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MISSOURI PUBLIC SERVICE COMMISSION

FILE NO. EO-2015-0055

SURREBUTTAL TESTIMONY

OF

RICHARD A. VOYTAS

ON

BEHALF OF

UNION ELECTRIC COMPANY
d/b/a Ameren Missouri

St. Louis, Missouri
April 2015

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RICHARD A. VOYTAS

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I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Richard A. Voytas. My business address is One Ameren Plaza, 1901 Chouteau Avenue, St. Louis, Missouri 63103.

Q. By whom and in what capacity are you employed?

A. I am employed by Ameren Services Company ("Ameren Services" or "Company") as Director of Energy Efficiency/Demand Response. Ameren Services provides various technical and corporate support services for Ameren Missouri and its sister companies in a number of functions, including the area of energy efficiency and demand response.

Q. Please describe your professional background and qualifications.

A. See Schedule RAV-1.

II. PURPOSE OF TESTIMONY

Q. What is the purpose of your Surrebuttal testimony in this proceeding?

A. The purpose of my Surrebuttal testimony is to address the positions taken in the rebuttal testimonies of Missouri Public Service Commission ("Commission" or "MPSC") Staff ("Staff"), Office of the Public Counsel ("OPC") and Intervenor witnesses with respect to the achievable potential for energy efficiency savings and MEEIA savings targets and associated budgets. Chiefly, my testimony addresses the allegation that Ameren Missouri's MEEIA 2016-2018 implementation plan understates the amount of realistically achievable

cost effective energy efficiency for the 2016-2018 implementation period. The allegation is based on two primary arguments. The first issue is that the 2016-2018 realistically achievable potential is less than it was for the 2013-2015 MEEIA implementation period. The second is that there are other demand-side management ("DSM") potential studies in other jurisdictions covering different time periods that report higher levels of achievable potential. As explained below, my testimony articulates why these arguments are not persuasive.

III. EXECUTIVE SUMMARY

- **Cost effective equipment energy efficiency potential will be lower in the future than it has been in the past due to diminishing returns from more stringent energy efficiency building codes and equipment energy efficiency standards;**
- **Cost effective equipment energy efficiency potential will cost more in the future than it has in the past as low cost opportunities, such as CFLs, become codified into law;**
- **DSM Potential studies are based on a plethora of assumptions. When comparing and/or contrasting studies, details are important;**
- **When compared to other DSM Potential studies on a normalized basis, other DSM Potential studies are aligned with the Ameren Missouri DSM Potential Study;**
- **Evaluation, Measurement, and Verification ("EM&V") annual impact reports of Ameren Missouri Energy Efficiency programs inform and change the magnitude of achievable energy efficiency potential;**

- **Load reduction potential for MEEIA 2016-2018 for Ameren Missouri Business customers will exceed that of Residential customers;**
- **There are open issues that may impact the magnitude of cost effective energy efficiency potential for Ameren Missouri going forward. Issues, which may require MEEIA statutory and/or MEEIA rule revisions, include:**
  - **Definition of the term "energy efficiency";**
  - **Role of Non-Energy Benefits ("NEBS") in the estimation of future avoided costs;**
  - **Role of utility infrastructure energy efficiency improvements in MEEIA energy efficiency programs;**
  - **Prospective vs. retrospective application of EM&V results for purposes of determining the financial performance incentive;**
  - **Prospective vs. retrospective application of net-to-gross ("NTG") ratios to energy efficiency programs;**
  - **Flexibility to change energy efficiency programs, annual load reductions goals, and annual budgets based on information from the latest EM&V reports for individual programs.**

IV. NATIONAL TRENDS ON UTILITY-SPONSORED ENERGY EFFICIENCY POTENTIAL

Q. Several witnesses comment on national energy efficiency trends. As a general proposition, is it true that more states are pursuing more aggressive energy efficiency portfolio annual load reduction goals starting in 2016 and beyond?

A. No, in fact, the opposite is true. As more and more states complete the latest round of DSM planning and associated studies underlying the plans, it is apparent that they are backing off from earlier implementation period load reduction goals. This is not because they are changing their mind concerning utility-sponsored energy efficiency as a general proposition, but rather that as these programs mature, the reality of diminishing returns and increasing incremental cost to achieving higher and higher energy savings is becoming apparent. Energy efficiency is a sound means upon which to assist in meeting the forecasted demand for electricity, but there are natural limitations to achieving affordable energy savings. The plan presented by Ameren Missouri is grounded in a sound potential study prepared by a competent and recognized authority – Applied Energy Group ("AEG") - an authority that is relied upon by energy efficiency planners throughout North America.

Q. Please list some of the recent major national developments relative to the direction of future utility DSM portfolios.

A. A list of some of the most significant recent developments includes the following:

1. In 2014, Indiana passed Senate Bill 340 which allows investor-owned utilities to offer energy efficiency programs to customers after December 31, but bars the Indiana Utility Regulatory Commission ("IURC") from extending, renewing or requiring an energy efficiency program stemming from a December 2009 demand-side management order. The bill also prohibits the IURC from requiring a utility to meet a goal or target established under that order, which sets a statewide energy savings goal of 2% by 2019 for all regulated utilities. In short,

Indiana passed a law to rescind its legislation on energy efficiency resource standards ("EERS").

2. In 2014, Ohio passed Senate Bill 310, which froze annual increases in standards for renewable energy and energy efficiency for two years.
3. In 2014, Florida regulators approved proposals to reduce Florida's energy efficiency goals by more than 90%.
4. In 2014, the Arizona Corporation Commission ("ACC") proposed changes to its energy efficiency rules. The ACC sees the changes as a way to keep standards realistic. The proposal is built on the notion that setting long-term energy efficiency load reduction goals is ineffective.
5. In 2014, Louisville Gas & Electric and Kentucky Utilities petitioned the Kentucky Public Service Commission to reduce annual energy efficiency load reduction goals based on the results of their latest DSM Potential Study. The study showed achievable potential representing 3.9% to 6.1% of forecasted retail sales in 2033. The study also showed the utilities are currently on track to exhaust their achievable energy efficiency potential by 2018.
6. The New York State Public Service Commission ("NYPSC") approved its current energy efficiency portfolio standard ("EEPS") programs through 2015. However, beginning in late 2013 and continuing through 2015, the NYPSC Staff issued an EEPS Restructuring Proposal that is still undergoing review and analysis. Among other recommendations, the EEPS Restructuring Proposal recommends the following:

a) A more strategic and planned approach to energy efficiency program design and evaluation that incorporates:

i. Statewide potential studies to inform program design, targets and budgets;

ii. Technical information studies and regulatory guides standardizing and documenting basic program parameters; and

iii. A statewide, reliable approach to evaluation of program performance.

7. In March 2015, the Michigan House and Senate announced that they do not support higher renewable energy targets and that they will seek to eliminate energy efficiency standards from state law. Both say they support developing renewables and energy efficiency if it is cost-effective for ratepayers through Integrated Resource Plans rather than through unvetted energy efficiency resource standard mandates.

8. In March 2015, the Maine Public Utilities Commission voted to restrict funding for its energy efficiency program. The ruling means funding for Efficiency Maine will be capped at $22 million per year instead of $60 million.

9. Thirteen of the twenty-five, or 52%, of the states with EERS legislation also have rate caps that preclude the pursuit of annual EERS targets, regardless of whether they are feasible or not, especially in the post 2015 time period. Those states are:

1. Arizona
2. Arkansas
3. California
4. Colorado
5. Connecticut
6. Hawaii
7. Illinois
8. Maine

9. Michigan
10. Minnesota
11. North Carolina
12. Pennsylvania
13. Wisconsin

Q. Are the states listed above rejecting customer energy efficiency initiatives?

A. No. These states have simply come to the realization that they cannot meet the annual energy efficiency load reduction goals that they had initially signed up for – at any budget. In addition, these states recognize the balance necessary to keep electric rates affordable for all customers. All states expect to continue with their energy efficiency efforts, but at realistic levels established on the basis of utility specific studies of cost effective energy efficiency potential.

Q. What are the reasons for the movement toward more realistic, achievable energy efficiency goals?

A. When it comes to equipment energy efficiency, the law of diminishing returns is in full force. The law of diminishing returns is when more resources are invested in energy efficiency, yet less energy savings are achieved. Federal and state building codes and appliance efficiency codes are pervasive and aggressive and, because they drive energy efficiency from another source, they drive down the potential savings from utility energy efficiency efforts. The baselines for energy usage associated with lighting, heating, ventilation and air conditioning equipment, appliances, motors, set top boxes for TVs, computers, etc., are being reset to much lower levels, thereby limiting the amount of available energy savings from equipment built at the next higher tier of efficiency (lower energy consumption) than the baseline while increasing the incremental costs associated with

achieving those lower energy savings. When it comes to realistic, achievable energy savings, the future does not resemble the past. Due primarily to more stringent codes and standards, the future will consist of lower achievable energy savings at higher costs.

