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 DSM PLAN, INCLUDING MODIFIED	**)**	
ELECTRIC ENERGY SAVINGS AND DEMAND	**)**	
REDUCTION GOALS, AND REVISED	**)**	
INCENTIVES FOR THE PERIOD 2015	**)**	
THROUGH TO 2020; FOR APPROVAL OF A	**)**	
DISTRIBUTION VOLTAGE OPTIMIZATION	**)**	
PROGRAM TOGETHER WITH COST	**)**	
RECOVERY AND INCENTIVES, AN LED	**)**	**DOCKET NO. 13A-0686EG**
STREET LIGHTING PRODUCT AND	**)**	
APPROVAL TO INCLUDE BEHAVIORAL	**)**	
CHANGE PRODUCTS IN THE COMPANY'S	**)**	
DSM PORTFOLIO AND OF THE	**)**	
METHODOLOGY TO BE USED TO MEASURE	**)**	
SAVINGS FROM SUCH PRODUCTS; AND	**)**	
FOR COMMISSION GUIDANCE REGARDING	**)**	
THE FACTORS TO BE CONSIDERED AND	**)**	
APPROPRIATE LEVEL OF THE COMPANY'S	**)**	
GAS DSM PROGRAM IN THE FUTURE.	**)**	

REBUTTAL TESTIMONY AND EXHIBIT OF JEREMY A. PETERSEN

ON

BEHALF OF

PUBLIC SERVICE COMPANY OF COLORADO

December 20, 2013

Corrected on April 11, 2014

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

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REBUTTAL TESTIMONY AND EXHIBIT OF JEREMY A. PETERSEN

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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 DSM PLAN, INCLUDING MODIFIED ELECTRIC ENERGY SAVINGS AND DEMAND REDUCTION GOALS, AND REVISED INCENTIVES FOR THE PERIOD 2015 THROUGH TO 2020; FOR APPROVAL OF A DISTRIBUTION VOLTAGE OPTIMIZATION PROGRAM TOGETHER WITH COST RECOVERY AND INCENTIVES, AN LED STREET LIGHTING PRODUCT AND APPROVAL TO INCLUDE BEHAVIORAL CHANGE PRODUCTS IN THE COMPANY'S DSM PORTFOLIO AND OF THE METHODOLOGY TO BE USED TO MEASURE SAVINGS FROM SUCH PRODUCTS; AND FOR COMMISSION GUIDANCE REGARDING THE FACTORS TO BE CONSIDERED AND APPROPRIATE LEVEL OF THE COMPANY'S GAS DSM PROGRAM IN THE FUTURE.	)	**DOCKET NO. 13A-0686EG**

REBUTTAL TESTIMONY AND EXHIBIT OF JEREMY A. PETERSEN

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Jeremy A. Petersen. My business address is 414 Nicollet Mall, Minneapolis, Minnesota, 55401.

Q. HAVE YOUR PREVIOUSLY SUBMITTED TESTIMONY IN THIS PROCEEDING?

A. Yes. On June 17, 2013, I submitted Direct Testimony and Exhibits in this proceeding on behalf of Public Service Company of Colorado ("Public Service" or the "Company").

Q. ARE YOU SPONSORING ANY EXHIBITS AS PART OF YOUR REBUTTAL TESTIMONY?

A. Yes. I am sponsoring Exhibit No. JAP-7, which was prepared by me or under my direct supervision.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. The purpose of my rebuttal testimony is to present a comparison of the electric energy savings goals advocated for by the Company against those proposed by the Intervenors, in terms of cost-effectiveness, net economic benefits, and rate impacts resulting from Demand Side Management ("DSM"), under a reduction in avoided costs. I will also respond to Intervenors' Answer Testimony regarding the Updated Colorado DSM Market Potential Assessment (Exhibit No. JAP-1 in my Direct Testimony; hereafter referred to as the 2013 Potential Study), including suggested new and emerging technologies for energy efficiency. I will also address the discount rate that should be applied if the Societal Test ("SCT") is used to measure cost-effectiveness of gas DSM as the Colorado Public Utilities Commission Staff ("Staff") has recommended. Lastly, I will provide the Company's response to

proposed demand response goals, suggested new demand response technologies, and the 2013 Demand Response Market Potential Study (Exhibit No. JAP-6; hereafter referred to as the Demand Response Potential Study).

III. IMPACTS OF THE CHANGE IN AVOIDED COSTS

Q. PLEASE SUMMARIZE THE INTERVENORS' REQUESTS CONCERNING ELECTRIC ENERGY EFFICIENCY GOALS, AS DESCRIBED IN THEIR ANSWER TESTIMONIES.

A. Seven intervenors specifically addressed the Company's electric energy efficiency goals within their Answer Testimony.

The Southwest Energy Efficiency Project ("SWEEP"), within Mr. Howard Geller's Answer Testimony (on page 3, lines 18-19), recommends the Commission approve goals of 405 GWh/yr starting in 2015, increasing to 495 GWh/yr by 2020. These goals did not include any savings from behavioral conservation measures, distribution voltage optimization ("DVO"), or light emitting diode ("LED") Street Lighting; however, SWEEP has not opposed inclusion of any of these programs within the Company's DSM portfolio.

Sierra Club (within Table 7 on page 57 of the Answer Testimony of Mr. Tim Woolf) recommends that the Commission require the Company to adopt DSM goals of escalating percent of sales metrics, from 1.4 percent in 2015 to 2.0 percent in 2020.

Staff (within Ms. Rachel Ackermann's Answer Testimony on page 17, lines 4-6) suggests that it is premature to adjust DSM goals and that the Commission should wait until after the 2013 program year results are available before making any changes.

