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	)	DOCKET NO.
VOLTAGE OPTIMIZATION PROGRAM	)	13A-0686EG
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.	)	

Answer Testimony of
Tim Woolf

On Behalf of the Sierra Club

On the Topic of Setting Energy Efficiency Goals

October 16, 2013

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1. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name, title and employer.

A. My name is Tim Woolf. I am a Vice President at Synapse Energy Economics, located at 485 Massachusetts Avenue, Cambridge, MA 02139.

Q. Please describe Synapse Energy Economics.

A. Synapse Energy Economics is a research and consulting firm specializing in electricity and gas industry regulation, planning and analysis. Our work covers a range of issues, including integrated resource planning; economic and technical assessments of energy resources; electricity market modeling and assessment; energy efficiency policies and programs; renewable resource technologies and policies; and climate change strategies. Synapse works for a wide range of clients, including attorneys general, offices of consumer advocates, public utility commissions, environmental advocates, the US Environmental Protection Agency, US Department of Energy, US Department of Justice, the Federal Trade Commission and the National Association of Regulatory Utility Commissioners. Synapse has over twenty five professional staff with extensive experience in the electricity industry.

Q. Please summarize your professional and educational experience.

A. Before joining Synapse Energy Economics, I was a commissioner at the Massachusetts Department of Public Utilities (DPU). In that capacity, I was responsible for overseeing a significant expansion of clean energy policies, including significantly increased ratepayer-funded energy efficiency programs; an update of the DPU energy efficiency guidelines; the implementation of decoupled rates for electric and gas companies; the promulgation of net metering regulations; review of smart grid pilot programs; and review and approval of long-term contracts for renewable power. I was also responsible for overseeing a variety of other dockets before the commission, including several electric and gas rate cases.

Prior to being a commissioner at the Massachusetts DPU, I was employed as the Vice President at Synapse Energy Economics; a Manager at Tellus Institute; the Research Director of the Association for the Conservation of Energy; a Staff Economist at the

Massachusetts Department of Public Utilities; and a Policy Analyst at the Massachusetts Executive Office of Energy Resources.

I hold a Masters in Business Administration from Boston University, a Diploma in Economics from the London School of Economics, a BS in Mechanical Engineering and a BA in English from Tufts University.

Q. Please describe your professional experience as it relates to energy efficiency policies and programs.

A. Energy efficiency policies and programs have been at the core of my professional career. While at the Massachusetts DPU, I played a leading role in updating the Department's energy efficiency guidelines, in reviewing and approving the recent three-year energy efficiency plans, in reviewing and approving energy efficiency annual reports, in leading a working group on rate and bill impacts, and advocating for allowing energy efficiency to participate in the New England wholesale electricity market. I served as a co-chair of the Working Group on Utility Motivation as part of the State Energy Efficiency Action Network sponsored by the U.S. Department of Energy and the U.S. Environmental Protection Agency.

As a consultant, I have reviewed and critiqued utility energy efficiency policies and programs throughout the US, and I have testified on these issues in British Columbia, Colorado, Delaware, Massachusetts, Minnesota, Nevada, Nova Scotia, Québec, and Rhode Island. My work has encompassed all aspects of energy efficiency program design and implementation, including efficiency measure assessment, program delivery options, program budgeting, cost-benefit analyses, avoided costs, utility performance incentives and other relevant regulatory policies. I have also represented clients on several energy efficiency collaboratives, where policies and programs were discussed and negotiated among a variety of stakeholders. I work for a variety of clients on energy efficiency issues, including consumer advocates, environmental advocates, regulatory commissions and the US Department of Energy.

Q. On whose behalf are you testifying in this case?

A. I am testifying on behalf of the Sierra Club. Sierra Club has more than 15,500 members in Colorado.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to address the Public Service Company of Colorado's (Public Service or the Company) proposed energy savings goals. I begin with a review and critique of the Company's methodology for analyzing the cost-effectiveness of energy efficiency, with a focus on the proper treatment of non-energy benefits (NEBs) and the value of reduced emissions. I also address the appropriate way to consider the rate impacts of energy efficiency, when developing energy efficiency plans and setting energy efficiency goals. I review and critique some of the Company's estimates of energy efficiency savings opportunities. Finally, I offer some recommendations regarding alternative energy efficiency savings goals for the period 2015 to 2020.

Q. Have you previously testified before this commission?

A. Yes. As indicated on my resume, I testified before the Colorado Public Utility Commission four times between 1994 and 1996, on several subjects related to integrated resource planning and energy efficiency, on behalf of the Colorado Office of Energy Conservation.

Q. How is your testimony organized?

A. My testimony is organized as follows:

1. Introduction and Qualifications.
2. Summary of Conclusions and Recommendations.
3. Screening Efficiency for Cost-Effectiveness.
4. Proper Consideration of Rate Impacts.
5. Estimates of Efficiency Savings Opportunities.
6. Recommendations for Setting Efficiency Goals.
7. Decoupling and Recovery of Lost Revenues.

2. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Q. Please summarize your primary conclusions.

A. My general conclusion is that the Company's proposed efficiency savings goals dramatically understate the full potential for cost-effective energy efficiency savings available in Colorado for the period of 2015 to 2010. My specific conclusions include the following:

- The Company's cost-effectiveness analysis significantly understates the value of non-energy benefits.
- The Company's cost-effectiveness analysis does not include any value for the reduced emissions from energy efficiency programs, despite the requirement to do so in Colorado law.
- The Company's cost-effectiveness analysis places far too much emphasis on the rate impacts of energy efficiency programs.
- The Company does not address rate impacts properly and does not provide sufficient support for its contention that concerns about rate impacts should limit the energy efficiency savings goals.
- The reduction in bills due to energy savings from the Company's energy efficiency programs are likely to more than offset the increased rates from those programs for a large portion of customers.
- The Company significantly overstates the constraints on energy efficiency savings in Colorado caused by the federal lighting standards and recent trends in efficiency markets in Colorado.
- The Company's efficiency potential study understates the opportunities for efficiency savings in Colorado, primarily because of understated avoided costs and overly-conservative estimates regarding the achievable potential.
- The Company's own experience with implementing energy efficiency resources indicates that the potential for savings from 2015 to 2020 is significantly greater than what is included in their proposed savings goals.
- The Company's proposed savings goals do not account for energy efficiency programs and plans in other states that demonstrate higher savings potential than the the Company has included in its proposed efficiency goals.
- The Company's approach for recovery of lost revenues associated with energy efficiency programs is fundamentally flawed. Revenue decoupling is a much more effective way to provide the Company with the appropriate financial incentives to promote demand-side resources.

Q. Please summarize you primary recommendations.

A. I offer the following recommendations:

- **Efficiency Goals:** The Commission should reject the Company's proposed efficiency goals and instead require the Company to adopt the goal of reducing electric sales by 2 percent per year by the year 2020 through electric efficiency programs. To achieve this reduction, the annual savings goals should increase steadily from the current 2014 goal to the revised goal for 2020. These goals are significantly higher than what the Company has proposed, but are reasonable and achievable. This level of efficiency savings will lead to a much greater amount of net benefits for Colorado electricity customers than the Company's proposed goals.

- **Non-Energy Benefits:** The Commission should require the Company to use more accurate estimates of the non-energy benefits of energy efficiency in all future analyses of energy efficiency cost-effectiveness. For the short-term, and for the purpose of setting energy efficiency goals in this docket, the Commission should require the Company to adopt the NEB values that I develop below, which vary across different program types. For the long term, the Commission should require the Company to conduct independent analyses to develop better estimates of the non-energy benefits associated with the Company's efficiency programs.

- **Emissions Reductions Value:** The Commission should require the Company to include its best estimate of the value of reduced emissions in all future analyses of energy efficiency cost-effectiveness. In the short term, and for the purpose of setting energy efficiency goals in this docket, the Commission should require the Company to use its previous estimate of the value of CO_2 emissions. For the long term, the Commission should require the Company to develop more up-to-date estimates of the value of avoiding CO_2 emissions, as well as the value of avoiding other relevant emissions from power plants.

- **Rate Impacts from Efficiency Programs:** The Commission should find that concerns about rate impacts from energy efficiency programs have no role in determining the cost-effectiveness of energy efficiency. The Commission should also find that rate impacts should be considered in a comprehensive manner when setting future energy efficiency

goals. This would include meaningful, qualitative analyses of long-term rate impacts, bill impacts and participation rates.

- **Lost Revenues and Decoupling**: The Commission should open a separate docket, either in the next rate case or in a generic docket, to investigate the advantages and disadvantages of revenue decoupling as a means to align the Company's financial incentives with the state's energy policy goals.

3. SCREENING EFFICIENCY FOR COST-EFFECTIVENESS

Q. In general, how should cost-effectiveness tests be applied in Colorado?

A. As a fundamental principle, the costs and benefits included in any state's energy efficiency screening test should be consistent with the state's policy objectives, because these objectives provide guidance on the value that a state places on energy resources. The list of relevant policy objectives to use for efficiency screening may be unique to each state. Examples of such policy goals include: reduce long-term energy costs; assist low-income customers with high energy burdens; increase the diversity of energy resources; improve system reliability; reduce environmental impacts of energy; promote economic development.

Q. Please describe Colorado's current energy efficiency cost-effectiveness policies and practices.

A. CRS 40-1-102(5) sets forth the definition for the benefit-cost ratio applied to energy efficiency programs. This statute specifies that the benefits in cost-effectiveness testing should include the utility's avoided generation, transmission, distribution, capacity and energy costs; the valuation of avoided emissions; and non-energy benefits (NEBs) as determined by the Commission. (C.R.S. 40-1-102(5)(b)). This statute also specifies that the costs in cost-effectiveness testing should include program design, administration, evaluation, advertising, and promotion; customer education; incentives and discounts; capital costs; and operation and maintenance (O&M) expenses. (C.R.S. 40-1-102(5)(c)).

Based on this statute, Colorado relies on what the Company refers to as a modified version of the Total Resource Cost (TRC) test to screen for cost-effectiveness. The Company also provides the results of other cost-effectiveness tests, including the TRC

test as defined in the California Standard Practice Manual (SPM),[1] the Utility Cost test,[2] Participant Cost test, and Ratepayer Impact Measure (RIM) test. The Company runs these cost-effectiveness tests on energy efficiency measures, products, programs, and the entire portfolio to optimize for cost, availability to customers, and savings, as well as to determine the appropriate level of energy efficiency to pursue and thus inform the setting of goals. (Petersen Testimony, p 44).

The distinction drawn by the Company between the TRC test as defined in the SPM and the TRC test used in its cost-effectiveness analysis (i.e., the modified TRC test) is based on the inclusion of non-energy benefits, which are not explicitly included as a benefit in the SPM. (Petersen Testimony, p 45, 58).

Q. Do the Company's cost-effectiveness analyses address the state's cost-effectiveness policy goals?

A. Not entirely. The Company does not sufficiently account for the statutory goals concerning NEBs and avoided emissions. Below, I discuss each of these benefits and explain why they are important to include in cost-effectiveness testing.

Non-Energy Benefits

Q. What are non-energy benefits?

A. NEBs are those costs and benefits that are not part of the costs, or the avoided costs, of the energy provided by the utility that funds the efficiency program. In addition, energy efficiency resources also provide "other fuel savings," which are the savings of fuels that are not provided by the utility that funds the efficiency program.[3]

There is a wide range of NEBs associated with energy efficiency programs. NEBs are categorized by the perspective of the party that experiences the impact: the utility, the participant, or society at large. Utility-perspective NEBs are indirect costs or savings to the utility and its ratepayers, and include impacts associated with financial accounting, customer service, and safety. Participants in energy efficiency programs can realize a

[1] California Public Utilities Commission, "California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects," October 2001. See Ex. TW-3, CPUC Standard Practice Manual.

[2] The Program Administrator Cost (PAC) test is another name for the Utility Cost test.

[3] Synapse Energy Economics, Inc., "Energy Efficiency Cost-Effectiveness Screening: How to Properly Account for Other Program Impacts and Environmental Compliance Costs," prepared for Regulatory Assistance Project, November 2012, p 3. See Ex. TW-4, Synapse Energy Efficiency.

variety of NEBs, including water savings, equipment cost and performance, health and safety, comfort, reduced costs for businesses, economic stability, improved productivity, increased sales revenue, property value, and utility-related benefits. Participants can also experience benefits in terms of "other fuel savings," i.e., when gas, oil or other fuels are saved as a result of an electric efficiency program. Most of these participant-perspective NEBs are relevant to both low-income and non-low-income customers. Finally, societal-perspective NEBs are indirect program effects that accrue to society at large beyond those realized by utilities, their ratepayers, or program participants, and include impacts on the environment, healthcare, economic development, and national security.

Q. How are non-energy benefits accounted for in Colorado cost-effectiveness testing?

A. The Commission previously determined that it is appropriate to use a percentage adder as a means to incorporate non-energy benefits in cost-effectiveness testing. Specifically, the Commission found that a percentage adder of 10 percent applied to the sum of the other quantifiable benefits should be used when calculating TRC test results for specific energy efficiency programs and the overall portfolio (Decision No. C08-0560, p 26). The Commission further specified that the benefits included in the TRC test calculation for low-income programs should be increased by 20 percent to reflect the higher level of non-energy benefits that are likely to accrue from energy efficiency services to low-income customers (Decision No. C08-0560, p 43). The low-income adder was later raised to 25 percent based on results of a study and the continuing difficulty in quantifying non-energy benefits (Decision No. C11-0442, pp 50-51).

Q. Do the non-energy benefit adders used in Colorado adequately capture non-energy benefits?

A. No, not entirely. I believe the adders used in Colorado significantly undervalue non-energy benefits. While non-energy benefits are difficult to accurately quantify, as the Commission has previously acknowledged, studies that have placed values on non-energy benefits have shown that they can be quite large, and can significantly impact

cost-effectiveness results. Experience to date indicates that adders and other proxies designed to account for NEBs typically understate the magnitude of these benefits. [4]

Q. What impact do NEBs have on cost-effectiveness testing?

A. The extent to which other program impacts are accounted for in screening practices can have a significant impact on cost-effectiveness test results.

Massachusetts has commissioned two studies that quantify non-energy impacts to both residential and commercial and industrial (C&I) customers.[5] Based on these studies, and combined with other fuel savings associated with natural gas, oil, propane, and water, Massachusetts has accounted for NEBs more completely than any other state that I am aware of.

Figure 1, below, presents the actual 2012 benefit-cost ratios for a Massachusetts program administrator. Figure 1 provides the TRC benefit-cost ratios both with and without NEBs included, as well as the Utility Cost test results. Note that the version of the TRC test with NEBs also includes other fuel savings. Massachusetts considers a program to be cost effective if it has a benefit-cost ratio greater than 1.0.