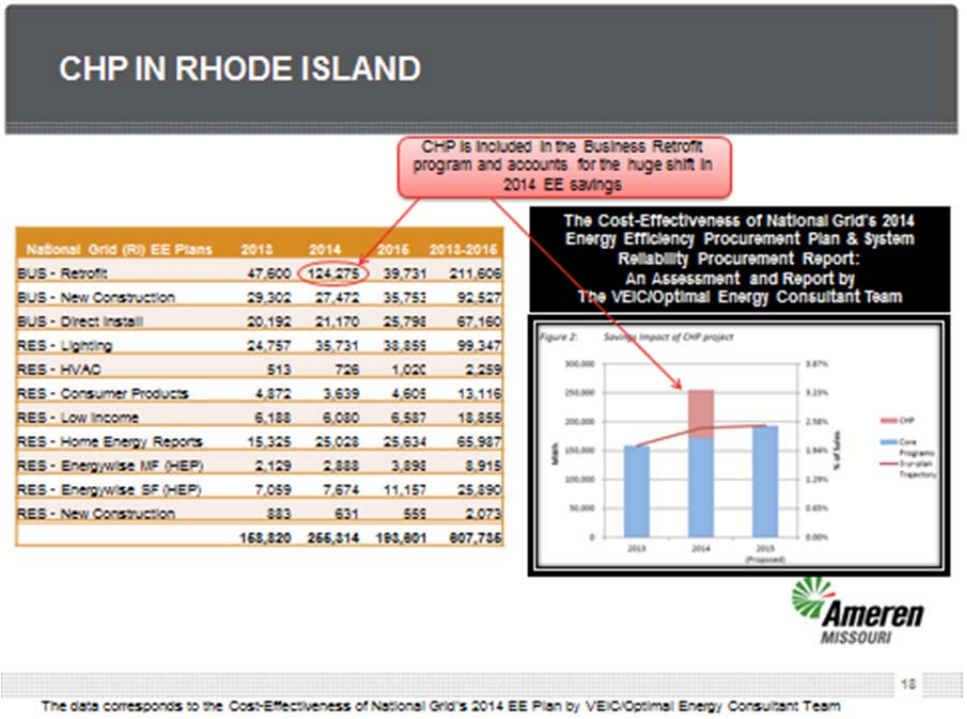
V. MASSACHUSETTS AND RHODE ISLAND

Q. Is it true, as Natural Resources Defense Council's ("NRDC") witness Philip Mosenthal states in his rebuttal testimony, that many states have continued to increase their savings levels, such as Massachusetts and Rhode Island are saving 2.6% and 3.4% of load, respectively?

A. It is true, as Mr. Mosenthal states, that Massachusetts and Rhode Island have reported preliminary 2014 savings. It is also true that states with EERS legislation allow wide latitude in reporting energy savings. What Mr. Mosenthal did not address is the cost to customers in Massachusetts and Rhode Island to report these high levels of savings. The American Council For An Energy Efficient Economy ("ACEEE"), in their annual state energy efficiency scorecard, reported the aggregate and per capita spending on energy efficiency for each state – which I will address in detail in my testimony. It is also true that in order to spend the levels that Massachusetts and Rhode Island spend on energy efficiency, it is necessary to create new categories of avoided costs and ensuing energy efficiency program benefits in order to make more, if not all, energy efficiency measures cost effective.

Q. Regardless of how avoided costs may be calculated, the 3.4% load reduction attributed to energy efficiency for Rhode Island may be the largest single year load reduction ever attributed to a state. What is the basis for such a large load reduction?

A. Rhode Island had an anomaly in 2014 in terms of reporting load reductions, due to energy efficiency and due to inclusion of a very large combined heat and power ("CHP") project. The following graph[1] provides insight as to the magnitude of the anomaly:



In June 2012, Rhode Island passed a new statute to further encourage CHP in the state. The key provision of the statute is to make all CHP projects cost effective by the inclusion of an ***Economic Benefit*** adder of $2.51 of lifetime gross state product increase per dollar of program investment.[2]

Q. Please discuss the Massachusetts and Rhode Island EERS reporting requirements.

[1] Data from The Cost-Effectiveness of National Grid's 2014 Energy Efficiency Procurement Plan & System Reliability Procurement Plan & System Reliability Procurement Report: An Assessment and Report by The VEIC/Optimal Energy Consultant Team Submitted to the Rhode Island Public Utilities Commission On November 27, 2013.
[2] *Id.*

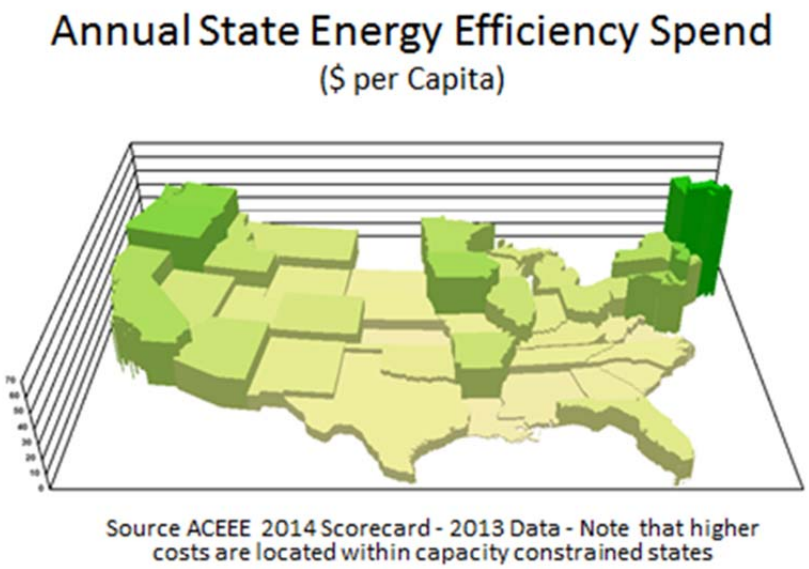
A. Massachusetts EERS legislation permits the inclusion of the following in reporting compliance with annual EERS load reductions:

1. Credit of CHP installations;
2. Credit for compliance with existing building codes and appliance efficiency standards; and
3. Credit for demand response toward energy efficiency annual load reductions.

Rhode Island has similar EERS reporting latitude as Massachusetts – with two exceptions. Rhode Island EERS legislation permits the inclusion of a credit for renewable energy toward meeting annual EERS load reductions and Rhode Island does not credit demand response as an energy efficiency load reduction resource.

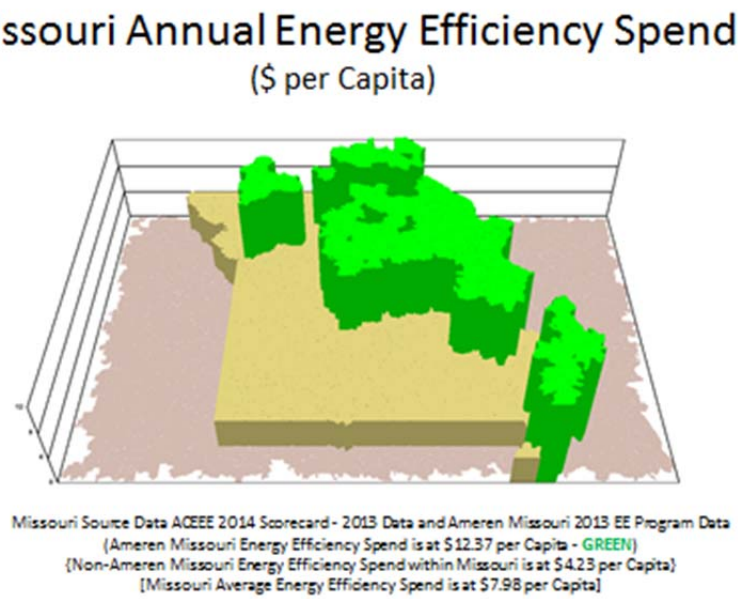
Q. Please discuss the annual budgets associated with the Massachusetts and Rhode Island energy efficiency implementation plans.