The Energy Efficiency Business Coalition ("EEBC") (within the Answer Testimony of Mr. Jim Bradford on page 28, as clarified in discovery) requests that the Commission not approve the Company's proposed goals, but instead keep in place the goals set forth in Docket 10A-554EG for 2015 through 2016, with 2017 goals equal to the 2016 goal, and then increase the 2018 goal to be 10% higher than the 2016 goal and maintain that level through 2020.

The State Office of Consumer Counsel ("OCC") (on page 31 of Mr. Chris Neil's Answer Testimony) recommends the Commission reject Public Service's proposed goals and require the Company to develop new electric goals that reflect delivery of only the most cost-effective DSM programs in order to reduce rate impacts by limiting them to a 2012 level, in the range of $50 to $70 million.

Colorado Energy Consumers ("CEC") (on page 4 of the Answer Testimony of Mr. Kevin Higgins) supports the Company's proposal to scale back energy savings goals and suggests that they should be set such that costs are limited to four percent of overall retail rates, where costs are the sum of program expenditures, performance incentives, and the disincentive offset.

It is clear from the range of Intervenor proposals that there is no consensus among the parties on the appropriate electric energy efficiency goal; and, as highlighted with Ms. Debra Sundin's Rebuttal Testimony, the Company's goals proposal within its original Application balances the competing interests of the stakeholders in this proceeding by maintaining goals at the level of achievable potential, while holding ratepayer impacts at moderate levels.

Q. HAS THE COMPANY MADE ANY CHANGE TO ANY OF THE UNDERLYING ASSUMPTIONS FOR ITS GOALS PROPOSAL IN THIS PROCEEDING?

A. Yes, the Company has made two significant changes. First, in response to feedback provided by SWEEP, we have reassessed KEMA's estimate of the costs we would expect to incur to achieve energy savings at various levels. Second, in response to the Answer Testimony filed by the OCC and for the additional reasons set forth in Ms. Sundin's testimony we have also reevaluated the avoided costs used by KEMA in the 2013 Potential Study.

Q. HOW HAVE YOU CHANGED YOUR ESTIMATES OF THE DSM PROGRAM COSTS YOU EXPECT TO INCUR TO ACHIEVE VARIOUS LEVELS OF DSM SAVINGS?

A. We have reduced KEMA's estimated cost to achieve various levels of energy savings by 40 percent.

Q. WHAT WAS THE BASIS FOR YOUR REDUCTION IN THE LEVEL OF ESTIMATED PROGRAM COSTS?

A. We first compared our actual program costs for the period 2010 to 2012 to the program cost estimates that had been included in the 2009 Colorado DSM Market Potential Assessment (hereafter referred to as the "2009 Potential Study"). This comparison showed that, on average, since 2010 we were able to meet or exceed energy savings goals at a cost that was approximately 40 percent below the cost estimates included in the 2009 Potential Study (see page 2 in Exhibit JAP-1 for more details). Although, as we explained in our Direct Testimony, the reduction in potential from future conditions may make it more difficult to achieve our energy savings targets without increasing our program costs, for purposes of our comparison of the various energy savings goals proposals presented by the parties in this case, we have decided to reduce the program costs estimates included in the 2013 Potential Study to a level that is commensurate with the level of program costs we incurred from 2010 to 2012.

Q. WHAT ARE THE NEW PROGRAM COST ESTIMATES OF THE COMPANY'S PROPOSED GOAL GIVEN THIS CHANGE?

A. Table JAP-1 below shows the GWh, along with the original program cost estimates, as well as the reduced program cost estimates.

Table JAP-1

Summary of Updated Program Cost Estimates

Year	PSCo Proposed Goals (GWh)	Program Costs	
		Original	*Updated*
2015	**349**	$130M	*$73M*
2016	**321**	$134M	*$71M*
2017	**322**	$130M	*$68M*
2018	**288**	$120M	*$60M*
2019	**288**	$127M	*$64M*
2020	**276**	$112M	*$61M*

Q. WHAT CHANGES HAVE YOU MADE TO YOUR AVOIDED COST ASSUMPTIONS FOR 2015 THROUGH 2020?

A. As Mr. Jim Hill testifies we have reevaluated the avoided costs assumed for the period 2015 to 2020 based on more recent information used in our evaluation of generation resource bids received in response to the 2013 All-Source Solicitation. The result of this reevaluation is that we have determined that the type of resource being avoided by incremental DSM installed beginning in 2015 is a simple cycle combustion turbine ("CT") rather than the combined cycle ("CC") that was assumed to have been avoided by the majority of our DSM activities in the past. As part of his analysis, Mr. Hill also updated the capacity cost per kw-month and marginal energy costs based on the costs associated with the Resource Acquisition Period ("RAP") generic CT. *See* Exhibit JAP-7, Page 4 for the original 2013 Potential Study avoided cost assumptions and the updated avoided costs, as they apply to DSM.

Q. WHAT IS THE EFFECT OF THE CHANGE IN AVOIDED COSTS AND THE REDUCTION IN PROGRAM COSTS ON THE COMPANY'S PROPOSED ENERGY SAVINGS GOAL PROPOSAL?

A. There are a couple of effects from the change (reduction) in avoided costs from what was assumed by KEMA in the 2013 Potential Study. First, there is a reduction in the number of measures or technologies that are cost-effective, resulting in a small reduction in achievable potential. Because the estimated reduction in achievable potential stemming from the reduction in avoided costs is small, we decided not to adjust our proposed goals for traditional energy efficiency. The principal effects of the reduction in avoided costs are a reduction in system benefits resulting from energy efficiency, leading to reductions in the magnitude of net benefits and an increase in the rate impact as measured by the various cost-benefit tests we use in evaluating energy savings goals. Table JAP-2 below presents the results of the Modified Total Resource Cost ("MTRC") test, the Utility Cost Test ("UCT"), and the Rate Impact Measure ("RIM") test for the Company's proposed goals for energy efficiency, including Traditional Energy Efficiency, Unidentified Emerging Technologies, Behavioral, and LED Street Lighting, as defined in Direct Testimony of Ms. Sundin. The proposed DVO project is excluded from these goals, as expected test results for DVO are presented later in my rebuttal testimony. For comparison purposes, Table JAP-2 also includes test results based on the avoided cost values used by KEMA from the 2012/2013 Biennial DSM Plan filing.