The figure shows that NEBs have a significant impact on overall program cost-effectiveness when comparing the results under the TRC test with and without NEBs. The low-income programs are much more cost-effective with the NEBs included because of the low-income other program benefits and the other fuel savings. The Residential New Construction and Residential Retrofit programs are much more cost effective with the NEBs included because of the other fuel savings. These two benefits (low-income other program benefits and other fuel savings) account for the vast majority of the differences between the cases with and without NEBs.

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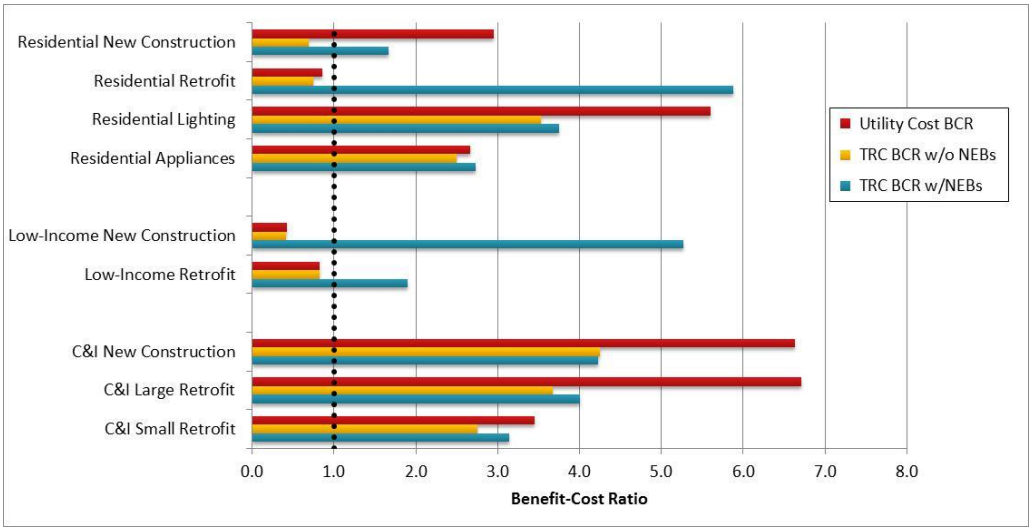
[4] Synapse Energy Economics, Inc., "Energy Efficiency Cost-Effectiveness Screening: How to Properly Account for Other Program Impacts and Environmental Compliance Costs," prepared for the Regulatory Assistance Project, November 2012. See Ex TW-4, Synapse Energy Efficiency.

[5] Tetra Tech, NMR Group, Inc., "Massachusetts Program Administrators: Massachusetts Special and Cross-Sector Studies Area, Residential and Low Income Non-Energy Impacts (NEI) Evaluation," August 15, 2011. See Ex. TW-5, Residential & Low Income REI Report.
Tetra Tech, "Massachusetts Program Administrators: Final Report – Commercial and Industrial Non-Energy Impacts Study," June 29, 2012. See Ex. TW-6, MA C&I NEI Report.
Massachusetts Technical Reference Manual for Estimating Savings from Energy Efficiency Measures, 2012 Program Year – Report Version, August 2013, Appendix D. See Ex. TW-7, MA TRM 2012 Report.

Additionally, the figure demonstrates the difference between the results under the Utility Cost test and the TRC test with NEBs. The differences between the results from these two tests are essentially driven by the customer incentive provided by the program administrator, and the value of the NEBs. In particular, the low-income programs are significantly more cost effective under the TRC test with NEBs, because (a) all of the efficiency measure costs are paid by the program administrator, thus the entire efficiency measure cost is included in the Utility Cost test, and (b) there are significant low-income NEBs included in the TRC test. Conversely, the commercial and industrial (C&I) programs are more cost effective under the Utility Cost test than the TRC test with NEBs because customers contribute toward a significant portion of the efficiency measure cost, and the NEBs for C&I programs are currently assumed to be relatively small.

Figure 1: 2012 Cost-Effectiveness Results for a Massachusetts Electric PA



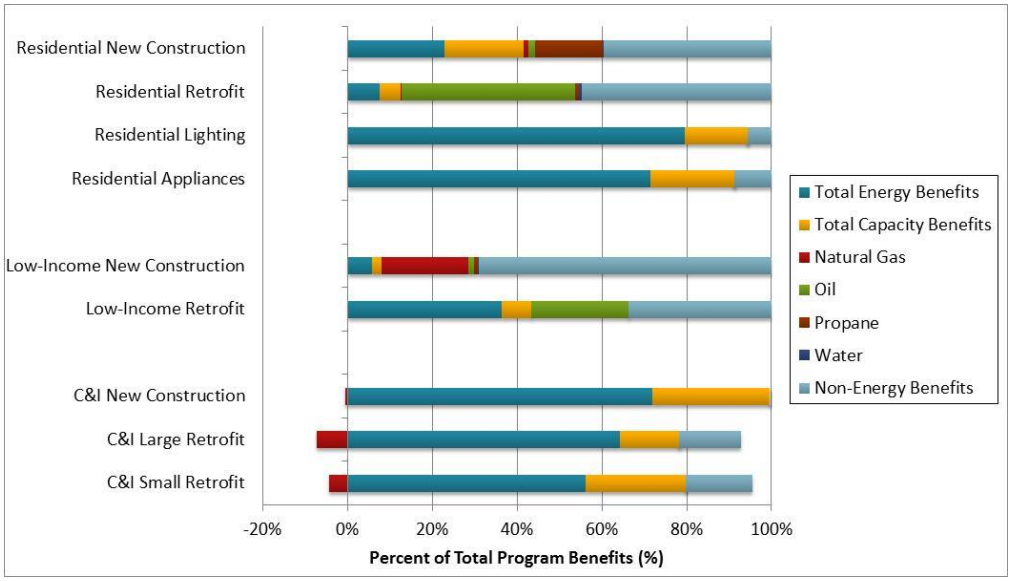
Q. How much of the total benefits are attributable to NEBs?

A. Figure 2 provides the break out of actual 2012 benefits for a number of electric energy efficiency programs implemented by the same Massachusetts program administrator presented in Figure 1. For each program, the figure provides each benefit's percent of the program's total benefits.

There are two important trends to note from this figure. First, for each program, non-energy benefits comprise a different percentage of total benefits. For example, NEBs comprise about 45 percent of benefits for the Residential Retrofit program, whereas NEBs comprise approximately 6 percent of the Residential Lighting program's benefits.

Second, NEBs can comprise a relatively high value of total program benefits. Specifically, NEBs comprise more than 10 percent of total benefits for most programs, and more than 25 percent of total benefits for low-income programs. The commercial programs are closer to 10 percent as well as the Residential Appliances and Residential Lighting programs, but other programs have NEBs that comprise significantly more than 10 percent or 25 percent of total program benefits. As examples, NEBs make up about 40 percent of the Residential New Construction program's total benefits, and about 75 percent of the Low-Income New Construction program's total benefits.

Figure 2: Composition of Benefits for a Massachusetts Electric Program Administrator



Q. Has the Company evaluated NEBs in the state of Colorado to assess whether the NEB adders adequately capture the value of non-energy benefits?

A. Yes, specifically the low-income NEBs. In Decision No. C08-0560, the Commission directed the Company to update its quantification of low-income related non-energy benefits prior to the filing of their second DSM plan. In response, the Company contracted with Skumatz Economic Research Associates (SERA) to prepare a study entitled "Non-Energy Benefits Analysis for Xcel Energy's Low Income Energy Efficiency Programs" (revised May 27, 2010; See Docket No. 10A-554EG, Ex. TW-8, SERA Report). SERA was tasked to:

- Review the use of non-energy benefits in low-income electric and natural gas energy efficiency programs by other utilities and regulatory agencies;

- Conduct an analysis using data specific to Public Service to quantify the NEBs specific to low-income customers associated with bill arrearages and ability-to-pay;

- Provide recommendations to Public Service on which low-income NEBs (Participant, Societal, and/or Utility) it should use in its future low-income programs, taking into consideration the value of the NEBs and the confidence and ease with which they can be calculated and updated.

Q. What are the findings and recommendations from the SERA study?

A. The SERA study determined that "the NEB adders currently used by Xcel Energy do not accurately reflect the net NEBs estimated to derive from the programs' activities and impacts – either in total, or for any of the individual perspectives of NEBs" and that the current multipliers considerably undervalue NEBs. (Ex. TW-8, SERA Report, p 8). Table 1 summarizes the recommended NEB values from the SERA study. Note that I have added the average row, which is not included in the SERA study. As the table shows, utility NEBs tend to be relatively small, while participants NEBs can be equal to or significantly larger than avoided costs.

Table 1: SERA Report Recommended NEB Values for Low-Income Programs

Low Income Program	Utility NEBs	Participant NEBs	Societal NEBs	Total Estimated Electric
Easy Savings Kits	14%	107%	91%	213%
Multi-Family Weatherization	14%	117%	16%	147%
Non-Profit Energy Efficiency	2%	151%	61%	213%
Single Family Weatherization	18%	126%	22%	166%
Average	12%	125%	48%	185%

Specifically for TRC test application, the SERA study recommended including multipliers that incorporate 100 percent of the utility NEBs, and 50 percent of the resource-related societal NEBs (including emissions, economic development, and water, but excluding health). The study also recommended presenting cost-effectiveness test results using 100 percent of the estimated NEB values for all three perspectives, at least for internal use. (Ex. TW-8, SERA Report, pp 8-10).

Q. How did the Company respond to the results of the SERA study?

A. The Company responded to the SERA study by conducting a scenario analysis on the NEBs included in the SERA study. Table 2 summarizes the NEB values from the Company's scenario analysis. The high scenario includes all NEBs included in the SERA study from all perspectives. The medium scenario includes all NEBs except hardship benefits and waste/wastewater benefits. The medium-low scenario excludes from all of the programs the NEBs for hardship benefits, water/wastewater benefits, and doing good for the environment, and excludes comfort and safety benefits from the Easy Savings Kits program. Finally, the low scenario includes only the arrearages and collections NEBs.

Table 2: The Company's NEB Values from its Scenario Analysis

Low Income Program	High	Medium	Medium-Low	Low
Easy Savings Kits	308%	135%	53%	42%
Multi-Family Weatherization	143%	99%	91%	11%
Non-Profit Energy Efficiency	39%	38%	38%	29%
Single Family Weatherization	74%	54%	50%	8%
Average	141%	82%	58%	23%

The Company ultimately concluded that, given the tremendous variability in the NEB values both within and between low-income programs, there is no clear scientific or mathematical "best" NEB values, and requested to increase the low-income NEBs adder to 25 percent, which the Commission accepted. The Company explained that 25 percent is a good middle ground between including the full NEB values and only including reduced arrearages. (Docket No. 10A-554EG, Ex. TW-9, Sundin Direct Testimony, pp 44-45).

The Company further explained that: "the consensus among utilities, regulators, and intervenors around the country is that low-income programs do produce non-energy benefits beyond arrearages, even if they are difficult to quantify. Rather than argue over the exact value of each line item, the Company believes that a more reasonable approach is to continue to use a reasonable proxy value that falls within the range of NEB values presented in the SERA Study. Even excluding the most extreme values, the SERA Study shows that the current NEB values of 5 percent for gas and 20 percent for electric programs are on the low side." (Ex. TW-9, Sundin Direct Testimony, pp 35-48).

Q. What do you think of the Company's conclusion to apply a 25 percent adder for low-income programs?

A. I think the Company's rationale for a 25 percent low-income NEB adder based on the SERA study is flawed at best. The Company finds that 25 percent is in between the low and the high scenarios, when the low scenario on average represents a 23 percent adder, and the high scenario on average represents a 141 percent adder. Common sense dictates that the middle ground between a high and low scenario would be the medium or medium-low scenario, which represent an average adder of 82 percent and 58 percent, respectively. Following the Company's own logic of excluding the most extreme values – both extremely high and extremely low values – then the conclusion would still be to apply an adder closer to the range of 80 percent to 60 percent.

The Company acknowledges that low-income program participants experience NEBs beyond just arrearages. However, considering that the Company's low scenario analysis only includes arrearages and collection related NEBs, which on average equate to an adder of 23 percent, the Company has essentially included only a 2 percent adder for NEBs that accrue beyond arrearages.

Further, the Company realized that the then current electric NEB adder of 20 percent was on the low side, but elected to increase the adder only by 5 percent. In contrast, the SERA study clearly demonstrated that the current adder considerably undervalues NEBs and provided a range of NEB values much higher than 25 percent.

Q. How could Colorado better account for NEBs?

A. Ideally, the Commission should consider establishing quantitative, monetary values for all relevant NEBs. There are, however, several challenges and uncertainties associated with developing monetary estimates of some NEBs. Some of the NEBs may be unique to certain customer types, and some of the NEBs may depend upon the unique preferences or conditions of different customers. Under even the best of circumstances it is difficult to ensure that all relevant NEBs are accounted for, and that their magnitudes are properly assessed. These challenges can be one of the biggest barriers that hinder a state's willingness and ability to account for NEBs.

Colorado currently relies on an adder to account for NEBs. The rationale for using an adder is that it is meant to be a proxy for the difficult-to-measure non-energy benefits. It

is an explicit acknowledgement that the non-energy benefits are higher than zero, and that the adder is the best approximation available at the time. Overall this is a simplified approach that does not require extensive evaluation activities and lends certainty to the routine of program screening.

Given that Colorado has a precedent for relying on adders to account for non-energy benefits, and given the uncertainties and challenges associated with quantifying individual NEBs, I recommend that Colorado continue to rely on adders for accounting for non-energy benefits. However, the current NEB adders of 10 percent for electric residential and business programs and 25 percent for electric low-income programs are far too low.

Q. How do you recommend that the Commission adjust the current NEB adders?

A. The Massachusetts values and the SERA study show that NEBs typically comprise a significant share of total program benefits, which the Company's current adders do not sufficiently value. I therefore recommend that the Commission require the Company to assign each program a specific NEB adder to better tailor the specific non-energy benefits associated with each program. As shown in the Massachusetts example above, NEBs can vary significantly depending on the program, indicating that certain programs provide greater benefits to participants and utilities than other programs. For example, residential retrofit programs have savings associated with thermal comfort, noise reduction, home durability, equipment maintenance, health benefits, and property value increase, whereas residential lighting programs only have non-energy benefits associated with operation and maintenance savings and lighting quality. The cost-effectiveness test results should capture such differences on a program-by-program basis in order to account for all of the costs and benefits that are relevant to each program and to the applicable test.