A. According to the 2014 ACEEE state energy efficiency scorecard that Mr. Mosenthal referenced on page 6 of his rebuttal testimony, the 2013 per capita spend (See ACEEE Appendix A) on energy efficiency for Massachusetts and Rhode Island was $75.86 and $73.70 respectively. The 2013 per capita spend for Missouri was $7.98 – according to ACEEE. To better illustrate the magnitude of the per capita spending on utility-sponsored energy efficiency by Massachusetts and Rhode Island relative to the entire nation, I have put the ACEEE per capita spending by state on the following graph:



Q. The graph very clearly illustrates the magnitude by which Massachusetts' and Rhode Island's budgets for energy efficiency are outliers relative to all other states. What else does the graph illustrate?

A. The graph shows that Missouri, in 2013, was relatively aligned with all the other states in the nation. However, what the graph does not show about Missouri is the magnitude by which Ameren Missouri impacted the Missouri per capita spend on energy efficiency in 2013. For example, for the 2013 ACEEE state scorecard, Ameren Missouri contributed 65% of the budget and 83% of the energy efficiency savings for the state of Missouri. The following graph shows only the state of Missouri and the per capita spend by Ameren Missouri on energy efficiency relative to the rest of the state:



Q. What would Ameren Missouri's MEEIA 2016-2018 budget be if Ameren Missouri proposed to spend at the same 2013 per capita rate as Massachusetts?

A. Ameren Missouri's MEEIA 2016-2018 budget is $134,461,396, which averages to be $44,820,465 per year. Ameren Missouri has approximately 1.1 million customers with approximately 2.56 persons per home for a total population of 2,783,000 people. At the Massachusetts 2013 per capita spend of $75.86, the Ameren Missouri MEEIA 2016-2018 budget would average $75.86 x 2,783,000 = $211,118,380 per year. Therefore, the three-year budget for MEEIA 2016-2018 would be $633,355,140, rather than $134,461,396.

Q. Using the state per capita spending energy efficiency budgets listed in Appendix A of the ACEEE state energy efficiency scorecard, what would be the national budget for energy efficiency if all states budgeted for utility-sponsored energy efficiency at the same 2013 per capita rate as Massachusetts?

A. The table below is an extract from the 2014 ACEEE state energy efficiency scorecard and shows each state's annual DSM budget at the same per capita rate as Massachusetts:

State	$ per capita	Calculated 2013 Budget	$ per capita Match MA	2013 Budget Adjusted to MA
Massachusetts	75.86	$507,700,000	75.86	$507,700,000
Rhode Island	73.70	$77,500,000	75.86	$79,771,370
Vermont	68.30	$42,800,000	75.86	$47,537,452
New Jersey	44.40	$395,100,000	75.86	$675,051,486
Oregon	43.58	$171,300,000	75.86	$298,183,066
Washington	42.13	$293,700,000	75.86	$528,841,253
Maryland	34.73	$205,900,000	75.86	$449,742,989
Iowa	34.53	$106,700,000	75.86	$234,412,453
California	31.01	$1,188,800,000	75.86	$2,908,170,526
New York	30.22	$593,900,000	75.86	$1,490,842,290
Minnesota	28.69	$155,500,000	75.86	$411,161,729
Connecticut	28.48	$102,400,000	75.86	$272,755,056
Maine	25.75	$34,200,000	75.86	$100,753,864
Idaho	24.05	$38,800,000	75.86	$122,385,364
Hawaii	23.85	$33,500,000	75.86	$106,553,878
Arkansas	22.27	$65,900,000	75.86	$224,480,198
Illinois	22.03	$283,800,000	75.86	$977,261,371
Arizona	21.61	$143,200,000	75.86	$502,690,976
District of Columbia	21.59	$14,000,000	75.86	$49,191,292
New Hampshire	20.70	$27,400,000	75.86	$100,413,720
Pennsylvania	18.60	$237,600,000	75.86	$969,050,323
Ohio	18.39	$212,800,000	75.86	$877,814,464
Montana	18.12	$18,400,000	75.86	$77,032,230
Nevada	18.10	$50,500,000	75.86	$211,653,591
Colorado	16.97	$89,400,000	75.86	$399,639,599
Michigan	16.72	$165,500,000	75.86	$750,886,962
Wisconsin	13.92	$79,900,000	75.86	$435,432,040
Florida	13.20	$258,100,000	75.86	$1,483,292,879
Utah	12.16	$35,300,000	75.86	$220,218,586
Indiana	11.69	$76,800,000	75.86	$498,378,785
New Mexico	11.08	$23,100,000	75.86	$158,155,776

Wyoming	10.96	$6,400,000	75.86	$44,297,810
Oklahoma	10.05	$38,700,000	75.86	$292,117,612
Kentucky	10.00	$44,000,000	75.86	$333,784,000
Tennessee	8.57	$55,700,000	75.86	$493,045,741
Missouri	7.98	$48,200,000	75.86	$458,202,005
North Carolina	7.61	$74,900,000	75.86	$746,637,845
Nebraska	7.36	$13,800,000	75.86	$142,237,500
Texas	6.86	$181,400,000	75.86	$2,005,977,259
South Dakota	6.04	$5,100,000	75.86	$64,053,974
West Virginia	4.87	$9,000,000	75.86	$140,193,018
South Carolina	4.62	$22,100,000	75.86	$362,880,087
Georgia	4.01	$40,100,000	75.86	$758,600,000
Delaware	2.59	$2,400,000	75.86	$70,294,981
Mississippi	2.50	$7,500,000	75.86	$227,580,000
Alabama	2.23	$10,800,000	75.86	$367,393,722
Louisiana	0.79	$3,700,000	75.86	$355,293,671
Kansas	0.26	$700,000	75.86	$204,238,462
Virginia	0.10	$800,000	75.86	$606,880,000
Total		$6,294,800,000		$23,843,163,255
Total if full population of US at MA per capita spend ---------->				$23,981,533,727

In aggregate, the nation's electric utilities would have spent approximately $24 billion on utility-sponsored energy efficiency programs in 2013. To put this amount of annual spend in a utility context, we can estimate how many megawatts of wind generators could be built annually with $24 billion per year. Assuming a cost of approximately $2,000/kW for wind generation, approximately 12,000 MW of wind generation could be built annually for $24 billion. I raise the comparison to wind to demonstrate an important point; energy efficiency is a finite resource option among other resources available - there are tradeoffs. This is particularly true in the context of Missouri, where utilities use an Integrated Resources Planning ("IRP") process to plan how they will meet prospective demand using a portfolio of resource options.

Q. In retrospect, it appears that thirteen states with EERS legislation which also have rate caps that limit spending on pursuing EERS have shown far-sightedness in making EERS contingent on rate caps.

A. I would agree that EERS legislation for the thirteen states with rate cap limits acknowledged justifiable concerns with not only the realism of the EERS annual load reductions but also for customer rate impacts associated with unrealistic and non-data driven studies of EERS-related annual load reductions.

Q. Hypothetically speaking, could Ameren Missouri justify spending $633,355,140 on cost effective energy efficiency for MEEIA 2016-2018, even if the Commission authorized it?

A. No. There are simply not enough cost effective measures that could be put into energy efficiency programs to justify a three-year implementation plan budget of $633,355,140.

Q. How did Massachusetts develop a portfolio of energy efficiency programs for the MassSave 2013-2015 implementation plan that resulted in a three-year budget of $1.5 billion?

A. While Massachusetts' traditional avoided energy, avoided capacity and avoided transmission and distribution costs are significantly higher than those of Ameren Missouri, Massachusetts expanded the components of their avoided costs by adding two new components created by Massachusetts for Massachusetts. The two components are:

a) Demand Reduction Induced Price Effects ("DRIPE"); and

b) Non-Energy Benefits ("NEBs").

The magnitude of DRIPE and NEBs together exceed the traditional avoided cost components of energy, capacity, transmission and distribution.

Q. Please define DRIPE.

A. DRIPE is a theoretical, academic concept wherein potential price suppression effects of efficiency programs on market clearing prices for electricity in a state or region are estimated based on a list of assumptions. DRIPE effects are then added to traditional avoided energy and capacity cost benefits used in the calculation of cost effectiveness of energy efficiency measures, programs, and portfolios.

Q. Since Ameren Missouri is a low cost generation producer and customers benefit in the form of lower revenue requirements from revenues and associated margins earned from off-system sales from Ameren Missouri energy centers into the Midcontinent Independent System Operator, Inc. ("MISO") market, is the impact of potentially lowering the market clearing prices for energy and capacity in MISO a benefit or cost to Ameren Missouri customers?