Table JAP-2

Summary of Avoided Cost Effects on MTRC, UCT, and RIM

Year	PSCo Proposed Goals (GWh)	MTRC Net Benefits		UCT Net Benefits		RIM Net Benefits	
		Original	*Updated*	Original	*Updated*	Original	*Updated*
2015	**349**	$267M	*$128M*	$293M	*$168M*	-$112M	*-$232M*
2016	**321**	$246M	*$112M*	$272M	*$169M*	-$109M	*-$191M*
2017	**322**	$279M	*$128M*	$306M	*$186M*	-$144M	*-$221M*
2018	**288**	$279M	*$113M*	$301M	*$162M*	-$149M	*-$202M*
2019	**288**	$276M	*$101M*	$299M	*$147M*	-$150M	*-$197M*
2020	**276**	$284M	*$93M*	$307M	*$134M*	-$161M	*-$193M*

As shown above, in each year, net benefits are significantly reduced for both MTRC (includes all costs and benefits to all parties) and UCT (revenue requirement savings) due to the significant drop in avoided costs, despite the significant reduction in expected program costs. Also, RIM net costs increase significantly, suggesting much greater rate impacts.

Q. HAVING REDUCED THE POTENTIAL STUDY'S ESTIMATES OF DSM PROGRAM COSTS BY 40 PERCENT AND HAVING REASSESSED AVOIDED COSTS, ARE YOU CONFIDENT THAT THE ADJUSTED POTENTIAL STUDY RESULTS PROVIDE A REASONABLE ESTIMATE OF THE FUTURE COSTS AND ACHIEVABLE POTENTIAL FOR ENERGY EFFICIENCY IN YOUR COLORADO SERVICE TERRITORY?

A. Yes. With the 40 percent adjustment applied to the program cost estimates within the 2013 Potential Study, we believe the resulting data represents a conservative estimate of the future costs of energy efficiency achievement in Colorado. We also continue to believe that the 2013 Potential Study

appropriately captures the reduced potential caused by enactment of new codes and standards and the necessarily reduced population of future participants given the Company's significant DSM achievements to date. While SWEEP, Sierra Club, and EEBC have argued that the projected drop in DSM market potential due to changes in codes and standards is too pessimistic, none have provided revised estimates. They have also provided studies including national potentials, which for the reasons I discuss below may not be applicable to Colorado. Therefore, we believe that the cost-benefit results we present below, which are based on the economic and achievable potential identified in the 2013 Potential Study, are the most accurate estimates available.

Q. HAVE YOU ALSO ANALYZED THE COST-EFFECTIVENESS, NET BENEFITS, AND RATE IMPACTS ASSOCIATED WITH THE VARIOUS ENERGY SAVINGS GOALS PROPOSALS MADE BY THE INTERVENORS USING THE NEW ASSUMPTIONS REGARDING AVOIDED COSTS AND PROGRAM COSTS?

A. Yes. Exhibit JAP-7 describes the methodology I used in estimating the impacts of the reduction in avoided costs on Intervenors' and the Company's energy savings goals proposals and includes a year-by-year breakdown of the results.

Q. HOW DO THE COSTS AND NET BENEFITS OF THE VARIOUS SCENARIOS COMPARE TO ONE ANOTHER AND TO THE COMPANY'S PROPOSED GOALS?

A. Table JAP-3 below shows the resulting GWh goals from 2015-2020 for each of the Intervenors' proposed goal scenarios,[1] along with the expected program costs, and the resulting net costs or benefits from each of the cost-benefit tests. Similar to the analysis presented in Table 1, this analysis is limited to energy efficiency, excluding any impacts from the proposed DVO program. These estimates are based on the revised program costs and avoided cost estimates.

Table JAP- 3

Estimated Impacts of PSCo and Intervenor Goal Scenarios (2015-2020)[2]

	Total GWh (2015-2020)	Total Program Costs (2015-2020)	MTRC Net Benefits	UCT Net Benefits	RIM Net Benefits
CPUC Staff	2,914	$960M	$786M	$1,301M	-$2,192M
SWEEP	2,903	$957M	$784M	$1,299M	-$2,182M
EEBC	2,748	$905M	$743M	$1,231M	-$2,065M
Sierra Club	3,147 ~~2,448~~	$1,037M ~~$807M~~	$847M ~~$658M~~	$1,403M ~~$1,087M~~	-$2,368M ~~-$1,844M~~
PSCo Proposed	1,842	$399M	$674M	$966M	-$1,235M
CEC	**1,807**	$384M	$668M	$945M	-$1,204M
OCC	760	$124M	$297M	$424M	-$480M

[1] Not all Intervenors provided specific, alternative goal scenarios.
[2] See Exhibit JAP-7 for more details on the process used to estimate these values, as well as the values by year.

Q. WHAT IS THE EFFECT OF THE REDUCTION IN AVOIDED COSTS ON THE DVO PROGRAM PROPOSED BY THE COMPANY?

A. Even with the reduction in avoided costs, the DVO program remains very cost-effective, as shown in Table JAP-4 below; although the rate impact of DVO is significant before taking into account the mitigating effect of bill savings that customers will experience as DVO is implemented.