Q. What NEB adder values do you recommend the Commission establish in Colorado for each program?

A. I recommend that the Commission require the Company to investigate better ways to account for the non-energy benefits of energy efficiency programs. For medium- to long-term purposes, the Commission should require the Company to conduct a study of the NEBs associated with non-low-income programs, similar to the study that was performed

for low-income NEBs. Such a study will be instrumental in identifying the magnitude of these important benefits from energy efficiency programs.

For the purposes of this docket, while non-energy benefits are under investigation, I recommend that Colorado use the Massachusetts' NEB values to provide guidance on better adders. Massachusetts is one of the few states that have fully quantified non-energy benefits; therefore, its NEB values provide one of the best sources to develop program-specific NEB adders.

Table 3 provides by program the Massachusetts total statewide electric non-energy benefits as a percent of total benefits for each program, as well as the NEB adders that should be applied to ensure that, when the adders are applied, the NEB values equate to the NEB percent of total benefits. Note that these adders are only for NEBs and do not include other fuels savings. Also, the Massachusetts values are based on the sum of the state's five electric program administrators' benefits.

Table 3: Massachusetts Total Electric NEB Benefits as a Percent of Program Benefits

Massachusetts Electric Program	NEB % of Total Program Benefits	NEB Adder
Residential New Construction	29%	42%
Residential Cool & Heating	18%	22%
Residential Multi-Family	42%	71%
Residential Retrofit	43%	76%
Behavioral Program	0%	0%
Residential Lighting	6%	6%
Residential Appliances	9%	10%
Residential Sector Total	**31%**	**45%**
Low-Income New Construction	68%	208%
Low-Income Retrofit	35%	54%
Low-Income Sector Total	**36%**	**57%**
Business New Construction	-1%	-1%
Business Large Retrofit	15%	17%
Business Small Retrofit	15%	17%
Business Sector Total	**10%**	**11%**
Grand Total	**19%**	**23%**

I realize that the Massachusetts energy efficiency programs do not align directly with the Colorado energy efficiency programs, which makes applying the NEB adders slightly more challenging. I recommend that the programs be aligned as best as possible, and where not easily aligned, the sector total NEBs percent of total sector benefits should be

applied. Further, to allow for regional differences between Massachusetts and Colorado, I recommended rounding the Massachusetts NEB adders to the nearest 5 percent increment so as not to imply too much precision. Table 4 maps the connection between the Colorado and Massachusetts programs that I recommend be applied in Colorado, and provides the resulting adders to apply for each of the Company's programs.

Table 4: Colorado Programs, Massachusetts Programs and associated Electric NEB Adders

Colorado Program	Massachusetts Program	NEB % of Total Program Benefits	MA NEB Adder	Recommended CO Adder
Residential				
ENERGY STAR New Homes	Residential New Construction	29%	42%	40%
Evaporative Cooling Rebates	Residential Cool & Heating	18%	22%	20%
High Efficiency Air Conditioning	Residential Cool & Heating	18%	22%	20%
Home Lighting & Recycling	Residential Lighting	6%	6%	5%
Home Performance with ENERGY STAR	Residential Retrofit	43%	76%	75%
Insulation Rebate	Residential Cool & Heating	18%	22%	20%
Refrigerator Recycling	Residential Appliances	9%	10%	10%
Saver's Switch	Residential Sector Total	31%	45%	45%
School Education Kits	Residential Sector Total	31%	45%	45%
Showerhead	Residential Appliances	9%	10%	10%
Water Heater Rebate	Residential Cool & Heating	18%	22%	20%
	Residential Sector Total	**31%**	**45%**	**45%**
Low-Income				
Energy Savings Kit	Low-Income Sector Total	36%	57%	60%
Multi-Family Weatherization	Low-Income Retrofit	35%	54%	55%
Non-Profit Energy Efficiency	Low-Income Sector Total	36%	57%	60%
Single-Family Weatherization	Low-Income Retrofit	35%	54%	55%
	Low-Income Sector Total	**36%**	**57%**	**60%**
Commercial & Industrial				
Compressed Air Efficiency	Small or Large Business Retrofit	15%	17%	20%
Computer Efficiency	Small or Large Business Retrofit	15%	17%	20%
Cooling Efficiency	Small or Large Business Retrofit	15%	17%	20%
Custom Efficiency	Small or Large Business Retrofit	15%	17%	20%
Data Center Efficiency	Small or Large Business Retrofit	15%	17%	20%
Energy Management Systems	Small or Large Business Retrofit	15%	17%	20%
Lighting Efficiency	Small or Large Business Retrofit	15%	17%	20%
Motor & Drive Efficiency	Small or Large Business Retrofit	15%	17%	20%
New Construction	Business New Construction	-1%	-1%	0%
Process Efficiency	Small or Large Business Retrofit	15%	17%	20%
Recommissioning	Small or Large Business Retrofit	15%	17%	20%
Segment Efficiency	Small or Large Business Retrofit	15%	17%	20%
Self-Directed Custom Efficiency	Small or Large Business Retrofit	15%	17%	20%
Small Business Lighting	Small or Large Business Retrofit	15%	17%	20%
Standard Offer	Small or Large Business Retrofit	15%	17%	20%
	Business Sector Total	**10%**	**11%**	**10%**
	Grand Total	**19%**	**23%**	**25%**

Note that the low-income NEB adders of 55 percent and 60 percent are within the range of the Company's medium-low scenario NEB adders based on the SERA study results, which range from 38 percent to 91 percent, and are 58 percent on average. The Company initially aimed for a low-income NEB adder that was between the low and high scenario cases, which should have directed the Company towards use of the medium or medium-low scenario cases. The fact that the Massachusetts-based adders are consistent with the medium-low scenario case provides greater confidence in my recommended approach, and should be amenable to the Company as the values are consistent with its initial goal.

Q. Does Massachusetts also apply NEBs to gas programs, from which NEB adders for Colorado can be developed?

A. Yes. Table 5 provides by program the Massachusetts total statewide gas non-energy benefits as a percent of total benefits for each program, as well as the NEB adders that should be applied to ensure that the NEB values equate to the NEB percent of total benefits. The table also presents how the Massachusetts gas programs map to the Colorado gas programs.

Table 5: Colorado Programs, Massachusetts Programs and associated Gas NEB Adders

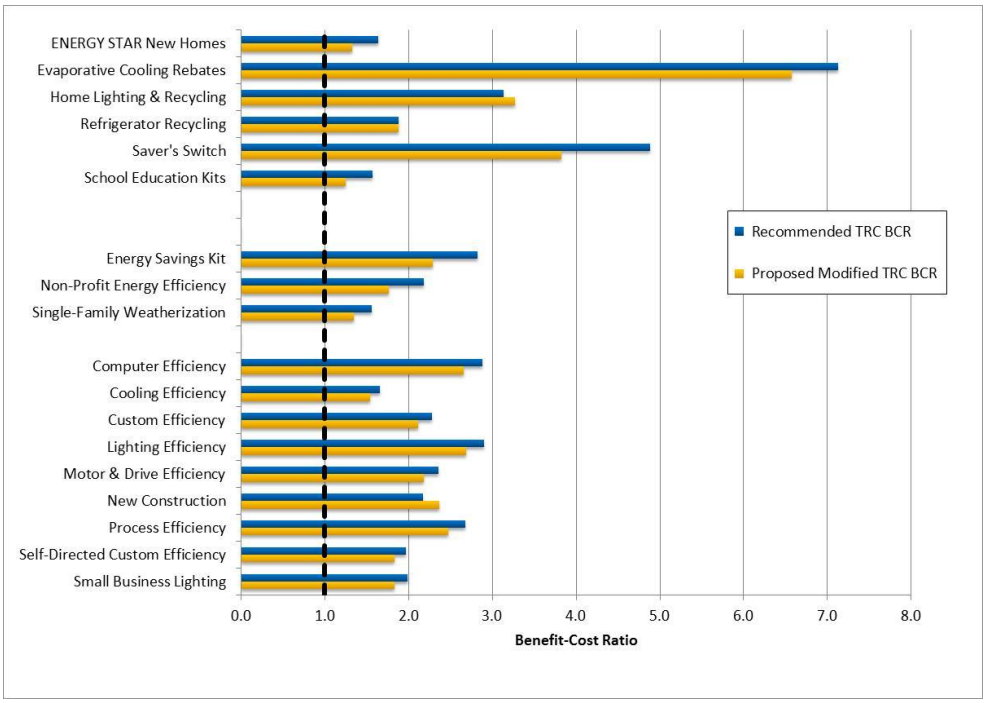
Colorado Gas Program	Massachusetts Gas Program	NEB % of Total Program Benefits	MA NEB Adder	Recommended CO Adder
Residential				
ENERGY STAR New Homes	Residential New Construction	49%	98%	100%
Heating System Rebates	Residential Heating and Water Heating	23%	29%	30%
Home Performance with ENERGY STAR	Weatherization Program	28%	38%	40%
Insulation Rebate	Weatherization Program	28%	38%	40%
Showerhead	Residential Sector Total	28%	39%	40%
Water Heater Rebate	Residential Heating and Water Heating	23%	29%	30%
	Residential Sector Total	**28%**	**39%**	**40%**
Low-Income				
Energy Savings Kit	Low-Income Sector Total	41%	71%	70%
Multi-Family Weatherization	Low-Income Retrofit	41%	71%	70%
Non-Profit Energy Efficiency	Low-Income Sector Total	41%	71%	70%
Single-Family Weatherization	Low-Income Retrofit	41%	71%	70%
	Low-Income Sector Total	**41%**	**71%**	**70%**
Business				
Custom Efficiency	Business Retrofit	11%	13%	15%
Energy Management Systems	Business Sector Total	8%	9%	10%
Heating Efficiency	Business Sector Total	8%	9%	10%
New Construction	Business New Construction	0%	0%	0%
Recommissioning	Business Retrofit	11%	13%	15%
Segment Efficiency	Business Sector Total	8%	9%	10%
Standard Offer	Business Direct Install	17%	21%	20%
	Business Sector Total	**8%**	**9%**	**10%**
	GRAND TOTAL	**24%**	**32%**	**30%**

In developing Table 5, I used the same methodology as applied to the electric tables above to determine the gas NEB adder values. Again, I recommend that Colorado study gas-specific NEB values for future use, and use the recommended adders in the table below as proxies in the meantime.

Q. If the Company were to apply such NEB adders by program, what impact would it have on the Company's program cost-effectiveness?

A. Figure 3 provides benefit-cost ratios for the Company's 2013 planned electric programs. The figure provides the modified TRC test as proposed by the Company, as well as the TRC test that I recommend the Company apply. The only differences between the recommended TRC test and the modified TRC test is that the recommended TRC test includes the NEB adders in Table 4 instead of applying a 10 percent adder to residential and business programs and a 25 percent adder to low-income programs.[6] Note that I have only included key programs that significantly contribute to the Company's costs, lifetime savings, or participation in order to limit the extent of the analysis.

Figure 3: The Company's 2013 Benefit-Cost Ratios Analysis for Electric Programs



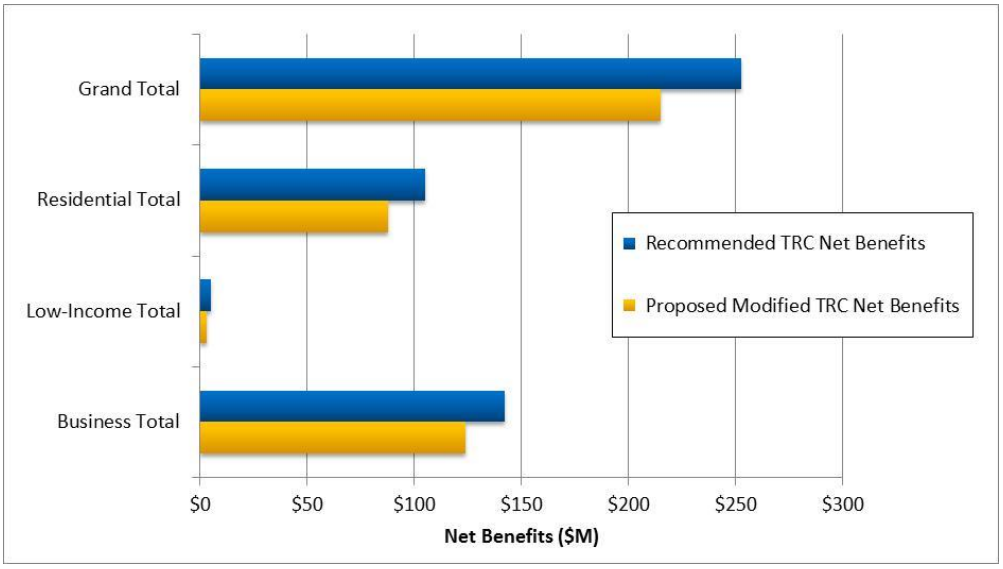
[6] In the modified TRC test, the Company considers the customer incentive both a benefit to customers, and a cost to the utility. In the TRC test application that is consistent with the SPM, the customer incentive is considered a cost to the utility.

As the figure shows, the benefit-cost results for the recommended and modified versions of the TRC test are fairly similar. However, the recommended TRC benefit-cost ratio is higher than the modified TRC benefit-cost ratio for almost every program except Residential Home Lighting & Recycling, Residential Refrigerator Recycling, and Business New Construction.

By reviewing the Company's net-benefits, the adjustment to the NEB adders becomes more apparent than looking at the benefit-cost ratios. Figure 4, below, presents the Company's 2013 planned net benefits at the sector level using the same three cost-effectiveness test variations discussed above.

As Figure 4 shows, the residential sector sees a $17 million increase in net-benefits, while the low-income sector has a $1.9 million increase in net-benefits, and the business sector experiences an $18 million increase in net benefits.

Figure 4: The Company's 2013 Net Benefit Analysis for Electric Programs



Q. Why do the Company's cost-effectiveness results in Figure 3 not show as much of a difference between the TRC tests with and without NEBs as shown in Figure 1 for Massachusetts?

A. In Figure 1, the without NEBs TRC test excludes both NEBs and other fuel savings. Among the participant-perspective benefits that should be included in the TRC test, other fuel savings deserve particular consideration. First, this type of benefit tends to have one of the biggest impacts on the cost-effectiveness of certain programs. Second, this type of NEB tends to support important public policy goals of regulators and other stakeholders.

Other fuel savings are important because they help justify comprehensive residential retrofit and residential new construction programs that are designed to treat multiple fuels in customers' homes. Other fuel savings also tend to be easier to quantify relative to non-energy benefits, and the Company could use publically available data to determine avoided cost rates for other fuel savings.