A. DRIPE, if it can be estimated, would represent a cost rather than a benefit to Ameren Missouri customers.

Q. Please define NEBs.

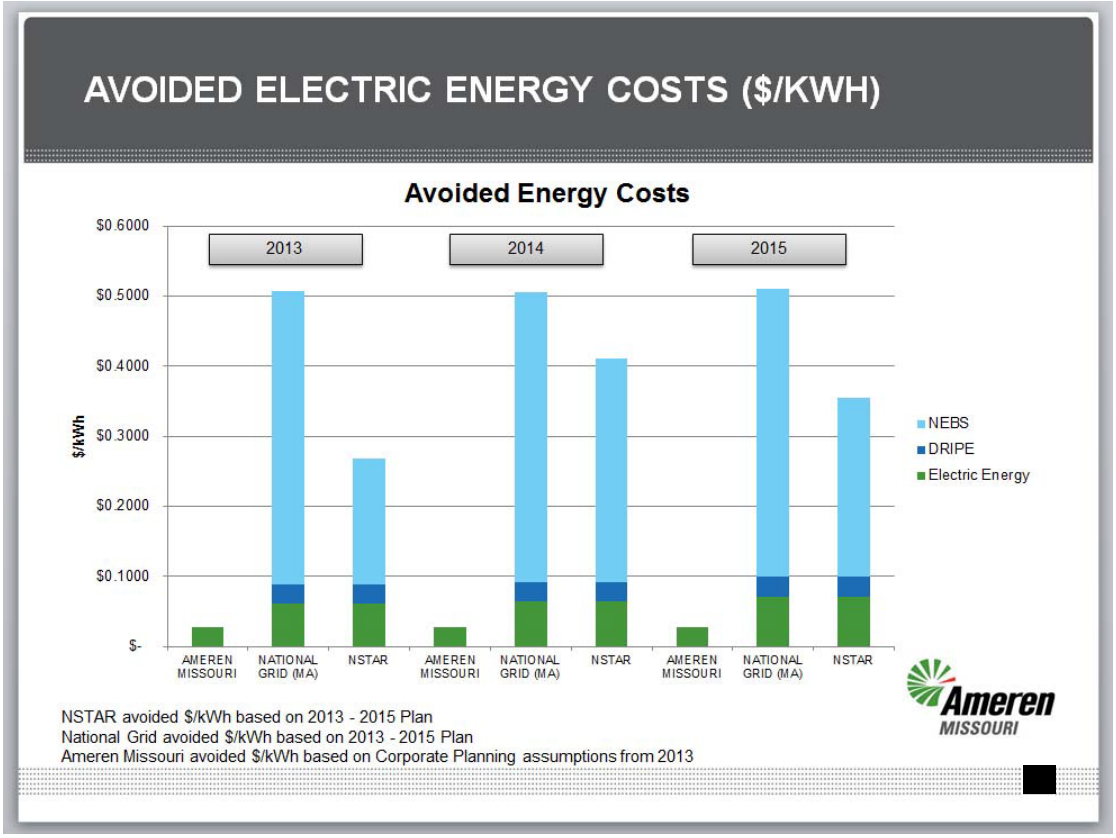
A. In Massachusetts, NEBs are referred to as non-energy impacts ("NEI"). NEIs include positive or negative effects attributable to energy efficiency programs apart from energy savings. Massachusetts' specific NEI covered the following categories:

1. Operations and maintenance costs;
2. Administrative or other labor not associated with operations or maintenance;
3. The cost of supplies, materials and materials handling;
4. Transportation or materials movement costs;
5. Other labor costs;
6. Water usage;

7. The amount of spoilage or defects;
8. Fees including insurance, inspections, permits and legal fees;
9. Other costs;
10. Sales;
11. Rent revenues; and
12. Other revenues.

Q. Using the avoided cost components that were used in the development of the 2013-2015 MassSave DSM implementation plan, please compare and contrast the various avoided cost categories to those of Ameren Missouri.

A. See the slides[3] below.



[3] Data for Massachusetts' utilities corresponds to the BCR model for 2013-2015 which was filed with the 2013 Annual Report. Data for Ameren Missouri corresponds to Corporate Planning assumptions from 2013.

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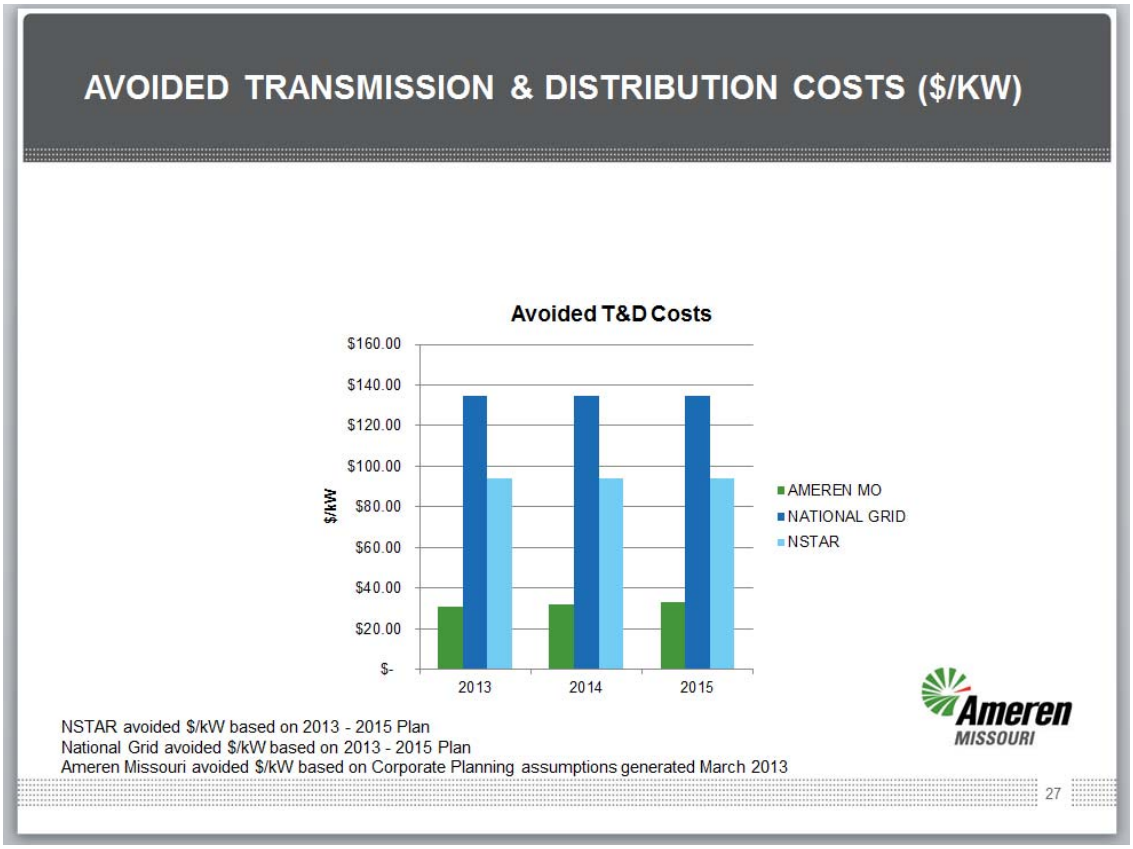


Q. Please explain the differences between Massachusetts' and Ameren Missouri's avoided costs shown above.

A. Just focusing on the main energy efficiency avoided energy cost component, absent the inclusion of either DRIPE or NEBs, Massachusetts has avoided energy costs that are more than double those of Ameren Missouri. Add DRIPE and the difference increases by another 20% or so. However, it is the NEBs component that puts avoided energy benefits for Massachusetts out of reach for Missouri. With NEBs, Massachusetts' avoided energy costs are approximately sixteen times the magnitude of Ameren Missouri's avoided energy costs. It is interesting that the NEBs component alone dwarfs the magnitude of the avoided energy component. In fact, it is not an exaggeration to surmise that Massachusetts' energy efficiency programs would be cost effective even if NEBs was the only avoided cost component included.

Q. Please summarize the national trends relative to cost effective energy efficiency opportunities for electric utilities.

A. The identification and analysis of cost effective energy efficiency opportunities is based on science rather than on political rhetoric. Technical and economic energy efficiency potential can be defined with statistical precision. States that signed up to achieve annual load reductions set forth in legislation which did not have state specific analysis supporting such legislation realize that they cannot achieve the load reductions in the EERS legislation. Thirteen of the twenty-five states that have EERS legislation also have exit ramps in the form of rate caps that preclude these states from achieving the EERS legislation annual energy efficiency load reductions.