Table JAP-4

Estimated DVO Program Impacts

	Total GWh (2015-2020)	Total Program Costs (2015-2020)	MTRC Net Benefits	UTC Net Benefits	RIM Net Benefits
DVO	506	$90M	$307M	$271M	-$573M

Q. WHY ARE THE PROGRAMS COSTS FOR ENERGY EFFICIENCY SHOWN IN TABLE 3 INCREASING AT A FASTER RATE THAN THE RATE OF GROWTH IN ENERGY SAVINGS?

A. As we have explained in prior cases and as KEMA shows in the 2013 Potential Study, in order to achieve higher levels of energy savings it is generally necessary to offer rebates that represent a higher percent of the incremental cost of the energy efficiency measure. This, in turn, increases the rate of growth of DSM program costs, as energy savings targets increase.

Q. SWEEP AND SIERRA CLUB HAVE CHALLENGED THE ASSUMPTION THAT PROGRAM COSTS PER GWH OF ENERGY SAVINGS INCREASE AS ENERGY SAVINGS GOALS RISE, IS THEIR SKEPTICISM JUSTIFIED?

A. No. We know from our experience delivering DSM to customers that we need to increase rebate levels in order to achieve higher levels of energy savings and that this results in an exponential increase in our program costs as goals are increased. We also know that our customers tend to adopt the most cost-effective technologies first and that the marginal technologies that are less cost-effective require higher rebates to encourage adoption. What is not certain is the relative magnitude of these cost relationships.

Q. THE RESULTS IN TABLE JAP-3 ABOVE SHOW UCT NET BENEFITS THAT INCREASE AT A SLOWER RATE THAN THE RATE AT WHICH ENERGY SAVINGS GOALS INCREASE AS YOU GO UP FROM THE LOWEST ENERGY GOAL LEVELS. WHAT EXPLAINS THIS EFFECT?

A. This is attributable to the increased rate of spend necessary to attain higher levels of energy savings goals.

Q. THE RESULTS ALSO SHOW MTRC NET BENEFITS INCREASING AT A SLOWER RATE THAN GROWTH IN ENERGY SAVINGS AS YOU GO UP FROM THE LOWEST ENERGY GOAL LEVELS. WHAT EXPLAINS THIS EFFECT?

A. This effect is attributable to a couple of factors. The primary driver is that the marginal technologies that are adopted as we pursue higher levels of energy savings are necessarily less cost-effective than the technologies that are

adopted with less pursuit. This is due to the most cost-effective technologies producing greater benefit to customers. Less cost-effective technologies may still be cost-effective but they produce less benefit to customers, and require higher rebate values to gain adoption. This is why, for example, SWEEP's proposal to increase energy savings goals by nearly 60 percent over the Company's proposed goals results in an increase in net benefits of only slightly more than 15 percent.

A secondary driver is timing. The estimated net benefits and costs are expressed in 2013 dollars. SWEEP suggests goals that increase over time, with a large portion of achievements coming later in the 2015-2020 timeframe; whereas the Company's proposed goals decreasing over time, resulting in a greater portion of achievements coming earlier in the 2015-2020 timeframe. Discounting costs to 2013 dollars results in lower relative net benefits for those benefits achieved farther into the future.

Q. IS THERE ONE PROPOSED GOAL SCENARIO THAT WOULD SATISFY ALL PARTIES?

A. No. The parties have divergent interests. On the one hand, Intervenors such as SWEEP, Sierra Club, and EEBC are focused on ensuring that the Company achieves the highest level of cost-effective energy savings without regard for the rate impact of such achievements. On the other hand, parties such as OCC and CEC are more concerned with the impact of DSM on rates, and would like to limit rate impacts to the extent possible. Thus, the positions of these Intervenors are in conflict; rate impacts will only increase with higher

goals. In this context, we believe that the goals we have proposed reflect an approach that appropriately balances the interests of maintaining a robust DSM portfolio while moderating rate impacts.

Q. HAS THE COMPANY DEVELOPED AN ALTERNATIVE ENERGY SAVINGS PROPOSAL THAT MODERATES THE INCREASE IN RATE IMPACTS ASSOCIATED WITH ITS ORIGINALLY PROPOSED GOALS FOR ENERGY EFFICIENCY?

A. Yes. As Ms. Sundin explains in her Rebuttal Testimony, we have developed a "moderate" goals scenario that mitigates the increase in rate impacts associated with energy efficiency resulting from the reduction in avoided costs. Table JAP-5 below shows that the Company's "moderate" goals proposal reduces rate impacts in 2015 by $22 million to $210 million.

JAP Table 5

Estimated Impacts of the Company's "Moderate" Goals Scenario

Year	Proposed Goal (GWh)	Program Costs	MTRC Net Benefits	UCT Net Benefits	RIM Net Benefits
2015	317	$66M	$118M	$153M	-$210M
2016	292	$64M	$103M	$154M	-$173M
2017	288	$60M	$115M	$166M	-$197M
2018	252	$52M	$100M	$142M	-$175M
2019	268	$59M	$95M	$137M	-$183M
2020	254	$55M	$86M	$123M	-$176M

Q. SWEEP AND SIERRA CLUB ARGUE THAT THE COMMISSION CAN ASSESS THE REASONABLENESS OF THE PARTIES' GOALS PROPOSALS BY COMPARING THEM TO WHAT IS BEING DONE IN OTHER STATES. ARE THE GOALS THAT HAVE BEEN ESTABLISHED FOR UTILITIES IN OTHER STATES APPROPRIATE BENCHMARKS FOR DSM IN COLORADO?