Q. These NEB adders do not include other fuel savings. How should the Company address other fuel savings?

A. The Company should quantify other fuel savings directly instead of relying on an adder. The Company already accounts for some natural gas and water savings in certain programs as part of the O&M savings category. (Docket No. 11A-631EG, Xcel Energy, "2012/213 Demand-Side Management Plan," Revised February 2012, Appendix E, Technical Reference Manual). However, the Company should explicitly ensure that it is fully capturing all other fuel and resource savings in every program, including natural gas, water, oil, propane, and any other resource savings that occur.

Accounting for the Value of Avoided Air Emissions

Q. Please explain why you think the Company has not properly accounted for the value of avoided air emissions.

A. As noted above, CRS 40-1-102(5) clearly requires the Company to consider the value of avoided emissions as one of the benefits of the energy efficiency programs. The Company does not include any value of avoided air emissions in its cost-effectiveness analysis in this docket (Ex. TW-2, Discovery Request No. SC2-11). Consequently, the Company's analysis is not consistent with Colorado law, does not reflect a key policy goal of the state, significantly understates the cost-effectiveness of energy efficiency, and therefore results in energy savings goals that are too low.

Q. Are there other statutes that require the Company to consider the value of reducing air emissions?

A. Yes. The Clean Air – Clean Jobs Act required all rate-regulated utilities that own or operate coal-fired electric generating units to submit to the Commission an emission reduction plan for emissions from those units covering the lesser of 900 MW or 50 percent of the utility's coal-fired electric generating units in Colorado. The plans had to give primary consideration to replacing or repowering coal-fired electric generators with

natural gas and to also consider other low-emitting resources, including energy efficiency (C.R.S. 40-3.2-204). In evaluating the plan, the Commission was required to consider whether the plan is likely to achieve at least a 70-80 percent reduction in annual emissions of NO_x as necessary to comply with current and anticipated federal requirements. As the Company implements its Clean Air – Clean Jobs plan, which the Commission approved in Decision No. C10-1328, the Company's primary goal is to address current and reasonably foreseeable emissions reductions in a coordinated fashion to reduce the overall cost of compliance (Decision No. C10-1328, p.36).

Q. Power plants produce a variety of air pollutants. Which type of pollutants should the Company account for in its energy efficiency analyses?

A. The Company should use its best estimate of the value of all air pollutants that may be avoided with energy efficiency resources. This should include a comprehensive list of air pollutants from power plants in Colorado and the region, including but not necessarily limited to SO_2, NO_X, particulate matter, air toxics, and greenhouse gases (GHG). Those pollutants that are expected to have a significant value should be accounted for by the Company. In general, greenhouse gas emissions typically have a very significant value, if they are properly accounted for.

Q. But there is some uncertainty surrounding the extent and type of greenhouse gas requirements that might be imposed in the future, especially at the federal level. How should the Company address this uncertainty?

A. Uncertainties regarding future carbon regulations, and uncertainties about the cost of complying with them, should not be a reason for ignoring them. Many energy efficiency resources have measure lives of 15 years, 20 years, or more. Supply-side resources have operating lives that are even longer. Resource decisions made in the near-term should be based on the best assumptions available about the conditions that will exist over these long time periods. Complying with future carbon regulations is clearly a condition that will affect electricity costs over the time period of interest in this docket. Many utilities in the US have adopted the practice of including estimates of the costs of CO_2 in their

resource planning analyses, despite the uncertainty regarding those costs.[7] The Company should do the same.

Q. How should the Company account for air emissions in its cost-effectiveness analyses?

A. It is important to note that there are two separate types of costs associated with air emissions. First, there are the costs of complying with current and future environmental regulations. To the extent that the Company and the Commission expect air emissions to be subject to state or federal regulations within the study period, those regulations will result in costs of compliance. These future costs of compliance will be incurred by the Company, and will eventually be included in electric rates.

Second, and separate, there may be environmental impacts of air emissions even after the Company complies with all environmental regulations. I refer to these as "indirect" environmental costs, to distinguish them from the costs of complying with environmental regulations. Reducing these indirect environmental costs through energy efficiency would provide additional value, beyond the value of avoiding capital or operating costs of complying with environmental regulations. This additional value would accrue to society in general in the form of reduced environmental and health impacts.

For example, while a coal plant might comply with all relevant regulations regarding criteria air pollutants regulated under the US Clean Air Act, any incremental emissions of criteria pollutants that are produced after compliance may still have air quality and health impacts on society. As another example, future federal greenhouse gas emission limits (or cap-and-trade programs) will impose a cost of compliance on electric generators, but unless these limits are sufficient to prevent damage from climate change, there may still be environmental, health and other costs imposed on society from the incremental greenhouse gas emissions that remain after compliance with the limits. Those costs will result both from coal generation and from natural gas extraction and generation. Therefore, there may be a societal value to achieving emission reductions beyond those that are required by laws and regulations.

[7] Synapse Energy Economics, "Energy Efficiency Cost-Effectiveness Screening: How to Properly Account for 'Other Program Impacts' and Environmental Compliance Costs," prepared for the Regulatory Assistance Project, November 2012. See Ex. TW-4, Synapse Energy Efficiency.

In sum, the benefits of reducing the costs of compliance with environmental regulations are experienced by customers in the form of lower costs, and the benefits of reducing the indirect environmental costs are experienced by all of society in the form of reduced environmental and health impacts. These two costs are separate and additive. However, over time as environmental regulations become increasingly stringent, the magnitude of the costs of compliance typically *increases* (all else being equal), while the magnitude of indirect environmental costs typically *decreases* commensurately (all else being equal), because there will be fewer incremental emissions after compliance with the more stringent regulations.

Q. Which of these two types of air emission costs should the Company account for?

A. The Colorado statute CRS 40-1-102(5) does not explicitly distinguish between the value of mitigating the cost of compliance with environmental regulations and the value of reducing air emissions further. Nonetheless, the legislative declaration does say that reducing emissions or air pollutants through energy efficiency programs is in the public interest, and that such efforts should result in an improvement in the quality of life and health of Colorado citizens (CRS 40-3.2-101). This language implies that the Company should account for both (a) the value of reducing the costs of complying with environmental regulations, and (b) the value of indirect environmental costs that might occur after environmental regulations are complied with. Therefore, I recommend that the Commission require the company to account for both types of air emissions costs.

Q. How should the Company account for the costs of complying with environmental regulations in its energy efficiency analyses?

A. First, the Company should identify those environmental regulations that are likely to affect power plants in Colorado and the region over the course of the energy efficiency cost-effectiveness study period. The obvious environmental regulations include the Colorado Clean Air – Clean Jobs Act and the US Clean Air Act, which includes the forthcoming GHG requirements for new and existing power plants, the Regional Haze Rule, the Mercury and Air Toxics Rule (MATS) and the tightening of National Ambient Air Quality Standards (NAAQS) for one-hour SO_2 and ozone. Second, the Company should develop its best estimates of the costs of complying with each of these existing and future environmental regulations.

Q. Has the Company developed any estimates of the cost of compliance with greenhouse gas regulations?

A. As noted above, the Company does not assume any value for reducing carbon emissions in its analysis in this docket. However, in a previous docket the Company previously proposed, and the Commission approved, placing the same value on avoided emissions for energy efficiency as the Commission approved for use in the Company's evaluation of supply-side resources for purposes of its supply-side resource planning and acquisition process (Decision No. C08-0560, p 27). In the Company's 2012 Renewable Energy Standard Compliance Plan, the base-case assumed zero cost for CO_2 emissions, due to the uncertainties related to the timing associated with possible carbon emission regulation. However, as part of that filing, the Company provided a sensitivity case that assumed the same carbon imputation costs ($20 per ton, escalating at 7 percent annually) as approved in the 2007 Colorado Resource Plan but on a delayed implementation schedule of 2014 instead of 2010. (Docket No. 11A-418E, 2012 Renewable Energy Standard Compliance Plan, Volume 1, Section 7, pp 4-5). This estimate of CO_2 costs is apparently meant to capture the cost of complying with future carbon emission regulations.

Q. Is the Company's previous estimate of the costs of complying with future carbon regulations reasonable?

A. I have not had the opportunity in this docket to undertake a review of the Company's CO_2 cost estimates from the previous docket. However, I can say that this estimate is not very different from other CO_2 cost estimates that I am aware of, including a cost estimate prepared by my company, Synapse Energy Economics.[8] Based on this cursory review, the Company's previous estimates of CO_2 costs appears to be reasonable to use in this docket.

I recommend that the Commission require the Company to apply its previous estimate of CO_2 costs for the purposes of setting efficiency goals in this docket. Further, I recommend that the Commission require the Company to update this estimate for the

[8] Synapse Energy Economics, "2012 Carbon Price Forecast," October 4, 2012.
Synapse Energy Economics, "Energy Efficiency Cost-Effectiveness Screening: How to Properly Account for 'Other Program Impacts' and Environmental Compliance Costs," prepared for the Regulatory Assistance Project, November 2012. See TW-4, Synapse Energy Efficiency.

purpose of its next energy efficiency cost-effectiveness evaluation, to account for recent developments regarding carbon regulations, particularly at the federal level.

Q. How should the Company account for indirect environmental costs, i.e., those costs that result from emissions after environmental regulations are complied with?

A. I recommend that the Commission provide guidance as to how the Company should address the value of indirect environmental costs going forward. There may not be sufficient evidence available in this docket to provide guidance on how indirect environmental costs should be treated in setting the Company's efficiency goals.

Nonetheless, the Commission should find that by not accounting for the value of reduced indirect environmental costs in this docket, the Company has understated the value of the efficiency measures and programs. Furthermore, the Commission should direct the Company to account for the value of reduced indirect environmental costs in its next energy efficiency cost-effectiveness evaluation.

Q. How should the Company account for the value of avoided emissions as part of setting the efficiency goals in this docket?

A. In Section 6, I describe my recommendations for how the Company's efficiency goals should be modified by accounting for the findings and recommendations of my testimony, including these findings on the value of avoided emissions.

One final point is relevant here. The Company notes that it has included a cost of zero for CO_2 in its current energy efficiency plan, and that this assumption does not impact the current efficiency plan because all of its programs are cost-effective (Ex. TW-2, Discovery Request SC2-11). While this may be true for the *current* efficiency plan, the Company has noted several times throughout this docket, including in the KEMA DSM study, that cost-effectiveness is a constraint on the amount of energy efficiency opportunities available in the 2015 – 2020 timeframe. If the value of CO_2 and the value of other air emissions were properly accounted for in the Company's assessment in this docket, then there may be significantly more efficiency opportunities identified as cost-effective, and the Company's goals could be considerably higher.

4. PROPER CONSIDERATION OF RATE IMPACTS

Q. How does the Company consider rate and bill impacts in its review of energy efficiency programs?

A. The Company includes the results of the RIM test in its energy efficiency annual status reports and plans. This is the only measure the Company has of the rate and bill impacts of energy efficiency programs. (Ex. TW-2, Discovery Request Nos. SC2-3 through SC2-6).

However, the Company has also stated that, as a result of declining avoided costs paired with reduced incremental energy savings above efficiency baselines, customers' rates are increasing even though the Company's electric revenue requirement is continuing to fall. The Company acknowledges that participating customers can counteract the increased rate impact by lowering their overall energy use resulting in lower bills, but that it is more difficult to obtain overall cost reductions from energy efficiency that benefit non-participants as well. (Sundin Testimony, pp 32-33).

Finally, the Company stated its concern that rate and bill impacts may be reaching unsustainable levels: "While we believe that the MTRC Test should still be used to determine which measures should be included in our energy efficiency portfolio, we believe other factors such as bill savings and rate impacts should also be considered. We are watching the rate impact and total bill savings of these larger more expensive portfolios and believe the Commission as well as the Company would be remiss if we do not take these factors into account and try to minimize the effect of these costs on our customers." (Sundin Testimony, p 38).

Q. Does the Company's analysis adequately consider the rate and bill impacts on customers from energy efficiency programs?

A. No. The Company has only completed the RIM test as a means of analyzing rate impacts, and it uses the results of the Utility Cost Test to analyze bill impacts. While the Company states that it is watching the rate impact and total bill savings of its DSM resources, it has not provided any analyses that look at these issues in a meaningful or comprehensive way.

Q. Does the RIM cost-effectiveness test provide an adequate assessment of rate and bill impacts from energy efficiency resources?

A. No. Despite its name, the RIM test does not provide an adequate analysis of the rate and bill impacts that result from energy efficiency resources. The RIM test should not be used for evaluating energy efficiency cost-effectiveness. There are several reasons for this.

- The lost revenue expected from the energy efficiency programs due to reduced consumption is not a "new" cost created by the energy efficiency programs. Lost revenues are simply a result of the need to recover existing costs spread out over fewer sales (see Petersen Testimony, p 52). The existing costs that are recovered through rate increases as a result of lost revenues from energy efficiency are (a) not caused by the efficiency program, and (b) are not a new, incremental cost. In economic terms, these existing costs that require rates to increase as a result of lost revenues are "sunk" costs. Sunk costs are not included in cost-effectiveness analyses; only future costs and benefits are included. Therefore, lost revenues should not be included in energy efficiency cost-effectiveness analyses.

- The Company's proposed lost revenues are overstated because off-system sales are ignored. Energy efficiency can free up generation to increase off-system sales, thereby significantly reducing lost revenues (Ex. TW-2, Discovery Request No. SC2-39). The Company estimates that its proposed energy efficiency scenario could increase rates by roughly $1.3 billion from 2015 through 2020. This number would likely be significantly lower if the revenues from increased off-system sales were properly accounted for.

- Applying the RIM test to screen efficiency programs will not result in the lowest cost to customers or the lowest cost to society. Instead, it will lead to the lowest rates (all else being equal). However, achieving the lowest rates is not the primary goal of utility planning and regulation, and achieving lowest rates can result in increased costs.

- A strict application of the RIM test can result in the rejection of large amounts of energy savings and the opportunity for large reductions in many customers' bills in order to avoid what are often small impacts on customers' bills.

- The RIM test does not provide useful information about what happens to rates as a result of program implementation. A RIM test benefit-cost ratio of less than one indicates that rates will increase (all else being equal), but says little to nothing about the magnitude of the rate impact, the effect on customer bills, the portion of customers that are likely to experience higher bills versus lower bills, the extent to which bills might go up or down, and other information necessary to consider this issue properly.

- Screening efficiency programs with the RIM test is inconsistent with the way that supply-side resources are screened, and creates an uneven playing field for the consideration of supply- and demand-side resources.

