[18] The participating parties included the Southwest Energy Efficiency Project, the Energy Efficiency Business Coalition, Colorado Energy Consumers, Western Resource Advocates, the Office of Consumer Counsel, the Commission Staff, Energy Outreach Colorado, and the Colorado Energy Office.

Q. PLEASE EXPLAIN THE CURRENT METHODOLOGY USED BY THE COMPANY TO CLAIM BEHAVIORAL ENERGY EFFICIENCY SAVINGS.

A. The Company's current methodology for business behavioral savings is the "average savings method." To calculate annual energy savings, this method takes the observed savings, the difference between pre-treatment energy usage and post-treatment energy usage, and divides those over a time period (currently three years) for which the savings are evaluated. To calculate the lifetime energy savings, the methodology takes the annual claimed savings and multiplies those by the assumed lifetime of the behavioral actions. This results in annual energy savings each year of observation.

However, this methodology is flawed where energy savings are increasing over time. In this case, dividing the annual energy savings by the number of years of observation understates the total energy savings. It is likely that new behavioral actions at a site will be identified over time, resulting in increasing energy savings over time. This effect is detailed in Table SMW-D11 below.

[18] Proceeding No. 16A-0512EG.

Q. WHAT IS THE COMPANY'S PROPOSAL FOR AN ALTERNANTIVE METHODOLOGY?

A. The Company is proposing to use an "incremental savings method." Similar to the average savings method, this method calculates the difference between pre-treatment energy usage and post-treatment energy usage to determine the annual energy savings. However, in subsequent years, this methodology only calculates and claims the incremental growth in energy savings from behavioral actions. This method results in a sum of annual energy savings over time that match the annual energy savings recorded in the last year of observation.

Lifetime savings are calculated by multiplying the annual energy savings by the remaining useful life of the behavioral action. This process fairly discounts the annual energy savings for the presumed persistence of the action and reflects that savings occurring in later years are not as likely to persist as those generated in earlier years.

Q. CAN YOU PROVIDE AN ILLUSTRATIVE EXAMPLE OF THE AVERAGE SAVINGS VERSUS INCREMENTAL SAVINGS METHODS?

A. Yes, the following two tables provide an illustrative example of how savings would be claimed for a participant under both methodologies.

Table SMW-D-9: Average Savings Method

Average Savings Method				
	Year 1	Year 2	Year 3	**Cumulative Savings**
Observed Annual Energy Savings	500	700	800	**800**
Annual Energy Savings (1/3 of Observed)	167	233	267	**667**
Lifetime (yrs)	10	10	10	
kWh	1,667	2,333	2,667	**6,667**

Table SMW-D-10: Incremental Savings Method

Incremental Savings Method				
	Year 1	Year 2	Year 3	**Cumulative Savings**
Observed Annual Energy Savings	500	700	800	**800**
Annual Energy Savings (Minus Prev. Year)	500	200	100	**800**
Lifetime (yrs)	10	9	8	
kWh	5,000	1,800	800	**7,600**

As shown in the tables above, the average savings method results in a total of annual energy savings (667) that falls short of the final annual energy savings (800). The lifetime savings also are short of (6667) the actual lifetime savings (7600), which are accurately captured in the incremental savings method.

Q. WHY DOES THE COMPANY BELIEVE THE INCREMENTAL SAVINGS METHOD IS SUPERIOR TO THE AVERAGE SAVINGS METHOD?

A. The incremental method is a better method in the specific instance of measuring behavioral savings associated with individual participating business customers. This is because the Company can directly control the time period over which the savings will be observed for each customer.

However, the Company does not believe the incremental savings methodology is appropriate for mass market products such as the Energy Feedback product[19] because it is not possible to control for individual changes in participation due to customers moving from premises. This results in a variation in the participation time period, with some customers receiving the energy efficiency information for several years and some just beginning to receive the information. In this case, it is more appropriate to use the generalized method of average savings.

Q. IS THE COMPANY PROPOSING TO CHANGE THE RESIDENTIAL SAVINGS METHOD?

A. No. The Company recommends continuing to use the average savings method for the reasons described above. The incremental method would be impossible to implement administratively because it would require individually calculating savings for each participating customer, and the only other method currently

[19] The Energy Feedback product is the Company's residential behavioral product implemented as part of the 2015/2016 DSM Plan and reauthorized in the Company's 2017/2018 DSM Plan.

considered by the general industry is a deemed savings methodology. This methodology creates a prescriptive assumption that all customers save a specified amount. While this has the benefit of reducing measurement and verification ("M&V") and increasing the potential participation pool, it has the downside of being less verifiable and less likely to persist as incremental customers, with lower ability to save energy, begin participating in the product.

C. Reconsideration of the Avoided Transmission and Distribution Study

Q. AS DISCUSSED IN MR. BROCKETT'S TESTIMONY, THE 2017/2018 DSM PLAN SETTLEMENT REQUIRES THE COMPANY REEVALUATE ITS AVOIDED TRANSMISSION AND DISTRIBUTION COST STUDY. HOW HAS THE COMPANY COMPLIED WITH THIS REQUIREMENT?

A. In Proceeding No. 16A-0512EG the Company proposed a study to determine the avoided transmission and distribution cost value from implementing DSM programs.[20] This value assumes that system wide DSM would avoid system wide implementation costs. As part of the settlement agreement in that proceeding, the Company agreed to review its study and identify if using historical costs instead of forecasted costs would lead to more consistent and accurate accounting of avoided transmission and distribution costs.

[20] *See*, Attachment SMW-3.