A. No. Utilities operating in other states face different regulatory environments, have differing histories of DSM achievement, and may have customer populations of varying compositions; therefore, it is challenging to make meaningful comparisons between our achievements and the achievements of other utilities. Ms. Sundin describes the various characteristics that distinguish different utilities DSM programs from one another and make comparison difficult at pages 23-27 of her Direct Testimony. The 2013 Potential Study remains the best way to measure energy efficiency potential in our service territory because it began with primary data collected from Colorado customers from the original 2010 Potential Study.

Q. SIERRA CLUB HAS PROPOSED THAT NEW DSM GOALS BE ESTABLISHED AT A LEVEL THAT ESCALATES TO TWO PERCENT OF ELECTRICITY SALES BY 2020. IS THAT A REASONABLE LEVEL?

A. No. The results of the cost-benefit analysis using the updated avoided costs in Table 3 above show that Sierra Club's energy savings goals result in a lower level of net economic benefits under the MTRC test than what can be achieved under our goals proposal. Moreover, although cumulative bill

savings, as measured using the UTC, are somewhat more than bill savings under our proposal, the overall rate impact of Sierra Club's proposal is unacceptably high from our perspective.

Q. DO YOU AGREE WITH MR. GELLER'S RECOMMENDATION THAT ANOTHER POTENTIAL STUDY SHOULD BE CONDUCTED TO INFORM FUTURE GOAL SETTING?

A. Yes, we agree that, given the rapid rate of change affecting the DSM market, we should conduct a new market potential study, to be completed by the end of 2016 to inform the next Strategic Issues filing that we would plan to submit in the first quarter of 2017. The 2016 potential study should involve collection of primary data from Colorado customers to obtain the best information possible regarding such important factors as penetration rates, and acceptance of new technologies. We agree with Mr. Geller that the new potential study to be performed in 2016 should measure the potential for energy efficiency out to 2025. The Company plans to issue an RFP in early 2016 to solicit bids from firms interested in performing the new study and to solicit input from interested stakeholders throughout the process of developing the RFP.

Q. WHY IS THE COMPANY RECOMMENDING THAT A NEW STUDY BE COMPLETED BY THE FOURTH QUARTER OF 2016?

A. The Company anticipates needing to file a new strategic issues application by March 2017, to inform both the Company's Electric Resource Plan ("ERP")

that will be filed in the fall of 2017 and to set the goals that the Company will use in the 2019/2020 Biennial DSM Plan that will be filed in mid-2018.

III. PROGRAM COSTS PER GWH OF ENERGY SAVINGS

Q. PLEASE STATE THE EXPECTED COST INTENSITY THE COMPANY EXPECTS GIVEN THE 40 PERCENT REDUCTION IN PROGRAM COSTS DISCUSSED IN THE PRECEDING SECTION OF YOUR TESTIMONY.

A. For the goals scenarios proposed by Public Service and CEC, the expected costs are now estimated to be between $210,000-$225,000 per GWh/yr. Our goals generally match the achievable potential associated with the 75 percent incentive scenario included in the 2013 Potential Study over the 2015-2020 time period in terms of GWh achievement, suggesting that the costs for these goals are best estimated by this scenario in the 2013 Potential Study. The scenarios proposed by SWEEP, Sierra Club, EEBC, and Staff are closer to the achievable potential estimated by the 100 percent incentive scenario, so the starting point for estimating the level of program costs we would expect to incur to achieve energy savings goals recommended by these parties was KEMA's estimate assuming rebates are paid equal to 100 percent of incremental cost. After reducing KEMA's estimate by 40 percent, the expected costs for these scenarios are estimated between $310,000-$335,000 per GWh/yr. For the OCC's goal scenario, aimed at limiting rate impacts, the Company believes that the cost of achievement is best estimated by the 50 percent incentive scenario, at a range of between $155,000-$170,000 per GWh/yr after adjustment.

Q. HOW DO THE COMPANY'S PROGRAM COST ESTIMATES PER GWH OF SAVINGS COMPARE TO SWEEP'S COST ESTIMATES?

A. SWEEP suggests that the costs to achieve it's proposed goals are in the range of $225,000-$250,000 per GWh/yr of achievement, a level 10-20 percent higher than historical annual costs from 2009-2012, and similar to the level we are now estimating assuming goals for traditional energy efficiency are set the level we propose.

Q. WHAT IS THE BASIS FOR SWEEP'S COST ESTIMATES?

A. SWEEP's cost estimates are consistent with the results of a national study Mr. Geller references at page 27 of his Answer Testimony performed by Lawrence Berkeley National Laboratory ("LBNL"). This study estimated the electric savings and costs nationwide as shown in Table JAP-6 below. Table JAP-6 also includes an estimate of the cost per GWh/yr from these estimates.

Table JAP-6

LBNL Nationwide Costs

Year	Electric Savings (TWh/yr)	Spend ($B)	$/GWh/yr
2010	18.4	3.9	$210,000/GWh/yr
2015	26.6	6.5	$240,000/GWh/yr
2025	28.8	8.1	$280,000/GWh/yr

Q. DO YOU BELIEVE IT IS APPROPRIATE TO USE THE COSTS ESTIMATED IN THIS STUDY TO PROJECT FUTURE COSTS IN COLORADO?

A. No. For several reasons we believe that the cost projections from this study are too low for achievement of the high levels of goals proposed by SWEEP, Sierra Club, EEBC and Staff. First, the projections are based on historically

observed spend[3] as the study states "State-specific cost of savings data (i.e., cost per first-year MWh saved) were used for 23 states, based on recent program results or recently-approved DSM program plans," LBNL Study at pp. 42-43. We believe that historical spend levels are not a good proxy for future costs to achieve the high levels of savings recommended by SWEEP, EEBC, Sierra Club and Staff due to standards changes reducing the amount of potential energy savings and requiring increased rebate levels to maintain energy savings. While the application of the 40 percent cost reduction to the potential study costs calibrates the spend levels to historical achievement, we believe the general cost increase associated with providing rebates equal to 100 percent of incremental costs as reflected in the Potential Study is appropriate.