Q. Should rate and bill impacts be considered as part of energy efficiency cost-effectiveness analyses?

A. No. It is very important to recognize that the rate impacts of energy efficiency programs are not a matter of cost-effectiveness. (As noted above, the lost revenues are simply a transfer payment and do not represent an incremental cost.) Instead, they are a matter of customer equity between (a) program participants that experience reduced bills and (b) non-participants that experience increased rates and therefore increased bills. Questions regarding customer equity are very important, but they are not a matter of cost-effectiveness. They are two separate issues.

Q. If rate and bill impacts should not be considered in cost-effectiveness tests, should rate and bill impacts from energy efficiency resources even be considered by the Commission and the Company?

A. Absolutely. Rate impacts of energy efficiency are a very important consideration in designing energy efficiency programs, developing energy efficiency plans, and setting energy efficiency goals.

Q. How should the Company address rate and bill impacts from energy efficiency resources?

A. First and foremost, I recommend that if the Company, or any other stakeholder, wishes to use concerns about rate impacts as a reason to constrain energy efficiency goals or budgets, then they should be required to provide quantitative evidence of the rate impacts and the bill impacts to demonstrate how these impacts will affect customers. Results of the RIM test do not qualify as sufficient information to analyze this important issue.

Q. How should the Company analyze rate and bill impacts in a fashion that provides much more meaningful information than what is available from the RIM test?

A. I recommend that the Commission establish several key principles regarding how to quantify and assess rate impacts so that they can be properly evaluated by the Company, the Commission and other stakeholders.

In particular, I recommend that the Commission adopt the following key principles for quantifying rate impacts of energy efficiency programs:

- Rate impact analyses should estimate the impacts of energy efficiency on customer bills, as well as customer rates.
- Rate and bill impacts should separately identify the impacts on (a) program participants, (b) program non-participants, and (c) all customers on average.
- Rate and bill impact analyses should estimate the number of program participants in order to provide an indication of the portion of customers that experience bill increases and bill reductions.
- Rate and bill impact analyses should account for impacts over the long-term (e.g., using a study period that includes at least the average life of energy efficiency measures), in order to capture the full effect on rates and bills of energy efficiency savings.
- Rate and bill impact analyses should account for all the costs and benefits of energy efficiency that are expected to affect rates. With regard to the benefits, this assessment should include avoided generation costs, avoided transmission costs, avoided distribution costs, and avoided environmental compliance costs.

Q. Please provide examples of how quantitative data can be used to provide more meaningful information than the results of the RIM test.

A. I did not have the opportunity within this docket to conduct the type of rate and bill impact analysis recommended above. However, a few examples help illustrate my point that rate and bill impacts should be considered in a more thoughtful and comprehensive manner than with the RIM test.

First, the likely rate impacts of the Company's current energy efficiency programs are relatively low. The DSM rates effective January 1, 2013 are $0.00217 per kWh for residential, $0.00216 per kWh for small commercial, and $0.00888 for commercial and industrial. (Docket No. 11A-631EG, Advice Letter 1615 – Electric, Colorado P.U.C. No. 7 – Electric, July 2, 2012). I estimate that these charges are likely to be less than 2 percent of the total bill for residential and small commercial customers. Note that this is a very simplistic analysis and does not account for the downward pressure that energy efficiency will place on rates over the long-term by avoided generation, transmission and distribution costs. A less than 2 percent increase on bills is relatively small compared to the volatility of generation costs. Indeed, the increase in the Company's Electric Commodity Adjustment from the second quarter of 2013 to the third quarter of 2013 results in a residential bill impact of 8.76 percent and a small commercial bill impact of 28.64 percent.[9] Energy efficiency can help mitigate this volatility in generation rates.

More importantly, this impact on customer bills could be easily offset by the reduction in customer bills that results from participating in energy efficiency programs. For example, the Company claims that a typical Colorado home has installed 10 to 12 CFL bulbs on average (Petersen Testimony, p 21). Based on the information included in the Company's 2012-2013 DSM plan, a typical CFL in the Residential Home Lighting & Recycling Program saves about 2.8 kWh per month. For those typical customers that have 11 CFLs in their home, they save about 31 kWh each month, which translates into bill savings of roughly 4.9 percent. This suggests that a typical home in Public Service's service territory has already installed enough efficient CFLs to more than completely offset the bill increase from the current DSM charge. In fact, a customer would need to install only four CFLs in order to neutralize the impact of a 2 percent increase in total bills. Customers who install more bulbs or additional energy efficiency measures will experience even greater reductions in electricity bills, more than offsetting the increase in rates.

[9] See Xcel Energy, "Colorado Rates, Rights and Service Rules," accessed October 9, 2013.

Q. Is there another example of how rates and bills might be affected by the Company's efficiency programs?

A. Yes. The Company states that the savings from the Distribution Voltage Optimization (DVO) program has the potential to reduce all customers' bill by roughly 1.8 percent (Ex. TW-2, Discovery Request SC2-23). This will not require any participation by customers, and the effect of this program will be to reduce customer end-use consumption, and thereby reduce customer electricity bills. A 1.8 percent reduction in consumption and therefore in bills could nearly or completely offset the increase in rates and bills as a result of the current energy efficiency charge in Colorado. When you combine this consideration with the point above about the impact of CFLs on bills, and with the fact that other efficiency measures will result in additional bill savings for participants, it becomes clear that the impact on rates might be entirely offset by the reduction in bills for a large portion of Public Service customers, maybe even the vast majority of customers.

Q. Is there another example of how rates and bills might be affected by the Company's energy efficiency programs?

A. Yes. The Company is proposing to implement behavioral change programs as part of its portfolio of future efficiency programs. Behavioral change programs typically save only a small amount of energy per participant; on the order of one to three percent of household consumption. However, a 2 percent reduction in household consumption would roughly offset the rate impacts associated with the current efficiency programs. The advantage of behavioral programs is that they are able to reach a large portion of customers relatively quickly; sometimes half or more of all residential customers within a year or two. Therefore, the Company's behavioral change program could go a long way to mitigate rate impacts for many of its customers. This would be in addition to the mitigating impacts with regard to the widespread adoption of CFLs and the widespread benefits of the DVO program mentioned above.

Q. You recommended that the level of program participation should be considered when deciding whether specific rate impacts are acceptable. Please elaborate on why the level of program participation should be considered when assessing rate impacts of energy efficiency programs.

A. The primary concern about rate impacts has to do with customer equity. In general, customers who participate in energy efficiency programs will benefit directly in terms of

lower bills – despite any rate increases. Customers who do not participate in the programs may see their bills increase. These are the customers that the Commission, and other stakeholders, are generally most concerned about when considering the rate and bill impacts of energy efficiency programs. In order to assess the rate and bill impacts on non-participants, it is important to take a look at who they are and what portion of total customers they represent.

Therefore, the extent of customer participation in energy efficiency programs should be a critical factor considered in assessing whether the rate and bill impacts are acceptable. It is important to analyze program participation to discern the extent of customers experiencing bill increases or decreases. If a large portion of customers participate in energy efficiency programs, then the Commission and other stakeholders should be willing to accept relatively higher rate impacts because many customers will experience net bill reductions and few customers will experience bill increases.

Furthermore, this type of participation information can be very important in reviewing and assessing the Company's DSM programs in general. It provides an indication of how successfully each program is pursuing customers, as well as an indication of which types of customers could benefit from future efficiency programs.

Q. Are there actions that the Commission and Company can take to increase customer participation in the energy efficiency programs, and thereby mitigate customer equity concerns?

A. Yes. First, the energy efficiency program goals and budgets can be set in a way to increase customer participation. The typical response to rate impact concerns is to limit or even reduce energy efficiency program goals and budgets. Unfortunately, this response tends to limit customer participation and increase the number of customers that experience bill increases – even though the bill increase might be smaller. A better response might be to do just the opposite: to increase energy efficiency program goals and budgets in order to reduce the number of customers that experience bill increases.

Q. Is there another approach that the Commission and Company can take to maximize customer participation in the energy efficiency programs?

A. Yes. The energy efficiency programs can be designed in a way that encourages as much participation as possible, across as broad a variety of customer types as possible. In particular, energy efficiency programs can be designed to:

- promote all types of end-uses that offer cost-effective savings;
- provide all customer types with an opportunity to participate, including hard-to-reach customers such as low-income customers;
- offer efficiency measures that are specifically tailored to many different customer types;
- provide financial and other incentives that are sufficient to help overcome the market barriers that prevent customers from participating; and
- identify, target and active pursue non-participants.

Programs that incorporate these design principles will be more likely to reach a large number of customers, and eventually increase program participation.

Q. Has the Commission previously addressed this issue of energy efficiency program non-participants?

A. Yes. In Docket No. 07A-420E, the Commission found that "the first way to address the impact of DSM on non-participants is to minimize the occurrence of non-participants. By this we mean that all customers need to be provided a reasonable opportunity to participate in DSM" (Decision No. C08-0560, p 46).

I agree with this finding, and I suggest that the Commission and the Company take it one step further. Customers should not only be provided with the opportunity to participate, they should also be encouraged to participate as much as possible, and ideally they should actually participate as much as possible. This means setting higher goals and higher energy efficiency budgets.

Q. You have emphasized that non-participants may experience bill increases from energy efficiency programs. Are you suggesting that non-participants do not experience any benefits of energy efficiency programs?

A. No, not at all. It is important to remember that all customers experience benefits of energy efficiency programs – regardless of whether they participate in the programs. Energy efficiency provides benefits to the entire electricity system, and these benefits are shared by all customers. In particular, energy efficiency can improve system reliability, reduce the need for new generation capacity, reduce transmission and distribution costs, reduce the costs of complying with environmental mandates, and reduce reliance upon fossil fuels. Efficiency also results in societal benefits such as reduced environmental impacts and increased economic development.

My main point is that concerns about rate impacts are rooted in customer equity issues between participants and non-participants because participants experience direct benefits from energy efficiency (i.e., reduced bills from reduced consumption) that non-participants do not experience. Therefore, when addressing rate impact issues, it is important to fully understand and address this customer equity issue.

Q. What else do you recommend about the Company's program participation going forward?

A. I recommend that the Company take steps to improve its methods for tracking customer participation. This includes defining participation better. It also includes tracking and reporting customer participation in a much more comprehensive way. This would mean gathering and keeping more detailed data about participation, and analyzing the data to identify customers that participate in more than one program or across more than one year. Better participation information will be useful over time in order to provide meaningful information regarding the magnitude of customers that experience bill savings from the DSM programs. It will also be useful in assessing program performance as the Company's programs gain more experience and reach a greater level of maturity. Furthermore, more detailed information on participation rates will help the Company identify those customers that may not have participated yet in the efficiency programs, so that it can target the efficiency programs to those customers in order to maximize customer participation rates.

Q. You mentioned above that the overall benefits of efficiency programs should be a factor in assessing rate impacts. What do you mean by this?

A. It is important to recognize that while energy efficiency can increase rates, it also results in a variety of important benefits. One of the Commission's goals should be to strike the appropriate balance between increasing rates and achieving the overall benefits of energy efficiency programs. When considering whether a certain level of rate impact is acceptable, the Commission and other stakeholders should weigh the increased rates against the many benefits of the efficiency program – particularly the extent to which the programs reduce total electricity costs. As noted above, the Company's 2013 energy efficiency programs are expected to result in net benefits of roughly $250 million. When considering potential rate and bill impacts of efficiency programs, it is important to not lose sight of this significant benefit to customers.

Q. Please summarize your conclusions with regard to proper consideration of rate impacts.

A. Based on the above discussion and analysis, I make the following conclusions regarding proper consideration of rate and bill impacts:

- Rate impacts should not be used in any way to determine cost-effectiveness of efficiency programs. They are separate issues.
- Rate impacts should not be a constraint in setting the Company's energy efficiency goals in this docket because the Company has not provided sufficient evidence to demonstrate that the rate impacts are significant, especially relative to the clearly identified benefits of the efficiency programs.
- A very simplistic assessment of rate and bill impacts of the Company's 2012 energy efficiency program suggests that the rate impacts are relatively small and are likely to be offset by bill reductions for a very large portion of the Company's customers.
- The company should start collecting better data on participation rates, as it has important bearing on energy efficiency program designs, planning, and goal setting.

5. ESTIMATES OF EFFICIENCY SAVINGS OPPORTUNITIES

Q. Please summarize your key conclusions regarding the Company's assessment of energy efficiency opportunities.

A. My review of the Company's plans and related documents regarding energy efficiency savings opportunities suggests that the Company significantly underestimates the savings opportunities for efficiency savings. First, as discussed in Section 3, the Company's energy efficiency cost-effectiveness screening practices are significantly constrained.

Second, the Company is overstating the impact of the Energy Independence and Security Act (EISA) of 2007 on the amount of lighting measure related savings that the Company can attain in the next several years.

Third, the KEMA Colorado DSM Market Potential Assessment study (KEMA potential study) that the Company uses to develop its new savings goal overlooked several key energy efficiency measures including emerging energy efficiency measures and practices. (Petersen Testimony, Exhibit NO. JAP-1, Update to the Colorado DSM Market Potential Assessment (Revised)).

Fourth, the Company's measure adoption rates used to estimate achievable potential estimates appear to be very conservative for various measures, but particularly for the residential sector.

Q. Please briefly summarize the Company's assessment of energy efficiency savings opportunities and its new savings target.

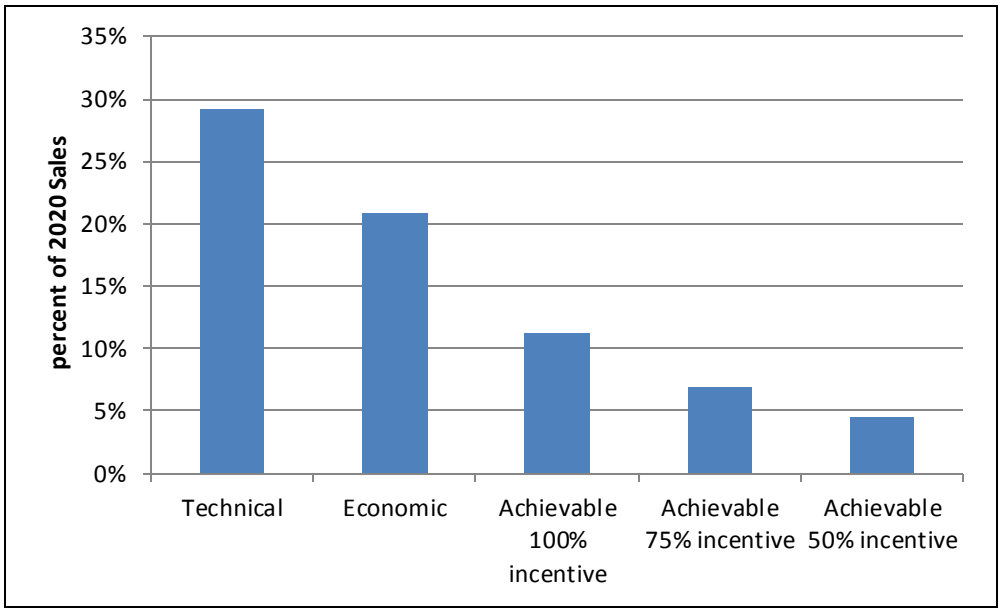
A. Based on the KEMA potential study, the Company states "not only that the effectiveness of traditional energy efficiency is declining, but that overall DSM potential is declining." (Petersen Testimony, p 10, lines 9-11.) According to Mr. Petersen's direct testimony, it appears that the largest impact on the declining DSM potential comes from the EISA lighting standard which reduces minimum wattages for certain standard service lamps over time, and also eliminates the use of T12 fluorescent lamps. (Petersen Testimony, pp 16-17.) The Company assessed emerging technologies such as LED, but it concluded that such technologies help only partially close the gap between the Company's current goals and the identified potential resulting from lost potential savings due to changes in lighting standards. (Petersen Testimony, pp 16-17.)