States such as Massachusetts and Rhode Island represent special circumstances. These two states spend extraordinary per capita amounts on energy efficiency. Both states have a per capita spend that represents an order of magnitude that is more than other states. These costs are passed through to customers. Both states justify very high per capita budgets on the basis of extraordinary levels of program benefits that come from estimates of avoided costs that include the addition of DRIPE and NEBs avoided costs.

Significant differences exist between Missouri and Massachusetts or Rhode Island. Comparisons of energy efficiency policies for Missouri relative to either state do not inform the Commission with respect to the proposed plan. The context is entirely distinct and so are the programs. The next section of my testimony will address DSM Potential studies, specifically how the "devil is in the details" in order to understand realistic achievable potential ("RAP") in Missouri relative to the potential studies referred to by Mr. Mosenthal and Sierra Club witness Tim Woolf in their respective rebuttal testimonies.

VI. NATIONAL DSM POTENTIAL STUDIES RELATIVE TO AMEREN MISSOURI

Q. NRDC and Sierra Club witnesses (Phil Mosenthal and Tim Woolf respectively) criticize the Ameren Missouri potential study and also cite to other potential studies. Please explain what a DSM "potential study" is and how it relates to Ameren Missouri's proposal in this case.

A. Quoting the National Action Plan for Energy Efficiency, "A potential study is a quantitative analysis of the amount of energy savings that either exists, is cost-effective, or could be realized through the implementation of energy efficiency programs and policies."

Ameren Missouri follows an IRP business model. All cost effective energy efficiency options are firmly grounded in the process of integrating cost effective demand side and supply-side options to serve customer load over planning horizons that could be as limited as three years to as long as thirty years. The completion of an energy efficiency potential study is one of the first steps undertaken by Ameren Missouri in the development of a portfolio of energy efficiency programs. It serves as the analytic basis for Ameren Missouri's efforts to treat energy efficiency as an equivalent resource with supply-side options.

Q. Please describe the scope, schedule and budget for a typical Ameren Missouri DSM Potential Study.

A. The typical Ameren Missouri DSM potential study scope includes analyses of energy efficiency, demand response, combined heat and power, customer-distributed generation, and demand-side rate potential to achieve energy savings from Ameren Missouri sponsored initiatives. A typical study takes 12-14 months to complete and costs in the $1 million range. Of the $1 million budget, approximately 40% or more (usually more) of

the budget is allocated to obtaining primary market research data on Ameren Missouri customer-specific equipment saturations, demographic information, and psychographic (i.e., how Ameren Missouri customers make energy efficiency purchasing decisions) information. The remaining 60% of the budget is allocated to analyses, modeling, sensitivity analyses and reporting. Included in the 60% are contractor billable hours devoted to the Ameren Missouri DSM Potential Study stakeholder collaborative process where input, comments, and concerns are solicited from all stakeholders on everything from study assumptions and study methodologies to the questions asked in customer surveys.

Q. Do the results of the DSM Potential Study translate into annual load reductions for realistic achievable potential and maximum achievable potential used to support both the 2014 Ameren Missouri IRP filing and the Ameren Missouri 2016-2018 MEEIA filing?

A. The measure level potential gives Ameren Missouri a frame of reference for the upper limits of program potential. The generic program potential in a potential study provides the basis for developing an energy efficiency program supply curve that assists in the assessment of the reasonableness of the final program design on a levelized cost basis. The final program design, especially in the case of a utility such as Ameren Missouri that now has a solid base of design, implementation and evaluation experience along with a solid base of trade allies and implementation contractors, involves extensive input from all program design team members. Consequently, final program design almost always differs from results found within the initial DSM Potential Study. Therefore, the answer to the question is that the results of the DSM Potential Study inform program design but do not directly translate into actual annual load reductions for final program design.

Q. Did Ameren Missouri seek the input of stakeholders with respect to its DSM Potential Study?

A. Yes, there were many interactions with stakeholders concerning the study at the time it was developed.

Q. Did Sierra Club witness Tim Woolf participate in the Ameren Missouri DSM Potential Study stakeholder collaborative or seek input on his testimony from Sierra Club representatives who participated?

A. No. In response to data requests, Mr. Woolf stated that he did not participate in any of the collaborative meetings and/or discussions nor did he discuss such with Sierra Club representatives who did participate.

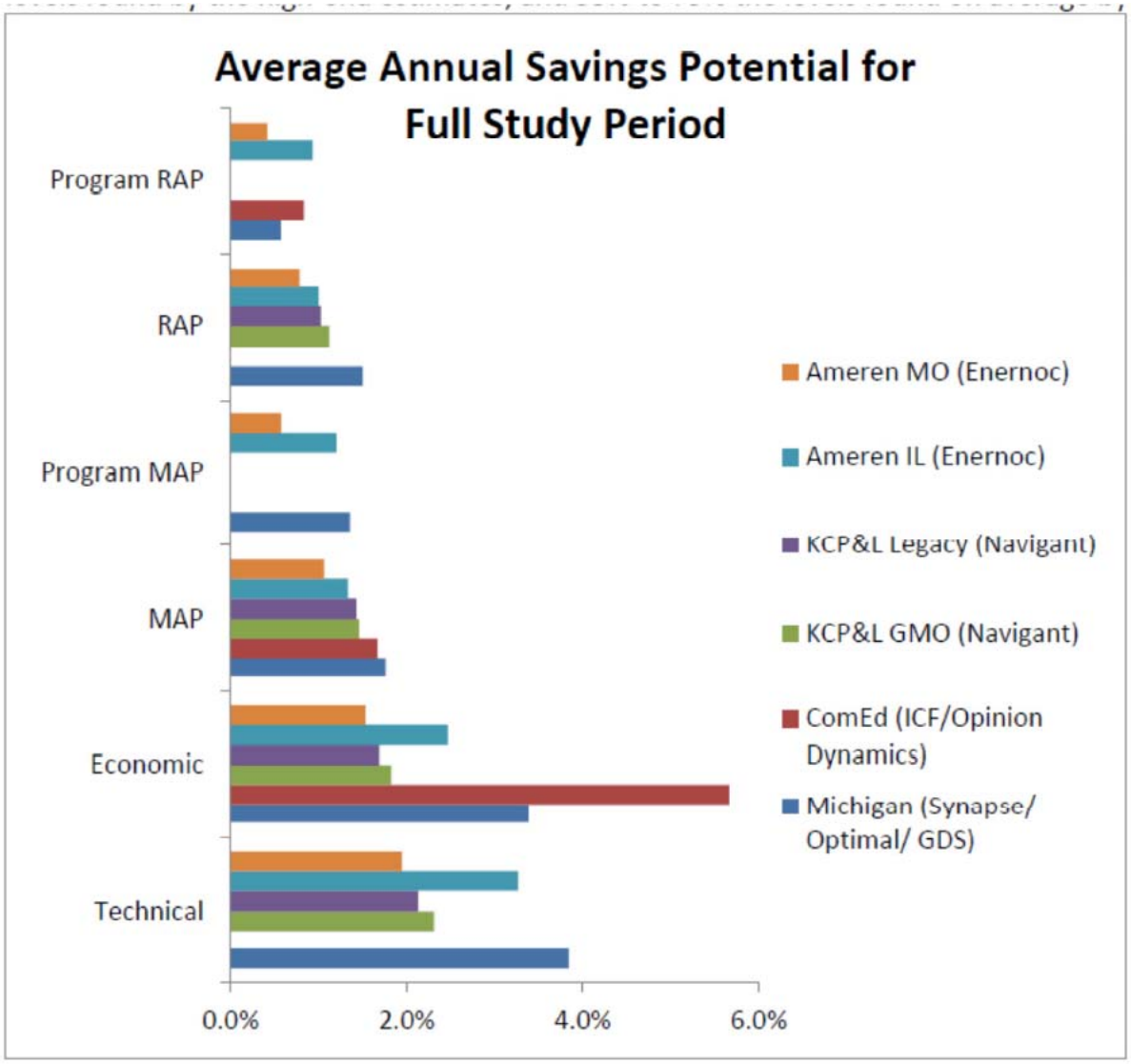
Q. Approximately how many Ameren Missouri DSM Potential Study stakeholder interactions took place during the development of the 2013 Ameren Missouri DSM Potential Study?

A. There were at least 70 interactions in the forms of face-to-face meetings, teleconferences, WebEx™ conferences, and e-mail correspondence. A list of those interactions is in Schedule RAV-2 to my testimony.

Q. What is Mr. Mosenthal's testimony in regards to how the results of the Ameren Missouri DSM Potential Study compares to studies from other jurisdictions?

A. Mr. Mosenthal's testimony on this issue is found on page 14, line 3-5 of his rebuttal testimony. Mr. Mosenthal states, "Comparing only Ameren Missouri's next MEEIA plan cycle with other state studies, the EnerNOC study estimates potential of 37% to 62% of the levels found by the other states' high-end estimates and 55% to 79% of the average levels."