IV. EMERGING TECHNOLOGIES & NEW PRODUCT IDEAS

Q. HAVE ANY INTERVENORS SUGGESTED EMERGING TECHNOLOGIES AND/OR NEW PRODUCT IDEAS ARE NOT SUFFFICENTLY ACCOUNTED FOR IN THE POTENTIAL STUDY?

A. Yes. Several Parties (SWEEP, Sierra Club, and EEBC) have suggested that the 2013 Potential Study did not fully account for the energy savings potential of all newly emerging DSM technologies. The Parties also argue that the analysis lacked consideration for innovative program delivery methods and underestimated the adoption rate for several technologies. The Parties

[3] G.L. Barbose et al. 2013. *The Future of Utility Customer-Funded Energy Efficiency Programs in the United States: Projected Spending and Savings to 2025.* LBNL-5803E. Lawrence Berkeley National Laboratory, Berkely, CA. Jan. 2013, http://empl.lbl.gov/sites/all/files/lbnl-5803e.pdf

further assert that these factors, combined, resulted in an underestimation of achievable potential and exaggerated costs.

Q. DO THE GOALS PROPOSED BY THE COMPANY ALREADY ACCOUNT FOR THE POTENTIAL ENERGY SAVINGS FROM EMERGING TECHNOLOGIES?

A. Yes. A comparison of our historical achievements from 2010 to 2012 to the achievable potential identified in the 2009 Potential Study showed that on average our historical achievements exceeded the achievable potential by approximately 8 percent, under relatively flat spend amounts over time. To account for, and capture this historical over-performance, the achievable potential from the 2013 Potential Study was escalated by 10 percent, to develop the goals from 2015-2020.

We further increased the proposed goals for 2019 and 2020 above the level of achievable potential identified in the 2013 Potential Study for those years because we recognize that there may be unidentified emerging technologies that would allow us to offset the declines in achievable potential identified for those years.

Q. DO THESE ADJUSTMENTS SUFFICIENTLY ADDRESS THE SHORTCOMINGS IDENTIFIED BY THE PARTIES?

A. Yes, we believe they do.

Q. PLEASE ADDRESS THE SPECIFIC GAPS IN THE 2013 POTENTIAL STUDY THAT HAVE BEEN IDENTIFIED BY THE INTERVENORS.

A. Parties have identified a few technologies that they claim were improperly excluded from the potential study. These include: early retirement of older refrigerators; high-efficiency clothes dryers; early-retirement of roof-top commercial air-conditioners; indirect evaporative cooling technologies; personal appliances and electronics at efficiencies higher than ENERGY STAR level; and virtualization of desktop computers. The expected future impact attributable to utility DSM programs from these measures is expected to be small. In only a couple of cases have the impacts been estimated (4.2 GWh in 2012 for refrigerators and 7.8 GWh goal in 2013 for virtualization). For these two cases, even though they represent some potential in the short-term, the potential is expected to expire by the 2015-2020 timeframe. Several other technologies (appliances, smart power strips, TVs, home computers, monitors) likely represent additional economic potential, but are better addressed outside of utility DSM programs. These technologies are improving in efficiency rapidly and are very cost-effective, as recognized by Mr. Geller. These technologies are rapidly adopted without utility DSM funds, and past utility DSM spend has proven to be non-influential. An example of this is the Company's ENERGY STAR® Retailer Incentive program which was discontinued beginning with the 2012 program year. Our experience with this program revealed that the efficiency gains in these products occurred without utility influence, and the adoption rate was not effectively improved with utility

funding. Any potential that these measures may represent is believed to be less than the 10 percent adder that applied to the achievable potential in arriving at our proposed goals, and has thus been fully accounted for.

Mr. Geller also claims that the increase in achievable potential due to new program delivery methods was not fully accounted for in the 2013 Potential Study. We agree that new program delivery methods may achieve additional savings, but they also represent an increase in costs, both in total costs and in cost intensity per kWh of achievement. The delivery method used in the 2013 Potential Study of increasing rebates and thus increasing utility costs to achieve higher potentials, resulting in increased cost intensity per kWh of achievement, captures this effect. The magnitude of the costs of these new program delivery methods has not been estimated by any Party, but we believe that the increasing cost intensity assumed in the 2013 Potential Study as energy savings rise is a reasonable estimate of these increasing costs.

Finally, EEBC's witness, Mr. Bradford, observes that the transfer function used in the Potential Study to estimate expected penetration is flawed in that it excludes the non-energy benefits realized by participants that are not quantified or used in the function, underestimating the customer adoption rate. While we agree with Mr. Bradford that factors other than energy savings may drive customer adoption, the same method and transfer function was used in the 2010 Potential Study; and by comparing actual

achievements to the expected achievable potential and adjusting future projections for this variance, the Company has already captured this effect.

Q. DO YOU AGREE THAT THE INCREASE IN POTENTIAL FROM NEW LED TECHNOLOGIES SHOULD COUNTERBALANCE THE EROSION OF SAVINGS POTENTIAL DUE TO INCREASED LIGHTING STANDARDS, AS THE INTERVENORS CLAIM?