It appears the only emerging measure that the Company ended up selecting for establishing its new goal is LED. (Petersen Testimony, p 7.) However, Mr. Petersen states that savings potential from LEDs is low for both the residential and business sectors, while reviewing and discussing the *current* energy consumption levels by CFLs and LEDs. Furthermore, the Company believes that the CFL market is reaching saturation. (Petersen Testimony, p 19, lines 20-21.) More specifically the Company believes that about 30 percent market saturation levels for CFLs is the maximum market potential for CFL. (Discovery Request No. SWEEP 1-47.)

Q. Please summarize the key findings from the KEMA 2013 DSM Market Potential Assessment for the Company's service territory and discuss how the Company used the study results to project its 2015 – 2020 energy savings goal.

A. The KEMA potential study analyzed technical, economic, and achievable energy efficiency potential for 2020. The study identified about 9,000 GWh of technical potential (29 percent of the forecasted sales in 2020, or 3.6 percent per year on average) and about 6,500 GWh of economic potential (21 percent of the 2020 sales). These results are presented in Figure 5. The study estimated achievable potential at three levels of average incentive levels relative to the incremental measure costs: 100 percent, 75 percent, and 50 percent incentives, which are also presented in Figure 5.

Figure 5: Summary of KEMA Colorado DSM Potential Study (2020)[10]



The study dramatically reduced the economic potential to estimate the achievable potential. At the 100 percent and 75 percent incentive scenarios, the study estimated only 11 percent and 7 percent of the forecasted energy use in 2020 or about 1.4 percent and 0.9 percent per year on average as achievable potential, respectively. This means that the achievable potential is just half of the economic potential at the 100 percent incentive level, implying that only half of cost-effective measures would be implemented due to various barriers to measure and program implementation such as funding limitation, lack of consumer awareness, lack of information and training for customers and contractors, lack of money or financing, or split incentives between renters and landlords. At the 75 percent incentive level, only about 33 percent of the cost-effective measures are implemented.

The Company used the achievable potential estimate at the 75 percent incentive level to project its long-term energy savings goal for its Traditional Energy Efficiency programs (excluding three new programs) because "the Company feels that paying a 100 percent incentive would be extravagant and over-pay customers for their efficiency choices", and "[t]he 75 percent scenario is the reasonable option, paying customers sufficiently to cause them to purchase and install efficiency measures, while limiting free-ridership." (Petersen

[10] Petersen Testimony, Exhibit JAP-1, Figure 4-3.

Direct Testimony, p 72, lines 12-16). In the sections below I identify several fundamental flaws with the Company's assumptions.

Efficiency Opportunities Overlooked in the KEMA Study

Q. Please explain how the KEMA potential study omits certain energy efficiency measures.

A. The KEMA study did not sufficiently account for a number of promising conventional or emerging measures or practices. I address each of these in turn below.

Compact Fluorescent Lights: The Company understates the opportunity to achieve continued savings from CFLs. This is illustrated by a recent study from the Northeast Energy Efficiency Partnership (NEEP), which laid out a regional lighting strategy for utility programs in the Northeast. [11] The study projected net savings from lighting measures throughout 2019 from CFL bulbs in compliance with the EISA standard. Unlike the Company's assumption of the maximum 30 percent CFL saturation, the study projects that the saturation of standard and specialty CFLs reaches nearly 60 percent by 2017, and aims to reach 90 percent saturation with all efficient light bulbs including LED by 2019. The NEEP study estimates roughly twice as much savings are available from CFLs than what the Company is assuming here.

LED linear tube and troffers and bay light: LED linear tube and troffers can be used to replace linear fluorescent lighting in commercial buildings. LED bay light can replace high-density discharge (HID) and linear fluorescent lighting for indoor spaces with high ceilings. These LED measures were not included in the KEMA potential study at all because the Company claims that a recent U.S. DOE study found LED linear tubes have very poor performance compared to base fluorescent tubes (Ex. TW-2, Discovery Request No. SC2-19.) The information about the current performance of LED tubes is useful for designing programs for the next few years. However, it is not so helpful for projecting mid- to long-term savings potential, especially given that the lighting efficacy of LED technologies is expected to increase rapidly over the next several years, and the price of such LEDs is expected to decline significantly.

[11] Northeast Energy Efficiency Partnerships, "Northeast Residential Lighting Strategy," March 2012. See Ex. TW-10, NEEP Residential Lighting Strategy.

According to U.S. DOE, LED's lighting efficacy is expected to improve from the current level of about 50 lumen per watt to over 100 lumen per watt by 2015, and to close to 200 lumen per watt around 2020.[12] Furthermore, a more recent study by U.S. DOE found that the efficacy of linear LED lamps (which are used in troffer fixture style) have been improved dramatically since the mid-2011 and now reached very close to the efficacy of T8 and T5 lamps (80 lumen per watt).[13]

Further, the 2012 U.S DOE study on the potential of LED lighting mentioned above predicts that the price of LED luminaire which can replace linear fluorescent lamps declines to about one-fifth of today's price by 2020 - from $110 per kilo lumen in 2011 to about $24 per kilo lumen in 2020.[14] The study also stated "by 2020, LED luminaries will be the most economical lighting option for fixture installations in this submarket."[15]

In summary, by omitting these LED applications, the Company has ignored a significant energy savings opportunity.

T5 fluorescent lighting: the Company stated that "[the KEMA] DSM Potential Study only modeled T5s as a high-bay replacement." (Ex. TW-2, Discovery Request No. SC2-32) It is not clear why the KEMA study did not model T5 linear lamps for regular office building applications. The omission of this application misses another significant energy savings potential, especially in the early years.

Heat pump water heater: the KEMA potential study identified a very small amount of energy savings from heat pump water heaters. The technical and economic potential estimates were just 40 GWh and 28 GWh in 2020 respectively, or only about 0.18 percent and 0.13 percent of the Company's residential and commercial electricity sales in 2012.[16] In contrast, ACEEE estimated economic potential for this measure at about 1 percent of projected U.S. electricity demand in the residential and commercial buildings

[12] U.S. Department of Energy, "Energy Savings Potential of Solid-State Lighting in General Illumination Applications," January 2012, Figure 5, p 28. See Ex. TW-11, DOE EE Savings Potential.
[13] U.S. Department of Energy, "LED Lighting Facts – Snapshot Indoor Ambient Lighting," April 1, 2013. See Ex. TW-12, DOE LED Lighting Facts.
[14] U.S. DOE. "Energy Savings Potential of Solid-State Lighting in General Illumination Applications," January 2012, Appendix A, p 65. See Ex. TW-11, DOE EE Savings Potential.
[15] Ibid, p 45.
[16] U.S. Energy Information Administration, "Electricity: Form EIA-861Data Files," accessed October 2013.

in 2012.[17] This relative potential is about 8 times more than KEMA's economic potential estimates. Further, Northwest Power and Conservation Council (NWPCC) identified in the 6th Power Plan the achievable potential from this measure at about 1.9 percent of projected load in 2030.[18] Based on the NWPCC's assumption, if we assume that the Company has achievable energy savings potential from this measure at about 1 percent of its residential and commercial sales, the total achievable potential from this measure would be about 195 GWh instead of 28 GWh, which provides the Company about 180 GWh of additional "achievable potential" savings beyond the KEMA's achievable potential under the 100 percent incentive scenario.

Ductless minisplit heat pump: this technology was not included in the KEMA potential study because the Company claimed that it "has not been able to find evidence that the technology is cost-effective." (Ex. TW-2, Discovery Request No. SC2-29-c) However, ductless minisplit heat pumps are mature technologies that have been used in Asia and Europe, and have recently been promoted in the US. Particularly they have been extensively researched and tested in the Northwest since 2006 by the Northeast Energy Efficiency Alliance (NEEA), Bonneville Power Administration, and the Regional Technical Forum (RTF). Since then, these entities found ductless heat pump save significant amount of energy in the range from 25 percent to 50 percent, perform well even under cold climate and cost-effective.[19] For example, the RTF which sets energy efficiency standards for the Northwest region currently assumes that ductless minisplit systems for a single family house cost about 8.4 cents/kWh savings.[20] As of 2011, the Northwest utilities have installed about 13,000 systems and saved 40 GWh in that year. NWPCC's 6th Power Plan estimated the achievable energy savings potential from this measure at about 1 percent of projected total electricity demand or 2 percent of the

[17] Ibid.

[18] NWPCC. "Sixth Northwest Conservation and Electric Power Plan," February 2010, Table E-1: Estimated Cost-Effective Conservation Potential in Average Megawatts 2010-2014 and 2010 – 2029. See TW-13, NWPCC Sixth Power Plan.

[19] NEEA, "Evolution of DHPs in the Northwest." See Ex. TW-14, NEEA Evaluation of DHP.
Bonneville Power Administration, "Ductless Heat Pump Engineering Analysis," December 2012. See Ex. TW-15, BPA Engineering Analysis.
The current cost and savings assumption by the Northwest Council Regional Technical Forum (which set energy efficiency standards for the Northwest region).

[20] Regional Technical Forum, "Residential: Heating/Cooling – Ductless Heat Pump SF – Version 1.3," April 17, 2012.

residential sector demand in 2030.[21] Although climate conditions in the Northwest region are not exactly the same, if we assume an additional 1 percent savings relative to the load from this measure, the Company could gain an additional 195 GWh achievable savings from ductless heat pump systems.

Accelerated equipment replacement and consumer electronics: the KEMA potential study included early replacement measures and consumer electronics. However, the potential from these measures appear to be very conservative. Equipment early replacement measures by the KEMA study are only for refrigerators and freezers and have only about 130 GWh of technical and economic potential or about 0.4 percent of projected total electricity demand. The potential for consumer electronics by the KEMA study are about 336 GWh of technical potential and 220 GWh of net economic potential, which are 1.1 percent and 0.7 percent of projected demand in 2020. Other studies estimate significantly more energy savings from these measures.

For example, McKinsey & Company conducted an economic potential study for the entire U.S. in 2009 and found 180 TWh of potential from accelerated equipment replacement (4 percent of projected load for the entire U.S. in 2020 by McKinsey) and 250 TWh from more types of electronic devices (6 percent of projected demand) relative to another study issued by EPRI in the same year.[22] As another example, NWPCC's 6th Power Plan identified about 7.3 TWh of energy savings potential from consumer electronics at about 3.3 percent of projected load in 2030 by NWPCC. Using McKinsey's potential estimates for these measures, the Company could obtain additional savings of about 1,500 GWh from accelerated equipment replacement and about 1,000 GWh from efficient electronic devices.

Other measures: The KEMA potential study also did not include heat pump clothes dryers or net zero energy buildings.

[21] NWPCC. "Sixth Northwest Conservation and Electric Power Plan," February 2010, Table 3-4 and Table E-1. See Ex. TW-13, NWPPC Sixth Power Plan.

[22] McKinsey & Company, "EPRI and McKinsey Reports on Energy Efficiency: A Comparison," 2009. See Ex. TW-16, McKinsey & EPRI 2009. The EPRI study also covered the entire country, but it significantly underestimated savings from these measures.

Achievable Potential Estimates

Q. Please summarize the assumptions and methodologies for measure adoption rates in the KEMA DSM potential study.

A The KEMA potential study presented detailed energy savings outputs by measure under various scenarios including the net economic, and 100 percent incentive and 75 percent incentive scenarios (KEMA potential study Table 4-3, 4-4, and 4-5). The savings potential under the three achievable potential scenarios represent single year achievements, while the savings under the economic and technical potential scenarios represent total savings through 2020 by measure (Discovery Request No. SC4-1).

The KEMA study used a model that was introduced in the previous KEMA potential study for Xcel Colorado in order to predict measure adoption rates. The model presented on page A-16 in the previous study takes into account participants' benefit cost ratio and the maximum annual acceptance rate of a technology.[23] The previous study also claims that it takes into account the number of informed customers based on the amount of money spent on advertising.[24]

Further, the 2010 KEMA study stated that measure adoption rates were predicted partly based on measure implementation curves, which are calibrated to actual measure implementation results associated with major IOU commercial efficiency programs over the past several years.[25]

Q. Please summarize your concerns with this approach.

I have a number of concerns with this approach. In general it appears that the KEMA study assumed that several measures have extremely low adoption rates.[26] First, it appears that KEMA applied conservative assumptions when deciding the implementation curves for emerging measures such as LED (i.e., the inflection point value of a measure implementation curve discussed in the 2010 KEMA study). (Data Request SC4-1, Attachment SC4-1.A1.)

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[23] KEMA, "Colorado DSM Market Potential Assessment, Final Report Appendices," March 12, 2010, p A-16. See Ex. TW-17, KEMA DSM Market Assessment.

[24] Ibid, p A-25.

[25] Ibid, p A-16.

[26] Petersen Testimony, Exhibit JAP-1, Table 4-4, p 4-24. For example, a commercial screw-in LED in 20150 has 0 percent achievable potential relative to net economic potential under the 75 percent incentive scenario.

Second, the KEMA potential study uses the participant benefit-cost ratio as one of the key variables in predicting efficiency measure adoption rates. However, the participant benefit-cost ratio significantly understates the non-energy benefits that program participants experience, as I discuss in Section 6 (Attachment SC4-1.A1). The understated NEB assumptions will led to understated efficiency measure adoption rates.

Third, actual commercial measure implementation results used to calibrate the adoption rates may be outdated or may not be based on best practices.

Finally, measure implementation curves used for *residential* measures may be inappropriate because the study based the implementation curves on *commercial* measure implementation results.