Mr. Mosenthal then inserted a bar chart to illustrate the magnitude of the differences in the reported results of various DSM potential studies. The chart is reproduced below:



Q. Did Mr. Mosenthal put any effort into understanding why the studies he included contained different reported results? Put another way, did Mr. Mosenthal attempt to do any type of gap analysis to find out why the results of the studies were dissimilar?

A. No. We submitted a data request to Mr. Mosenthal to understand the level of analysis that he performed in comparing these potential studies. Mr. Mosenthal replied that

he did not perform any analysis. Mr. Mosenthal limited his work in the development of this chart to simply reporting the final numbers in each report.

Q. Can any two DSM potential studies be compared to add clarity to an evidentiary proceeding by simply comparing the final unexplained results in terms of annual load reduced from energy efficiency programs?

A. Absolutely not. The devil is always in the details. An analysis of how different DSM potential studies compare and/or contrast requires a gap analysis of the major drivers for the respective studies. Once a gap analysis has been performed, the results can be revised to present an "apples to apples" comparison between the two studies.

Q. What are the most common key drivers in potential studies that impact results?

A. The most common key drivers include:

1. Net vs. gross: Report estimates of annual load reductions in either gross or net terms, preferably net.
2. Inclusion of Natural Gas Benefits For Electric Potential: Adjust avoided costs to include similar components. For example, if one study for electric DSM potential includes natural gas benefits in the screening of cost effectiveness for measures and another study only includes electric benefits, compare both studies using the same level of benefits.
3. Opt Out Customers: If a jurisdiction has provisions for customers to opt out of participating in utility DSM programs, remove opt out customers from estimates of DSM potential or vice versa.
4. EM&V True Up: DSM potential studies are typically based on measure parameters that come from secondary data sources or from deemed measure savings listed in Technical Resource Manuals that have not been updated to reflect the latest EM&V results on actual energy efficiency measure impacts. DSM potential studies should be adjusted to reflect actual EM&V results.
5. Measure vs. Program Level Potential: Measure level is a simplistic assessment based on stand-alone individual measure incremental energy savings. Not all measures, e.g., consumer electronics, are suitable for utility energy efficiency programs. When measures are bundled together in programs there are interactive effects such that

total energy savings from multiple measures are less than the sum of the individual measures. Program level potential is significantly less than measure level potential.

6. Effective Useful Life ("EUL"): Once an efficient measure is installed, will the measure be replaced by another efficient measure or by an inefficient measure when it reaches the end of its useful life?
7. Emerging but unknown technologies: Is there an attempt to quantify emerging but unknown energy efficient technologies in the potential study?
8. Combined Heat and Power: Is CHP included or excluded in the estimate of DSM Potential?
9. Baseline Technology Assumptions: Do the studies have similar baseline energy consumption estimates?
10. Avoided Cost Assumption: Are they similar?
11. Sales Forecast Growth Rates: Are they similar?
12. Calibration of DSM Potential Study To Utility End-Use Sales Forecast: Necessary in order to avoid double counting of energy efficiency savings.
13. Start/Stop Dates: Align the start and stop dates of the potential studies to account for the rapidly changing building code and appliance efficiency standards.

Q. Did you do a high level reconciliation of the DSM potential studies in Mr. Mosenthal's testimony relative to Ameren Missouri's DSM Potential Study?

A. Yes. The results of the analyses showed that the studies in Mr. Mosenthal's testimony, when normalized, are more similar than dissimilar. In other words, the estimate of achievable potential in the studies cited by Mr. Mosenthal when normalized to Ameren Missouri show similar and, in some cases less, achievable potential as Ameren Missouri's study.

VII. KANSAS CITY POWER & LIGHT COMPANY ("KCPL") DSM POTENTIAL STUDY

Q. Start with the KCPL DSM Potential studies cited by Mr. Mosenthal. Please reconcile the KCPL studies cited by Mr. Mosenthal with the Ameren Missouri study.

A. Ameren Missouri worked with KCPL to do a high level reconciliation of the two potential studies. The results of the reconciliation were presented at an Ameren Missouri MEEIA 2016-2018 Technical Conference in March of 2015. The presentation is attached to my testimony as Schedule RAV-3.

Key drivers for the KCPL study that differed from the same drivers for the Ameren Missouri study included:

- KCPL reported gross rather than net potential thereby yielding higher estimates of potential;
- KCPL included opt-out customers thereby yielding higher estimates of potential;
- KCPL included natural gas benefits in their cost effectiveness screening of measures thereby yielding higher estimates of potential;
- KCPL did not adjust estimates of potential from TRM derived estimates to actual EM&V results;
- KCPL reported measure level rather than program level potential thereby yielding higher estimates of potential;
- KCPL assumed a 1.0% sales forecast rate compared to Ameren Missouri's 0.6% thereby yielding higher estimates of potential; and
- KCPL assumed customers would revert back to buying inefficient equipment when efficient equipment reached the end of its useful life thereby yielding higher estimates of potential.

When Ameren Missouri normalized the KCPL DSM Potential Study to the Ameren Missouri potential study, the estimate of KCPL energy efficiency potential decreased from a cumulative total of 19.3% in 2033 to 6.4%, which is similar to that of the Ameren Missouri DSM Potential Study.

Q. What did KCPL state their position to be on DSM potential in their April 1, 2015 IRP filing in File No. EO-2015-0254?

A. KCPL's position refers to their preferred DSM plan as "Option C" in their IRP filing. KCPL states that "Option C represents a more conservative level of achievable DSM levels than RAP or MAP identified in the Potential Study." In Volume 5 of the KCPL

IRP filing on pages 3-5, KCPL describes the adjustments that they made to their potential study and the adjustments reflect those described in the Ameren Missouri normalization of the KCPL DSM Potential Study described previously in my testimony. Here is what KCPL stated regarding their adjustments to their DSM Potential Study for the IRP filing:

1) An NTG ratio of 1.0 was used in the Potential Study for all measures, with the exception of appliance recycling. For appliance recycling an NTG ratio of 0.52 was used as agreed upon with the stakeholders. Thus, the potential estimates for all other measures are "gross" savings.
2) The Potential Study did not include an allowance for commercial and industrial customer opt-outs. (However, as noted above, KCPL did make an adjustment to the RAP and MAP levels used in the integrated analysis by factoring in an estimated 10% opt-out of commercial and industrial customers).
3) KCPL has also learned that the new baselines that begin in 2020 as a result of the Energy Independence and Security Act of 2007 (EISA) were not reflected in the Potential Study.
4) The Potential Study also includes gas impacts for certain measures (19 residential measures and 10 C&I measures), which result in both significant electric and gas savings, such as shell and envelope measures. Technologies that focused primarily on natural gas savings, however, were not included.
5) The Potential Study conducted by Navigant is at the measure level. As such, the Potential Study did not consider or adjust for the interactive effects between measures when multiple energy efficiency measures are installed at a single location.
6) KCPL has learned that some potential studies estimate and adjust for naturally occurring energy efficiency. Naturally occurring energy efficiency is savings that would occur over and above those that would occur from changes in codes and standards but in the absence of any market intervention. No such adjustment was made in the KCPL potential study.

KCPL states, "Each of the above input assumptions would result in the potential savings to be overestimated, however, the effects of these assumptions have not be quantified individually or in total."[4]

[4] File No. EO-2015-0254; Vol 5: Demand-Side Resource Analysis, p. 4.

Q. There is no question that KCPL agrees that their DSM Potential Study, cited in Mr. Mosenthal's rebuttal testimony, significantly overstates KCPL DSM potential. Is that correct?

A. That is correct. There is no question that the KCPL DSM Potential Study significantly overstates DSM potential due to, at least, all the reasons cited by KCPL in their IRP filing.

Q. How much did KCPL quantify in their 2015 IRP filing that their DSM Potential Study overstated RAP?

A. KCPL quantified this in Volume 5 in Table 48 on page 129 of their IRP filing. A replication of the table is shown below. Option C, which represents the KCPL IRP preferred plan, is 43% of RAP.