A. No. SWEEP, OCC, and EEBC have all pointed out the rapidly increasing efficiency and decreasing costs expected from LED lighting in the near future. We also recognize that LED technology is becoming increasingly more efficient and less costly; however, because the standards against which we must measure efficiency gains resulting from our efforts also continue to change, it remains highly uncertain that future gains in efficiency of LED technology can offset the erosion in potential from codes and standards changes. For example, the historical baseline for residential lighting has been residential "a-bulb" lighting, represented by 60W incandescent bulb. In 2007, the Energy Independence and Security Act ("EISA") established a new 42W baseline reducing the potential savings associated with installation of a 13W CFL bulb from 47W (60W-13W) to only 29W (42W-13W). The efficiency gain of LED bulbs from the current 100 lumens per watt, which equates to approximately 9W bulbs, to 200 lumens per watt, or 4W bulbs, represents only a 5W gain. Thus, while the expected efficiency gains in LED lighting are impressive, the incremental 5W impact associated with the increasing efficiency of LEDs is small relative to the 18W decline in economic and

achievable potential from due to the effects of EISA codes and standards updates and other market transformation that has occurred.

Q. WHAT OTHER FACTORS CAN CAUSE FUTURE POTENTIAL ENERGY SAVINGS TO BE REDUCED WHEN COMPARED TO HISTORICAL ACHIEVEMENT?

A. The increasing availability of high-efficiency products has led to significant naturally-occurring adoption of these technologies that is not attributable to the Company's DSM programs. The declining net-to-gross values for CFLs within the Residential Lighting product offer an example of this.

Q. HOW HAVE NET-TO-GROSS FACTORS, WHICH ATTEMPT TO MEASURE THE PORTION OF GROSS SAVINGS ATTRIBUTABLE TO THE UTILITY'S DSM ACTIVITIES, CHANGED FOR RESIDENTIAL LIGHTING CFLS?

A. Table JAP-7 below shows how the net-to-gross factors for residential CFLs have largely decreased in recent years. The net-to-gross factor for 2014 reflects the net-to-gross factor agreed to as part of the settlement of our 2014 DSM Plan Application that is pending consideration in Proceeding No. 13A-0773EG.

Table JAP-7

Year	CFL Net-to-Gross
2009	83%
2010	90%
2011	90%
2012	85%
2013	85%
2014	70%

As the achievements attributable to our DSM programs are required to be measured at the net level, this decline in net-to-gross reduces the achievable potential. This may be the case, even if the economic potential increases. For instance, if the economic potential of residential lighting increases by 10% due to the rapid improvement in LED lighting, but the net attribution to utility programs (net-to-gross) reduces by 20 percent, the achievable potential for utility DSM programs goes down.

VI. DISCOUNT RATE TO BE USED IN CONJUNCTION WITH THE SOCIETAL COST TEST APPLIED TO NATURAL GAS DSM

Q. WHAT IS THE DISCOUNT RATE THAT SHOULD BE USED IN CONJUNCTION WITH THE SOCIETAL COST TEST RECOMMENDED BY STAFF FOR GAS DSM?

A. We recommend basing discount rate on the United States Department of Treasury's 20-Year Constant Maturity Rate. This is the same basis for the 2.67 percent discount rate Xcel Energy has used in Minnesota in applying the Societal Cost Test to natural gas DSM. We believe an updated value, using this metric, would be a reasonable discount rate to apply under the Societal Cost Test in Colorado.

Q. HOW SHOULD THE SOCIETAL DISCOUNT RATE BE APPLIED IN THE SOCIETAL COST TEST?

A. The Societal Discount Rate should be applied only to environmental externalities, which are a small portion of the total benefits of gas DSM programs. The majority of benefits—the cost of fuel, avoided utility variable

O&M and capacity costs—are still subject to utility investment, and should be valued using the Weighted Average Cost of Capital (WACC) for the utility as the discount rate. Given this, we do not expect that application of the Societal Cost Test to measure cost-effectiveness of natural gas DSM would result in significant differences in the cost-effectiveness of gas DSM programs. This is consistent with the way the Societal Cost Test is applied by our affiliate, Northern States Power in Minnesota.

VII. DEMAND RESPONSE MARKET POTENTIAL

Q. PLEASE SUMMARIZE THE ANSWER TESTIMONY BY EACH PARTY CONCERNING DEMAND RESPONSE.

A. SWEEP (within the Answer Testimony of Mr. Geller) recommends the Commission approve the Demand Response goals proposed by the Company through 2017, and that the Company refine it's Demand Response Potential Study prior to the next Strategic Issue's filing.

EEBC (within the Answer Testimony of Mr. John Kloster-Prew) suggests that Saver's Switch technology is outdated and therefore should be updated with Wi-Fi thermostats.

The OCC (within the Answer Testimony of Mr. Neil) recommends approval of the Company's proposed demand reduction goals from load management and demand response programs for each of the years 2015 through 2020. Regarding the incentives paid for the Interruptible Service

Option Credit (ISOC), he recommends the incentives be consistent with new, lower avoided costs.

Both SWEEP and OCC suggest there is additional market potential to be included within the goals proposed by the Company and that additional pilots should be considered.

Q. HOW WERE THE COMPANY'S PROPOSED DEMAND RESPONSE GOALS DETERMINED?

A. The Company's demand response goals were developed using estimated future resource needs identified within the 2011 ERP (Docket No. 11A-869E), as well as the results of the demand response potential study, Estimating Xcel Energy's Public Service Company of Colorado Territory Demand Response Market Potential, prepared by the Brattle Group and attached to my Direct Testimony as Exhibit JAP-6 (hereafter referred to as the "DR Potential Study"). These goals are noted below in Table JAP-8 for reference. The Company's analysis suggests little need for additional capacity from DR through the 2019 timeframe; therefore, any additional load opportunity was added after that time. The Company's intent was to shift the potential opportunity to further out-years and begin adding resources only as needed.