Q. Why do you describe these assumptions as overly conservative?

A As mentioned above, the Company mainly relied on the 75 percent achievable potential scenario to develop its savings goal. The adoption rate assumptions used to estimate this achievable potential are not consistent with the adoption rates that several leading energy efficiency program administrators have achieved in the past and are expecting to achieve in the near future.

For example, Vermont's recent experience shows a significantly high adoption rate for specialty CFL bulbs, while the KEMA study found specialty CFLs have one of the lowest adoption rates in terms of achievable savings as a percent of the net economic potential. Efficiency Vermont encountered a significant drop (about 40 percent) in participations in its CFL program in 2009 when the economy slowed down. However, the entity quickly modified its program designs and marketing approaches and regained the participation rate in the following year by significantly increasing the consumer purchase of specialty CFLs to the level equal to the purchase of regular CFL in just a few years. As a result, in 2011 Vermont's CFL program reached the highest participation rate in the program's history.[27]

[27] Lara Bonn, "A Tale of Two CFL Markets: An Untapped Channel and the Revitalization of an Existing One," Proceedings of the 2012 ACEEE Summer Study on Energy Efficiency in Buildings, August 12, 2012. See Ex. TW-18, Bonn 2012.

As another example, NWPCC projects measure adoption rates based mainly on its review of historical evidence of program penetration, and NWPCC assumed for its potential studies that over a twenty-year planning horizon, efficiency retrofit measures can reach 85 percent of technical potential and new construction measures can reach 65 percent of the technical potential.[28]

As another example, a natural gas efficiency potential study conducted for Massachusetts in 2009 modeled two alternative scenarios of 80 percent and 60 percent market penetration for all measures over a ten-year time frame.[29] These rates represent rates relative to the economic potential. In addition, the 80 percent scenario represents aggressive incentive levels and strong educational and marketing campaigns, and the 60 percent scenario represents smaller incentive and more limited marketing.

Q. Are there other considerations that might affect how the Commission should interpret the Company's estimates of efficiency potential?

A. Yes. Energy efficiency potential studies, while helpful as a reference point in determining goals, have a tendency to understate the actual efficiency potential over the long-term.[30] In particular, when estimating *technical* potential, studies tend to rely only upon proven technologies or outdated technologies; include few or no new efficiency technologies developed in the future; overestimate certain efficiency measure costs; assume no energy savings synergies when multiple measures are installed; and have a limited scope with regard to sector, end-use, and technologies. When estimating *economic* potential, studies tend to use conservative avoided cost estimates, and assume little or no reduction in efficiency measure costs in the future. When estimating *achievable* potential, studies tend to assume limited funding levels and do not account for evolving best practices in program designs that can help increase customer adoption of efficiency measures.

[28] NWPCC "Achievable Savings - A Retrospective look at the Northwest Power and Conservation Council's Conservation Planning Assumptions," August 2007. See Ex. TW-19, NWPCC Achievable Savings.

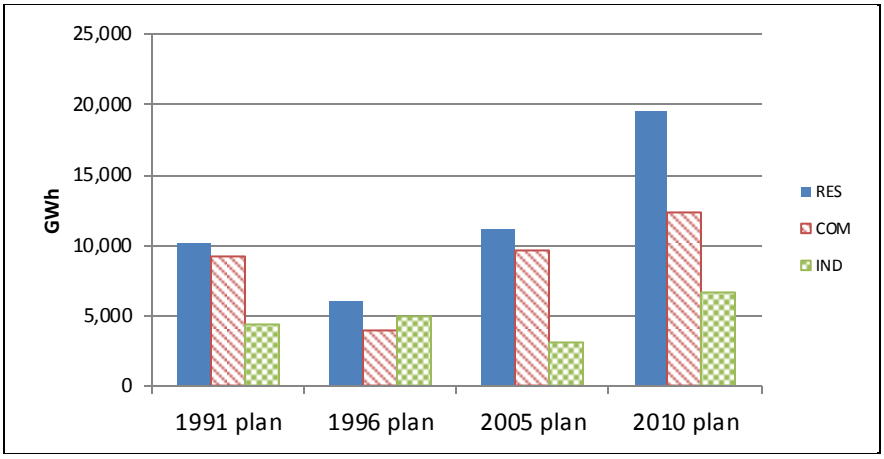
[29] Energy Futures Group, "Ten Pitfalls of Potential Studies," prepared for the Regulatory Assistance Project, November 2012, p 30. See Ex. TW-20, Ten Pitfalls.

[30] Many of these conservatisms and limitations were identified in (a) Energy Futures Group, "Ten Pitfalls of Potential Studies," prepared for the Regulatory Assistance Project, November 2012, pp 34-35; and (b) Energy Center for Wisconsin and American Council for an Energy Efficient Economy, "A Review and Analysis of Existing Studies of the Energy Efficiency Resource Potential in the Midwest," August 2009. See Ex. TW-21, ACEEE & Wisconsin 2009.

Q. Are you aware of empirical evidence that demonstrates the limits of energy efficiency potential studies?

Yes, energy efficiency potential analyses performed over time in the Pacific Northwest illustrate how potential studies can understate efficiency opportunities. Figure 6 presents a summary of energy efficiency potential studies performed by the NWPCC at four different points in time: 1991, 1996, 2005 and 2010. As indicated, the efficiency potential increased from the 1996 studies to the later studies, suggesting a tendency to understate future efficiency opportunities.

Figure 6: Comparison of Energy Efficiency Achievable Potential Estimates for Pacific Northwest by NWPCC's Historical Regional Power Plans (GWh)[31]



Furthermore, the Pacific Northwest region has saved roughly 30,000 GWh since 1991. This amount of savings is more than the energy efficiency potential estimates identified back in1991. Despite achieving even more savings than was identified in 1991, the latest power plan in 2010 has found the potential for additional efficiency savings of roughly 38,000 GWh. This experience indicates the extent to which efficiency potential studies can understate the full potential available. It also indicates that the Company's concerns about the limits of energy efficiency potential as a result of the recent progress on energy efficiency in Colorado are probably overstated.

[31] American Council for Energy Efficient Economy, "Beyond Supply Curves," Fred Gordon, Lakin Garth, Tom Eckman, and Charles Grist, 2008 ACEEE Summer Study on Energy Efficiency in Buildings, August 17, 2008. NWPCC. "Sixth Northwest Conservation and Electric Power Plan," February 2010. See Ex. TW-22, ACEEE Beyond Supply Curves.

Efficiency Opportunities Relative to the Company' Current Programs

Q. Please provide a high-level assessment of the Company's 2013 electric energy efficiency programs?

A While I have not had the opportunity to assess the 2013 programs in detail, a brief review indicates that the Company has a reasonable, well-designed set of electric efficiency programs. The programs address a variety of end-uses and serve a variety of different customer types; most programs are highly cost-effective (see Figure 3) with an average benefit-cost ratio of roughly 2.5. The programs also result in significant net benefits to customers of roughly $250 million (see Figure 4). These programs provide a very solid foundation from which to build to increase the Company's efficiency goals and savings.

Q. Why do you believe that the Company should be able to build off of these programs to increase its efficiency savings and goals?

A. First, there are likely to be significant opportunities for the Company to increase the participation rates of its current programs. Table 6 presents the participation rates (i.e., the number of participants divided by the number of eligible customers), for the most significant efficiency programs. With the exception of the residential lighting program, these participation rates are relatively low. I expect that additional budget and additional effort from the Company could result in higher participation rates, and correspondingly higher savings in future years.

Table 6: Participation Rates from Select 2013 Electric Efficiency Programs

	Eligible Participants	Participation Rate
Commercial & Industrial		
Small Business Lighting	195	0.1%
Self-Directed Custom Efficiency	13	0.0%
Process Efficiency	15	0.0%
New Construction	74	0.0%
Motor & Drive Efficiency	1,924	1.2%
Lighting Efficiency	981	0.6%
Custom Efficiency	38	0.0%
Cooling Efficiency	304	0.2%
Computer Efficiency	2,816	1.8%
Low-Income		
Single-Family Weatherization	2,593	0.2%
Non-Profit Energy Efficiency	25	0.0%
Energy Savings Kit	8,250	0.7%
Residential		
School Education Kits	30,000	2.5%
Saver's Switch	19,500	1.7%
Refrigerator Recycling	8,600	0.7%
Home Lighting & Recycling	535,000	45.4%
Evaporative Cooling Rebates	4,630	0.4%
ENERGY STAR New Homes	2,629	0.2%

Q. What other information indicates that the Company can achieve higher efficiency savings than in its current efficiency plans?

A. While the Company's current programs appear to be a reasonable effort to achieve efficiency savings, there is a variety of evolving best practices that energy efficiency program administrators are using and can use to extract ever greater savings from efficiency programs. A recent American Council for Energy-Efficient Economy (ACEEE) report provides a comprehensive description of "next generation" efficiency programs and concepts that are available to reach high efficiency savings – beyond current practices and beyond existing efficiency standards and building codes.[32] The study describes a variety of evolving program types and program areas to increase efficiency savings from the residential, commercial and customer sectors. Several conceptual themes run through the study, including the importance of focusing on system efficiencies in residential and commercial buildings; the optimization of industrial processes; reaching underserved markets; better understanding customer behavior and motivations; and making energy use a visible and valued element deserving of customer

[32] ACEEE, "Frontiers of Energy Efficiency: Next Generation Programs Reach for High Energy Savings," January 2013. See Ex. TW-23, ACEEE Frontiers of EE.

attention. The study finds "significant progress being made with technologies and program designs to create a next generation of programs that are capable of realizing the high energy savings."[33]

Q. Are you aware of other states that are achieving significantly higher efficiency savings than what the Company is currently achieving in its efficiency programs?

A. Yes. I, and colleagues of mine at Synapse, have been actively involved in three states that have achieved, and plan to continue to achieve, significantly more than what the Company is currently achieving or what the Company is proposing for its energy efficiency savings goals.

Massachusetts: In 2012 the Massachusetts program administrators achieved electric efficiency savings equal to 2.1 percent of sales.[34] The energy savings goals that the efficiency program administrators set for the years 2013 to 2015 are 2.50, 2.55 and 2.56 percent of sales each year, respectively. These goals were approved by the Massachusetts Department of Public Utilities.[35]

Rhode Island: In 2012, the Rhode Island program administrator achieved electric efficiency savings of 1.5 percent of sales. The energy savings goals for 2013 and 2014 are 2.05 and 2.44 percent of sales per year, respectively. These goals were approved by the Rhode Island Public Utilities Commission. The program administrator and other stakeholders are currently proposing energy savings goals for 2015-2016 equal to 2.50, 2.55 and 2.60 percent of sales each year, respectively.[36] These goals have not yet been approved by the Rhode Island Public Utility Commission.

Vermont: As noted above, Vermont has achieved significant energy savings of roughly 2 percent per year on average for the past five years, cumulatively achieving 10 percent

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[33] ACEEE, "Frontiers of Energy Efficiency: Next Generation Programs Reach for High Energy Savings," January 2013, p x. See Ex. TW-23, ACEEE Frontiers of EE.

[34] MA EEAC Consultant Team, "2010-2012 Electric and Gas Energy Efficiency Programs: Three-Year Review and Trend Analysis," September 10, 2013, Slide 24. See Ex. TW-24, EEAC Consultant Presentation.

[35] Massachusetts Department of Public Utilities, approval of three-year plan "Approval of the Three-Year Energy Efficiency Plans for 2013 through 2015," D.P.U. 12-100 through D.P.U. 12-111, January 31, 2013, Table 1, p 17. See Ex. TW-25, MA DPU 2013-2015.

[36] Rhode Island Energy Efficiency and Resource Management Council, "2015-2017 Savings Targets Recommendations," slide deck prepared by Vermont Energy Investment Corporation and Optimal Energy, August 8, 2013. See Ex. TW-26, RI Savings Targets Recommendations.

savings over those years. The state currently has efficiency savings goals of roughly 2 percent per year for 2012 – 2014.[37]

Note that all three of these states have been implementing some of the most aggressive and successful efficiency programs in the country for many years. Also, note that the energy savings goals above account for federal efficiency standards, as well as state and local standards and building codes. Despite these two important considerations, these states are setting energy efficiency goals that are approximately twice the goals being proposed by the Company in this docket. Also note that none of these states currently has a Distribution Voltage Optimization or comparable program. Finally, note that the savings goals above except Vermont do include potential savings from combined heat and power programs, which are not included in the energy savings goals in Colorado.

Q. Are these results unique to the Northeast?

A. No. Other states have achieved, or are expected to achieve, savings comparable to those described above. While there can be differences in the efficiency savings across states due to different customer types, different end-use patterns and different climate conditions, there is generally such a diverse array of energy efficiency opportunities that these levels of savings are available in all states.

6. RECOMMENDATIONS FOR SETTING EFFICIENCY GOALS

Q. What efficiency savings goals do you recommend for Public Service for 2015 to 2020?

A. I recommend that the Company set a goal of reducing electricity sales by 2 percent per year by the year 2020. The electricity savings goals should increase evenly from the 2014 savings goal to this 2020 savings goal. The annual energy savings goals for the years 2015 to 2020 would be as follows: 1.4 percent, 1.5 percent, 1.6 percent, 1.8 percent, 1.9 percent, and 2.0 percent, respectively.

[37] Efficiency Vermont, "Annual Plan 2013," November 1, 2012. See Ex. TW-27, Efficiency Vermont Annual Plan.

Q. Please explain how you derived these efficiency savings goals.

A. I derived the recommended goals based upon my findings above regarding the Company's analysis. I also based my recommendation upon my review of the Company's current energy efficiency programs, as well as my experience reviewing energy efficiency programs, plans and goals in other states.

To develop this goal of 2 percent savings per year by 2020, I start with the Company's estimate of potential efficiency savings, then I make very high-level adjustments to reflect my findings that the Company's cost-effectiveness analysis was overly constrained and that the Company's energy savings potential estimates are overly conservative. I then apply a "reality check," to consider whether this goal is reasonable in light of the conditions in Colorado and the achievements in other states.

Q. Please summarize the Company's efficiency savings potential results as they apply to your methodology for determining an energy efficiency goal.

A. As described above, the Company's potential study found that Public Service could achieve efficiency savings of roughly 3.7 percent (technical), 2.6 percent (economic) and 1.4 percent (achievable) of sales per year on average. Note that the 1.4 percent (achievable) result is from the scenario where customer incentives are equal to 100 percent of incremental costs. While the Company has used the 75 percent incentive scenario to set its efficiency goals, I believe that the 100 percent scenario is more indicative of the type of customer acceptance that could be achieved through well-designed energy efficiency programs.[38]

Q. What adjustment to these results do you make to reflect your conclusion that the company has understated the cost-effectiveness of energy efficiency?