Year	Option C	RAP	MAP
2016	68,782	113,259	147,686
2017	122,446	245,023	324,785
2018	176,168	386,550	518,940
2019	226,837	513,318	702,822
2020	269,941	642,534	889,820
2021	302,208	766,066	1,069,225
2022	333,479	878,946	1,234,937
2023	364,793	978,749	1,382,363
2024	392,059	1,058,780	1,504,823
2025	427,581	1,123,883	1,606,023
2026	454,893	1,177,265	1,692,079
2027	482,171	1,215,175	1,755,330
2028	509,000	1,244,211	1,806,816
2029	535,436	1,253,693	1,831,914
2030	560,088	1,251,401	1,839,705
2031	570,408	1,241,142	1,834,834
2032	581,833	1,222,401	1,816,888
2033	593,171	1,199,740	1,791,421
2034	604,314	1,177,764	1,766,638
Sum	7,575,608	17,689,900	25,517,049

VIII. MICHIGAN STATEWIDE DSM POTENTIAL STUDY

Q. Please discuss the Michigan statewide DSM Potential Study cited by Mr. Mosenthal as having higher DSM potential than Ameren Missouri's Potential Study.

A. This was a statewide study contracted to GDS Associates, Inc. ("GDS") that was published on November 5, 2013. This study covered two distinct time periods – both of which were considerably shorter than the 20-year time period of the Ameren Missouri DSM Potential Study. The two time periods in the Michigan study were:

- The 5-year period from January 1, 2014 through December 31, 2018; and
- The 10-year period from January 1, 2014 through December 31, 2023.

Q. In Mr. Mosenthal's bar chart, he states the contractor for the Michigan study was Synapse/Optimal/GDS. What were the results of the Michigan study for the 5-year period from January 1, 2014 through December 31, 2018?

A. I located the study that identified GDS as the contractor and reviewed the results. The results are shown in Table 1-1, page 4 of the study. Table 1-1 is shown below:

Table 1-1: Summary of Technical, Economic and Achievable Electric and Gas Energy Savings for 2018

End Use	Technical Potential	Economic Potential (UCT)	Economic Potential (TRC)	Achievable Potential (UCT)	Achievable Potential (TRC)	Constrained Achievable (UCT)
Electric Sales MWh						
Savings % - Residential	45.8%	41.3%	39.8%	10.7%	10.5%	4.3%
Savings % - Commercial	48.5%	44.9%	37.4%	12.2%	10.5%	3.1%
Savings % - Industrial	27.0%	21.0%	19.3%	4.9%	4.5%	2.3%
Savings % - Total	**40.7%**	**36.1%**	**32.4%**	**9.4%**	**8.6%**	**3.2%**

If the Total Resource Cost ("TRC") potential is 8.6% over a 5-year period, that would equate to a simple average of 8.6%/5 = 1.72% per year.

Q. What were the results of the Michigan study for the 10-year period from January 1, 2014 through December 31, 2023?

A. The results are shown in Table 1-2, page 6 of the study. Table 1-2 is shown below:

Table 1-2: Summary of Technical, Economic and Achievable Electric and Gas Energy Savings for 2023

End Use	Technical Potential	Economic Potential (UCT)	Economic Potential (TRC)	Achievable Potential (UCT)	Achievable Potential (TRC)	Constrained Achievable (UCT)
Electric Sales	**MWh**					
Savings % - Residential	39.7%	35.2%	33.7%	14.7%	14.3%	5.9%
Savings % - Commercial	48.0%	44.5%	37.0%	20.8%	17.6%	6.0%
Savings % - Industrial	26.4%	20.5%	18.9%	8.9%	8.1%	5.0%
Savings % - Total	**38.4%**	**33.8%**	**30.1%**	**15.0%**	**13.5%**	**5.7%**

If the TRC potential is 13.5% over a 10-year period that would equate to a simple average of 13.5%/10 = 1.35% per year.

Q. What are the key DSM Potential Study driver differences between the Michigan and Ameren Missouri DSM Potential Studies?

A. The most obvious key driver difference is the study period. The Michigan 5-year study period starts two years prior to the Ameren Missouri study and ends seventeen years prior to the Ameren Missouri study. The Michigan 10-year study also starts two years prior to the Ameren Missouri study but ends twelve years prior to the Ameren Missouri study. Consequently, the impact of lower incremental energy savings due to the proliferation of building energy codes and appliance energy efficiency standards is minimized in the Michigan study relative to the Ameren Missouri study.

Other key driver differences include the following:

1) The basis for the Michigan measure level information used in their DSM Potential Study is the Michigan Energy Measures Database ("MEMD").

MEMD is based on a secondary data source called the Morgan Measure Library ("MML"). Many of the measures in the first Ameren Missouri TRM were derived from MML. The MML measures were generally adjusted downward when actual Ameren Missouri primary EM&V results were compared to MML results.

2) With respect to non-energy benefits of energy efficiency programs, GDS included an adder of $9.25 per ton of carbon for reduced emissions of CO2. Ameren Missouri had no such adder.
3) GDS included natural gas and water benefits in the determination of the cost effectiveness of electric measures. Ameren Missouri did not.
4) GDS reported measure level potential. Ameren Missouri reported program level potential.
5) Michigan did not make an adjustment to reflect loss of any opt-out customers from DSM potential.
6) Residential DSM Potential in Michigan includes significant components related to consumer electronics, i.e., LED TVs, PCs, and consumer appliances. Neither consumer electronics nor most appliances are cost effective for Ameren Missouri. Even if consumer electronics were cost effective, the value of using customer funds to encourage customers to purchase Energy Star branded TVs and PCs is questionable. The latest Energy Star brand awareness shows that in excess of 87% of all consumers recognize and value this brand absent any utility DSM program. In addition, many Energy Star branded consumer electronics have lower costs than non-Energy Star branded consumer electronics. It is also true that some Energy Star brands have negative incremental energy savings due to other features that consumers value. Finally, it is difficult to justify the use of customer funds to support the purchase of highly discretionary consumer electronics products that are often out of date within five years.

To illustrate the reliance of consumer electronics on the Michigan DSM residential customer potential, Table 6-10 on page 64 of the Michigan study states the various types and magnitude of residential DSM potential:

Table 6-10: Residential Achievable TRC Potential Electric Energy Savings by End Use

END USE	2018 ENERGY (MWH)	% OF 2018 SAVINGS	2023 ENERGY (MWH)	% OF 2023 SAVINGS
Appliances	366,811	10%	673,510	14%
Electronics	749,078	21%	854,883	17%
Lighting	1,353,255	38%	1,440,074	29%
Water Heating	262,683	7%	594,697	12%
Other	43,585	1%	96,303	2%
HVAC (Envelope)	170,658	5%	344,028	7%
HVAC (Equipment)	339,401	10%	670,349	14%
Behavioral Programs	264,123	7%	273,098	6%
Total	3,549,596	100%	4,946,942	100%
% of Annual Sales Forecast	*10.5%*		*14.3%*	

Appliances and electronics represent 366,811 + 749,078 = 1,115,889, or 31% of Michigan's residential DSM potential in 2018.

Q. How much impact do appliances and electronics have on Michigan's business DSM Potential?

A. Table 7-10 on page 95 of the Michigan study shows the following:

Table 7-10: Commercial Achievable TRC Potential Electric Energy Savings by End Use

End Use	2018 Energy Savings (MWh)	% of 2018 Total	2023 Energy Savings (MWh)	% of 2023 Total
Appliances, Computers, Office Equipment	183,669	5%	352,481	5%
Compressed Air	221,662	6%	329,391	5%
Cooking	29,293	1%	58,586	1%
Envelope	10,967	0%	16,213	0%
HVAC Controls	194,726	5%	278,618	4%
Lighting	1,328,909	33%	2,503,571	37%
Other	89,843	2%	168,312	2%
Pools	9,231	0%	15,656	0%
Refrigeration	1,229,658	31%	1,934,311	28%
Space Cooling	72,972	2%	112,002	2%
Space Heating	12,378	0%	19,957	0%
Ventilation	511,177	13%	876,720	13%
Water Heating	110,063	3%	169,284	2%
Total	4,004,548	100%	6,835,102	100%
% of Annual Sales Forecast	*10.5%*		*17.6%*	

Thus, appliances, computers and office equipment account for 183,669 MWh or 5% of the Michigan business DSM potential.

Q. Are there any other program elements in the Michigan DSM Potential Study that would not be cost effective in the Ameren Missouri study?

A. Yes. On the residential side, the behavior and HVAC envelope measures identified as part of achievable potential would not be cost effective for Ameren Missouri due primarily to the exclusion of natural gas benefits in cost effectiveness analyses. On the business side, refrigeration makes up 31% of Michigan's DSM potential. For Ameren Missouri, refrigeration makes up approximately 7% of business DSM potential due in part to the significant negative interactive effects associated with increased commercial HVAC load when commercial refrigeration cases are sealed up. To be conservative, however, we will

assume that 50% of the 31%, or 16%, of the Michigan DSM potential is applicable to Ameren Missouri.