Table JAP-8

Cumulative Demand Response – Demand Savings Goal

(MW)	2015	2016	2017	2018	2019	2020
Total System Controllable Load (Demand Response)	528	537	555	575	598	623

Q. ARE THE PROPOSED GOALS LOWER THAN WHAT IS INDICATED BY THE DR POTENTIAL STUDY?

A. Yes. The DR Potential Study suggested an incremental increase in cost-effective demand response (above the 531 MW predicted for the continuation of existing programs) of between 267 and 424 MW in 2020. From this same baseline of 531 MW, we proposed increasing the level of DR by only 92 MW by 2020.

SWEEP and the OCC have suggested that the Company's proposed goals should be increased to capture more of the identified market potential. However, we have chosen to curb our proposed demand response goals for two reasons. First, assuming we meet or exceed the energy efficiency proposed in this proceeding, we do not have a need for additional capacity before 2019. Second, individual cost analyses were not conducted by program within the DR Potential Study; therefore, as further planning is conducted for future programs, additional analysis will be needed on cost-effectiveness. These analyses will be conducted as we begin to expand our demand response programs closer to 2019.

Q. DESCRIBE THE COMPANY'S METHOD FOR CALCULATING FUTURE DEMAND RESPONSE OPPORTUNITY, AND THE RESULTING IMPACT ON DEMAND RESPONSE GOALS.

The DR Potential Study was used to guide the Company in its demand response goal setting, but several other factors were considered when identifying goals. Demand response is a quickly changing market, costs

continue to fluctuate and how these programs are used within our portfolio is difficult to capture in a snapshot. There is no question that this potential could exist, but we continue to have questions about the cost-effectiveness of incremental demand response, adoption rates, and whether it is needed at a resource level.

Q. WOULD INCREASED DEMAND RESPONSE GOALS BE APPROPRIATE FOR BALANCING LOWER ENERGY EFFICIENCY GOALS?

A. No. Unlike energy efficiency, demand response is a dispatchable resource used to reduce electricity during periods of high demand. The amount of dispatchable resource needed is thus dictated by peak load and therefore cannot be used to "fill in" for the shortfalls in energy efficiency programs as suggested by OCC (within the Answer Testimony of Mr. Neil). The Company feels that the proposed goals are responsive to this objective.

Q. DO YOU AGREE WITH SWEEP'S SUGGESTION THAT ANOTHER DR POTENTIAL STUDY SHOULD BE CONDUCTED TO INFORM FUTURE GOAL SETTING?

A. Yes. The Company agrees that the DR Potential Study should be updated in order to inform the next strategic issues filing. If ordered by the Commission, the Company would aim to complete an update to the DR Potential Study by the end of 2016, in parallel to an update of the DSM Potential Study.

Q. SHOULD ENABLING TECHNOLOGIES BE INCLUDED WITHIN A FUTURE POTENTIAL STUDY?

A. Perhaps. The Company suggests that SmartGridCity™ Pricing Pilot results, filed on December 19, 2013 in Proceeding No. 09A-796E, may offer further insight into determining the market potential of these technologies, prior to the timeframe for a DR Potential Study update.

Q. IS THE COMPANY CONDUCTING ANY OTHER DEMAND RESPONSE ANALYSES?

A. Yes. The Company is conducting several pilots that will inform future demand response programs. These include:

- **In-Home Smart Devices Pilot:** The In-Home Smart Device pilot is designed to test how residential customers respond to various control strategies and energy consumption information delivered to their homes through in-home energy management devices. The pilot will end in 2013 and a final evaluation will be completed in 2014.
- **Smart Thermostat Market Study Group:** Within the Settlement Agreement for the 2014 DSM Plan (Docket No. 13A-0773EG), the Company agreed to form a study group, consisting of trade representatives and other interested stakeholders, to design and implement a pilot to evaluate the capabilities of Wi-Fi connected thermostats, starting in mid-2014.

VIII. NEW TECHNOLOGIES FOR DEMAND RESPONSE

Q. ARE THERE NEW DEMAND RESPONSE PRODUCT IDEAS PROPOSED BY THE PARTIES THAT THE COMPANY HAS EVALUATED?

A. Yes. There were several potential programs suggested by SWEEP and OCC, these include Wi-Fi thermostats, smart appliances, and dynamic pricing programs.

- **Wi-Fi Thermostats:** The Company has agreed to initiate smart thermostat market study group in 2014 to design and launch a pilot to evaluate the capabilities of Wi-Fi connected thermostats. The market potential and/or impacts on Saver's Switch participation is currently unknown.
- **Smart Appliances**: OCC suggests that the Commission should require the Company to test smart appliances within SmartGridCity™ using the Advanced Metering Infrastructure ("AMI") deployed. However, the AMI technology deployed within SGC is not directly compatible with the smart appliances appearing on the market. A primary reason for this lack of compatibility is that SGC was developed and deployed before communications standards for interfacing with customer devices, such as appliances, had been fully developed. The Company does believe it should keep watch on market trends in the area of Smart Appliances and would consider running a pilot at some future point once these devices have matured. Where the pilot would be conducted should not be limited to SGC.

- **Multi-family Saver's Switch**: This strategy was shown to have low cost-effectiveness and high customer costs, therefore, the Company has chosen to address other more cost-effective opportunities.
- **Dynamic Pricing Programs:** As noted in Mr. Brockett's direct testimony dynamic pricing programs are better suited to be reviewed within the Company's next Phase II electric rate proceeding. Mr. Brockett further discusses the market potential and concern around this rate design in his rebuttal testimony.

Q. WOULD ADOPTION OF ANY OF THE PROPOSED DEMAND RESPONSE PRODUCTS REQUIRE AN ADJUSTMENT TO THE PROPOSED GOALS?

A. No. While we are committed to investigating the market potential for some of the demand response product opportunities suggested by the Parties; because they have not yet been fully vetted the proposed program offerings would not warrant adjustments to the Company's proposed goals at this time.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.