A. Because of the limitations of the Company's cost-effectiveness analysis, I believe the economic potential could be well above the 2.6 percent savings per year identified in the Company's potential study. While I am not able to conduct an independent analysis of economic potential using better assumptions, I believe that the economic potential for

[38] However, I do not believe that 100 percent incentives are necessary to achieve the type of customer acceptance included in the 100 percent incentives scenario. Experience has demonstrated that this level of customer acceptance can be achieved with lower levels of customer incentives, combined with well-designed marketing, technical support, customer education, and program delivery methods. For example, leading states such as Vermont has attained annual energy savings beyond the level of the 100 percent incentive scenario, and yet offers much less incentive than 100 percent.

energy efficiency could easily be three percent per year or greater when better estimates of NEBs and emission reductions are properly accounted for.

Q. What sort of adjustment do you make to reflect your conclusions that the Company has understated the potential for efficiency savings.

A. I apply three considerations to reflect the fact that the Company has understated efficiency potential savings. First, the Company's current energy efficiency programs suggest that the Company could achieve more savings from existing programs by increasing the customer participation rates for the key programs, described above. Since these programs are already cost-effective, these would contribute to the economic potential.

Second, the Company has not included several efficiency measures in its potential estimates, as described above. Including these efficiency measures in the potential estimates would result in higher economic potential results.

Third, the Company could adopt some of the best practices in program design and delivery, as documented in the ACEEE study on the "next generation" of efficiency programs, as described above. These practices would result in savings above and beyond those from increased participation and the additional measures listed above.

Combining these considerations – increased participation, additional measures, and next generation program designs – indicates that the Company may have well over three percent per year, perhaps as much as four percent per year, in economic energy efficiency savings on its system.

Q. Finally, how do you estimate the likely achievable potential for energy efficiency savings in Colorado?

A. As noted above, the amount of achievable potential on any utility system is dependent upon how aggressively and how successfully the energy efficiency program administrator implements efficiency programs. While customer adoption rates are a critical element of achievable program savings, the customer adoption rates are heavily influenced by many things that are within the Company's control, including: customer financial incentives; tailored marketing approaches; tailored technical support to customers, assistance in overcoming barriers (e.g., by providing one-stop-shopping and easy access to contractors); customer education; working with energy efficiency trade allies (e.g.,

architects, home builders, contractors, manufacturers, distributors and retailers); offering whole-buildings and whole-systems support; and more.

A well-designed and implemented set of efficiency programs should be able to achieve a large portion of the economic potential for efficiency savings. Assuming that the Company has an economic potential of three to four percent savings per year, then achieving roughly one-half to two-thirds of that potential would lead to roughly 2 percent savings per year in achievable savings.

Therefore, I think that a savings goal of 2 percent per year by 2020 is a reasonable and achievable savings goal. This is especially true given that the Company has six years to incrementally work toward this goal, to incorporate best practices, and to adopt to emerging opportunities along the way.

Q. The adjustments you describe are clearly high-level and approximate. Are these sufficient for the Commission to use in setting energy efficiency goals for the Company?

A. I acknowledge that the estimates and goals I describe above are high-level and approximate. Nonetheless, the estimates, adjustments and considerations that I describe above are sufficient to support my proposal for a 2 percent per year savings goal. First, several of my assumptions are conservative, and while they may not be very precise, they do provide helpful guidance on how to consider and set better goals than those offered by the Company. Second, I am aware of several states that have already achieved roughly 2 percent per year savings, and several states that are planning to achieve more than 2 percent per year over the next several years. This experience indicates that a goal of saving 2 percent of sales per year is feasible and reasonable, especially by 2020.

Q. The Company has noted several times that the opportunities for efficiency savings have declined significantly in recent years, due to federal lighting standards and progress in the efficiency markets in Colorado. Do these points suggest that your savings goals are too high?

A. No. As described above, the Company overstated the likely impact of federal standards on efficiency opportunities, and it overstated the likely impact of recent and future progress in energy efficiency markets in Colorado. Therefore, these arguments do not suggest that a savings goal of 2 percent per year is too high. Also, as discussed above, I know of at least three states (Massachusetts, Rhode Island and Vermont) that have

efficiency savings goals that are higher than 2 percent for future years, after accounting for the recent federal standards, and despite the fact that these states have already been implementing efficiency programs at relatively high levels for many years.

Q. How does your savings goal of 2 percent relate to the other elements of the Company's proposal, particularly the emerging technologies, the behavioral programs, the LED street lighting and the Distribution Voltage Optimization (DVO) program?

A. My savings goal is intended to include a variety of traditional and new efficiency programs and opportunities. Therefore, my savings goal of 2 percent per year includes savings that would come from unidentified emerging technologies, behavioral programs and LED street lighting programs. My savings goals of 2 percent per year should be compared to the totals presented by the Company in the Total column in Table 2 on page 9 of Ms. Sudin's testimony.

Q. How should the savings from the DVO program be considered relative to your proposed savings goal?

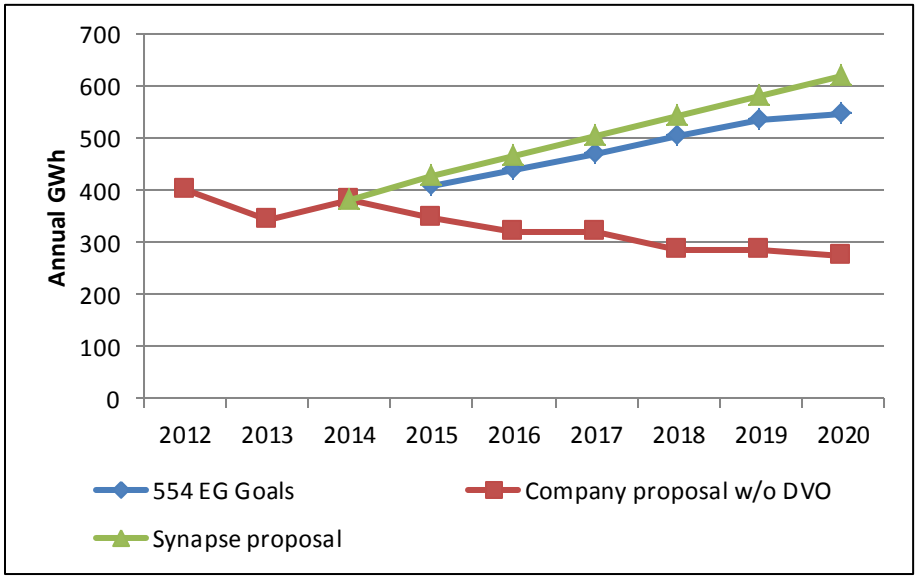
A. I recommend that the savings from the DVO program be considered separately, i.e., above and beyond, the 2 percent per year goal. This program is unique in that it addresses new efficiency opportunities on the distribution system and was not included in the Company's efficiency potential study. Also, the other utility efficiency programs that I am aware of that help to support my recommended goal do not include savings from DVO programs.

Based on my brief review of the Company's proposed DVO program, it appears to be cost-effective and in the public interest. However, the introduction of this new opportunity should not undermine the Company's or the Commission's support for conventional, customer-based, end-use efficiency programs. The DVO program should not provide the Company with a reason for reducing its goals for conventional efficiency programs. Rather, this new program should be used to increase the total efficiency savings, above and beyond what can be achieved from conventional programs.

Q. Please summarize how your recommended savings goals compare with the Company's proposed goals.

A. Figure 7 presents my proposed goals alongside the Company's proposed goals and the goals approved in Docket No. 10A-554EG, in terms of GWh savings. This information is also provided in Table 7 in terms of percent of sales.

Figure 7: Efficiency Savings Goals for Public Service (GWh)[39]



Note the goals presented in the Figure 7 and Table 7 do not include the projected savings from the proposed DVO program. For my proposed goals, I assume that annual energy savings gradually increase starting from the savings level currently proposed in the Company's 2014 DSM plan to 2 percent per year by 2020.

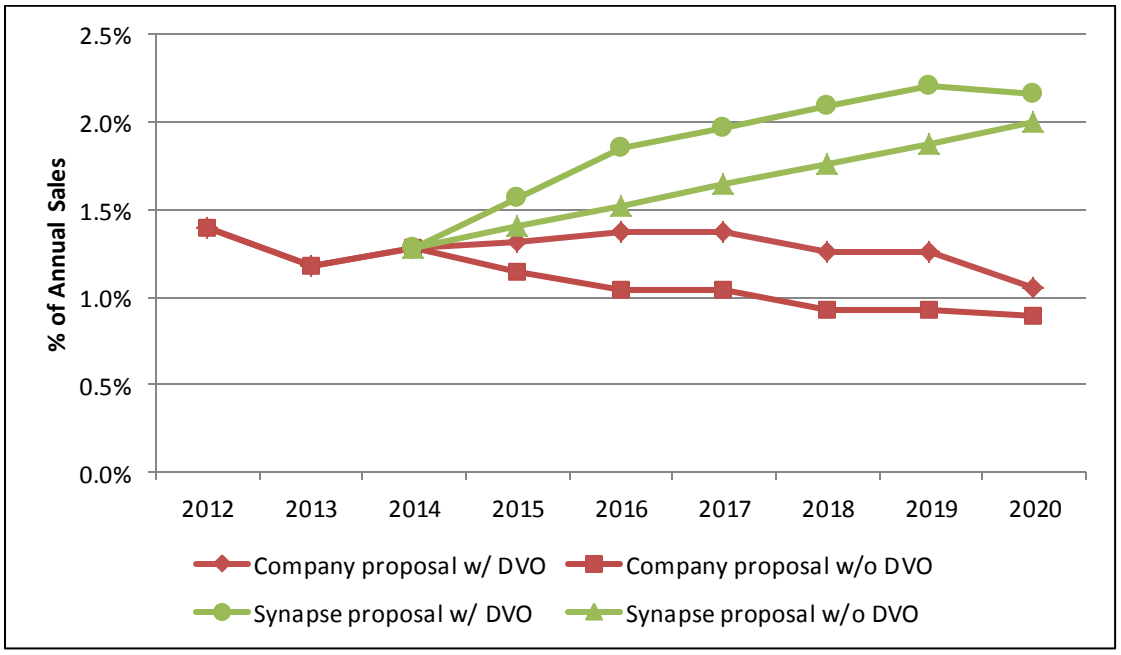
[39] Petersen Testimony, Table 11, page 70 and Table 11, page 70. Public Service Company of Colorado, "2012/2013 Demand-Side Management Plan - Electric and Natural Gas" (Revised), February 2012. Public Service Company of Colorado, "2014 Demand-Side Management Plan - Electric and Natural Gas," July 1, 2013.

Table 7: Efficiency Savings Goals for Public Service (percent of annual sales, per year)[40]

	2012	2013	2014	2015	2016	2017	2018	2019	2020
554 EG Goals				1.3%	1.4%	1.5%	1.6%	1.7%	1.8%
Company proposal w/o DVO	1.4%	1.2%	1.3%	1.1%	1.0%	1.0%	0.9%	0.9%	0.9%
Synapse proposal w/o DVO			1.3%	1.4%	1.5%	1.6%	1.8%	1.9%	2.0%

Figure 8 presents my proposed goals for the Company with and without the savings impact from the DVO program along with the Company's forecast with and without the DVO program. The inclusion of the DVO increases the annual savings levels by roughly 0.2 to 0.3 percent per year.

Figure 8: Efficiency Goals of the Company and Synapse, with and without DVO Program[41]



[40] Petersen Testimony, Table 11, page 70 and Table 11, page 70. Public Service Company of Colorado, "2012/2013 Demand-Side Management Plan - Electric and Natural Gas" (Revised), February 2012. Public Service Company of Colorado, "2014 Demand-Side Management Plan - Electric and Natural Gas", July 1, 2013. Company's response to Data Request SWEEP 1-3. EIA 861 Data Files.

[41] Ibid.

7. DECOUPLING AND RECOVERY OF LOST REVENUES

Q. What is the Company proposing for the purpose of recovering the lost revenues attributable to the energy efficiency programs?

A. The Company is proposing direct recovery of all lost revenues associated with its energy efficiency programs.

Q. Do you agree that direct recovery of lost revenues is the best way to remove the financial disincentive that the Company has with regard to reducing sales through energy efficiency?

A. No, I do not. There are many fundamental flaws with direct recovery of lost revenues. First, this approach does not necessarily account for factors that can offset the lost revenues, such as off-system sales. Second, it can become contentious and time-consuming to identify the exact amount of lost revenues that should be returned to the Company. Third, it does not eliminate the Company's financial disincentive associated with other important opportunities to reduce demand, such as supporting building codes and efficiency standards, promoting combined heat and power systems, and promoting distributed, behind-the-meter renewable technologies. Finally, it does not remove the Company's financial incentive to increase electricity sales through actions outside of the efficiency programs.

Q. Do you think the Company should be allowed to recover the lost revenues from efficiency programs somehow?

A. Yes. The Company should not be penalized financially as a result of successful implementation of efficiency programs. Without recovery of these lost revenues, the Company cannot be expected to implement comprehensive, meaningful efficiency programs, the customers will be deprived of the lowest-cost resource, and total electricity costs will be significantly higher.

Q. How should the Company recover the lost revenues from energy efficiency programs?

A. I recommend that the Commission require the Company to implement a revenue decoupling mechanism to recover the lost revenues from energy efficiency programs. Decoupling is a modification to traditional ratemaking that allows a company to recover a target level of revenues, regardless of the level of sales that occur between rate cases.

Revenue decoupling does not suffer from the fundamental flaws listed above regarding direct recovery of lost revenues. Revenue decoupling provides much more comprehensive and much better financial incentives with regard to all the Company's actions that might affect customer sales. I have been involved in several states that use direct recovery of lost revenues as well as several states that use revenue decoupling, and the difference is striking. Utilities that are allowed revenue decoupling are significantly more supportive of energy efficiency and other demand resources, and the entire regulatory context around efficiency and demand resource planning is significantly less contentious and adversarial. Further, there are ways to design revenue decoupling mechanisms that not only protect consumers but ensure that customers are better off than under traditional ratemaking.

Q. How should the Commission proceed on this issue of decoupling?

A. I recommend that the Commission open a separate docket to investigate whether revenue decoupling is a better way to align the Company's financial incentives with the state's efficiency policies and goals. The implications of revenue decoupling are significant and the issues are best addressed in a docket dedicated to investigating them. This could take the form of a generic docket on revenue decoupling, or it could be conducted as part of the Company's next rate case. If revenue decoupling is addressed as part of the next rate case, the Commission should put the Company and other stakeholders on notice that it intends to investigate decoupling options as part of that docket.

Q. Does this conclude your pre-filed testimony?

A. Yes, it does.