Q. HOW DOES THE COMPANY ADDRESS THIS REQUIREMENT?

A. The Company has reviewed the study and its historic costs to identify if historic costs are applicable to the study's methodology and if so are more accurate than forecasted costs.

The Company conducted the study using the System Planning Method. The methodology is summarized in section 3.2.1.c on pages 75-76 of the U.S. Environmental Protection Agency's ("EPA") Assessing the Multiple Benefits of Clean Energy: A Resources for States (2010) report[21]. In alignment with the EPA study and the Company's 2017-2021 distribution forecast and budget process, the Company compared two scenarios; forecasted load reductions with DSM, and without DSM. The Company allocated the energy efficiency demand reduction goals of 65 MW per year to individual substation banks (or transformers) and feeders. The Company then compared the two scenarios and reviewed if load reductions deferred overloads into future years. Based on this analysis, the Company calculated that eight substation banks and thirty-five forecasted overloads were deferred to future years.

Q. HOW DID THE COMPANY CALCULATE THE DISTRIBUTION AVOIDED COSTS?

A. The Company developed a distribution cost probability table that was representative of different types of projects, the historical cost of each type of project, and the probability the Company would be required to mitigate a bank

[21] Source: http://www3.epa.gov/statelocalclimate/documents/pdf/epa_assessing_benefits_ch3.pdf#page=11

and feeder overload (referred to as the Distribution Cost Probability Table in the study). This information can be found in Appendix A1 of the study. The Company then calculated the savings for each of the 43 overloads that were deferred to future years based on the Distribution Cost Probability Table and the Company's weighted average cost of capital ("WACC") less the escalated expenditures for a given project due to inflation. Based on the calculated avoided Distribution costs the Company then increased the annual savings based on inflation as shown in Table 1 of the study.

Q. DOES THE COMPANY ANTICIPATE ANY CHANGES TO THE DISTRIUBTION PORTION OF THE STUDY?

A. No. The Company reviewed the study and determined it was already based on historical project costs and it was not dependent on future years' budget for capacity projects that could either decrease or increase dependent on the amount of available funding. As such, it is consistent with the intent of the settlement agreement and no changes were needed for the distribution portion of the study.

Q. DOES THE COMPANY BELIEVE ANY OTHER ADJUSTMENTS ARE NEEDED FOR THE DISTRIBUTION PORTION OF THE STUDY?

A. No. The system planning approach utilized by the Company was consistent with the Commission's Decision No. C15-0735.

Q. PLEASE PROVIDE A SUMMARY OF THE METHODOLOGY USED FOR AVOIDED TRANSMISSION COSTS.

A. A steady-state power flow contingency assessment was performed on the study cases using Siemens PTI PSSE software AC Contingency Calculation ("ACCC") function. The analysis included single (N-1) contingencies of the loss of transmission lines, transformers, and generating units in the Public Service (Area 70) and WAPA- Area 73 Balancing Authorities. Monitoring of transmission elements were reported for facilities experiencing a thermal overload based on its normal rating. Comparison of the "with future DSM" case (at the 65 MW goal level and for the higher sensitivity analysis level) to the "without future DSM" case determined whether a mitigation project could be deferred or avoided. If a mitigation project could be deferred, the estimated number of years of deferral were determined by identifying the time when the facility becomes overloaded in the "without future DSM" case versus when it becomes overloaded in the "with future DSM" cases. In the event that the "with future DSM" cases did not show an overload by 2026, the estimated overload was found by extrapolating the facility loading based on the loading growth in prior years.

Q. HOW DID THE COMPANY CALCULATE THE TRANSMISSION AVOIDED COSTS?

A. The resulting cost savings were calculated using a planning estimate of a potential mitigation project for the particular transmission issue. The cost savings

calculation assumed the Company's WACC, as well as the current assumed weighted corporate escalation factor of 2.00%.

Q. BASED ON THE SETTLEMENT AGREEMENT, DOES THE COMPANY ANTICIPATE ANY CHANGES TO THE TRANSMISSION PORTION OF THE STUDY?

A. No. Proposed transmission projects are typically large-scale, multi-year undertakings that undergo years of pre-development work before becoming planned projects. Over the past six-year period, only a single load-driven project has been constructed in Colorado by the Company (the Rifle-Parachute 230kV Line #2). The project was placed in service in 2016 and was driven by oil and gas load development

VIII. CONCLUSION

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

Statement of Qualifications

Shawn M. White

I graduated from Hawaii Pacific University with a Bachelor of Science in Marketing and the University of Minnesota's Carlson School of Business with a Master's degree in Strategic Management. I am also a graduate of the United States Navy's Nuclear Power Program.

I am the Manager of the DSM and Renewable Regulatory Strategy and Planning Group at Xcel Energy. I manage a group whose primary responsibilities are to: (i) ensure that Xcel Energy's energy efficiency and demand response programs are adhering to regulatory policies; (ii) develop long-range goals for the portfolio of programs for resource planning; (iii) track and report on energy efficiency achievements and financial operations; (iv) prepare DSM regulatory reports and filings; and (v) analyze the cost-effectiveness of energy efficiency and load management programs and portfolios in each of Xcel Energy's state jurisdictions with active energy efficiency programs or pending legislation. I am also responsible for setting measurement and verification (M&V) policies and ensuring that proper M&V is being conducted for all programs.

I have held several positions within Xcel Energy's DSM group, including Marketing Assistant, Program Manager, and Manager of Consumer and Commercial Energy Efficiency Marketing. I have been responsible for the oversight of energy efficiency and load management programs in New Mexico, Texas, Minnesota, and

Colorado. I also have nine years of experience in the operation and maintenance of nuclear power plants.