Q. How would the adjustments in the preceding Q&A impact the results of the Michigan DSM Potential Study when normalized to Ameren Missouri – at least on an average annual basis through 2018?

A. Michigan cumulative residential potential in 2018 is 3,549,596 MWh. Removal of the appliances, electronics, HVAC building envelope, and behavior programs would reduce the potential to 1,998,926 MWh. Michigan cumulative business potential in 2018 is 4,004,548 MWh. Removal of the office equipment and 50% of the refrigeration potential would reduce the potential to 3,206,050 MWh. The revised potential would be 1,996,926 + 3,206,050 = 5,202,976 MWh or 69% of the total. Consequently, if the Michigan average annual DSM potential through 2018 was estimated to be 1.72% per year, the normalized value to Ameren Missouri would be 1.72% x 0.69 = 1.19%.

Q. Are there other significant adjustments that would have to be made but are not possible to estimate at this time?

A. Yes. The calculation of additional "normalizations" is where details and model specifics are necessary. First, there is the opt-out customer adjustment, which is significant. Second, there is the measure level to program level potential adjustment which, for Ameren Missouri, amounted to the application of what turned out to be a 54% multiplier to measure level potential. Third, there is the issue of the magnitude of CFLs in the Michigan DSM Potential Study vs. the Ameren Missouri study. For example, CFLs are not cost effective in the Missouri study. However, in the Michigan study, CFLs account for 53%

of Michigan's efficient lighting potential. Fourth, there is the issue of significantly different baseline assumptions for key energy efficiency measures.

Q. When normalized for the significant drivers in DSM potential studies, would there by a meaningful difference between the Michigan and Ameren Missouri DSM Potential Studies?

A. No. Similar to the normalization of the KCPL DSM Potential Study, the normalized Michigan DSM Potential Study would show similar, if not lower, achievable potential on an average annual basis than that of the Ameren Missouri study.

IX. COMMONWEALTH EDISON ("COMED") DSM POTENTIAL STUDY

Q. Please discuss the COMED DSM Potential Study cited by Mr. Mosenthal as having higher DSM potential than Ameren Missouri's Potential Study.

A. The COMED study was contracted to ICF International and Opinion Dynamics Corporation and the final report was issued in August 2013. The study covered the 6-year period of 2013-2018.

Q. What were the results of the COMED DSM Potential Study?

A. The results are shown on page iii, Figure ES-1 in the COMED study. Figure ES-1 is replicated below:

Figure ES-1. Total Achievable Potential, by Scenario and Year

	2013	2014	2015	2016	2017	2018
Cumulative Savings Forecast—GWh						
Economic potential	7,610	28,162	28,679	29,161	29,634	30,009
Maximum achievable potential	1,122	2,453	3,767	5,430	7,104	8,693
Program achievable potential	824	1,649	2,294	3,043	3,778	4,387
Cumulative Savings Forecast— % of load						
Maximum achievable potential	1%	3%	4%	6%	8%	10%
Program achievable potential	1%	2%	3%	3%	4%	5%
Incremental Savings Forecast—GWh						
Maximum achievable potential	1,122	1,438	1,602	1,865	1,956	2,111
Program achievable potential	766	868	827	846	828	846
Incremental Savings Forecast— % of load						
Maximum achievable potential	1.3%	1.6%	1.7%	2.1%	2.1%	2.4%
Program achievable potential	0.9%	1.0%	0.9%	1.0%	0.9%	1.0%
Program Costs (Millions, Real 2013$)						
Maximum achievable potential	$265	$349	$426	$487	$488	$527
Program achievable potential	$125	$137	$139	$146	$152	$157

Figure ES-1 shows that COMED is estimating a 6-year cumulative MAP of 10%, or an average of 1.67% per year. Illinois energy efficiency savings standards are constrained by statutory caps to mitigate rate impacts. With Illinois statutory rate caps on DSM spending, the COMED program 6-year achievable potential is 5% or an average of 0.83% per year.

Q. What are the key DSM potential study driver differences between the COMED and Ameren Missouri DSM Potential studies?

A. Similar to the Michigan state DSM Potential Study, the most obvious difference is the study period of the COMED study from 2013-2018 as compared to the Ameren Missouri study period from 2016-2033. The start date of 2013 for the COMED study is a particularly meaningful difference as it allows for substantial savings from CFLs using an incandescent light bulb as the baseline for determining incremental energy savings. There are no cost effective CFLs in the Ameren Missouri 2016-2033 DSM Potential Study. Other significant differences include the following:

1) COMED included non-cost effective measures in the potential analysis. 15% of the energy efficiency measures in the COMED DSM potential estimates are non-cost effective.
2) COMED included natural gas benefits in its electric energy efficiency measure cost effectiveness calculations. COMED used natural gas efficient furnace benefits to make non-cost effective electric central air conditioning technologies cost effective by, as one example, pairing the non-cost effective central air conditioner with a highly-cost effective natural gas furnace and then called the combination cost effective.
3) The COMED study is based on measure level rather than program level potential.
4) COMED used a Delphi approach or "council of experts" approach to subjectively estimate customer take rates for measures. This approach led to program participation rates that increased by a multiple of three or more from 2013 to 2018. Ameren Missouri is not aware of any large scale, established programs that have been able to increase customer participation in a mature utility energy efficiency program by a multiple of three or more over a 6-year planning horizon.
5) COMED electric sales are assumed to grow at the rate of 1.7% per year. Ameren Missouri electric sales are assumed to grow at the rate of 0.6% per year.
6) COMED has no opt-out customers
7) COMED did not true up DSM potential estimates with the latest EM&V findings.

Q. When normalized for the significant drivers in DSM potential studies, would there by a meaningful difference between the COMED and Ameren Missouri DSM Potential Studies?

A. Ameren Missouri does not have sufficient detail on the COMED program specific information for each year from 2013-2018 to make this assessment. That being said, there should be no question that key drivers, such as the assumption that program participation will increase by a multiple of three from 2013 to 2018, may drive COMED DSM Potential estimates as high as a multiple of two to three times higher than those of Ameren Missouri – solely due to this one key driver of potential.

The reporting of measure level rather than program level potential may increase COMED DSM potential by a multiple of two relative to the Ameren Missouri DSM Potential

Study. I must re-state the importance of reporting program level potential. Program level potential accounts for interactive effects of multiple measures in programs. These interactive effects reduce overall levels of equipment potential. There are certain measures, such as consumer electronics, that may screen as cost effective due to assumptions around avoided costs and incremental energy savings and costs. Many of these measures are not well suited for utility-sponsored energy efficiency programs. Finally, program level potential accounts for the fact that if utility-sponsored DSM equipment related programs are intertwined with DSM customer behavior programs, there are also interactive effects that result in less potential than if the potential was assessed independently for each type of DSM potential.

The development of program potential from measure-level achievable potential requires that the measure mix will change due to a number of the program delivery factors. Program potential is an optimized subset of the measure-level potential designed for implementation in a specific market and service territory.

COMED includes natural gas benefits in their analysis of cost effective electric energy efficiency potential. This is a significant driver insofar as it may show customer behavior based programs to be cost effective due to natural gas heating benefits that flow from measures intended to produce electric-only benefits.

Perhaps as significant as the other key drivers of electric energy efficiency potential is the simple fact that the COMED study period from 2013-2018 includes significant major measure baseline assumption differences from the Ameren Missouri study. For example, the COMED study uses a baseline of T12 linear fluorescent lighting to assess Business Lighting incremental energy savings. Ameren Missouri uses a baseline of T8. The energy savings of

linear fluorescent lighting using a baseline of T8 yields less than 30% of the incremental energy savings compared to a baseline of T12.

Without COMED program specific details for the COMED study period from 2013 to 2018, it is relatively certain that due to the significant differences in key driver assumptions between the COMED and Ameren Missouri DSM Potential Studies that the COMED study would yield similar results to those of Ameren Missouri if the study key drivers were normalized to each other.

X. AMEREN ILLINOIS DSM POTENTIAL STUDY

Q. Please discuss the Ameren Illinois DSM Potential Study cited by Mr. Mosenthal as having higher DSM potential than Ameren Missouri's Potential Study.

A. Although both studies were performed by Ameren operating companies and both studies were contracted to EnerNOC, the Ameren Illinois ("AIC") study and Ameren Missouri DSM Potential Studies are not comparable.

Q. Why not?

A. The AIC study covered the period 2013-2017. The Ameren Missouri study covered the period 2016-2033. Consequently, there are only two years of overlap between the two studies. Also, because it started in 2013, the AIC study has completely different baseline energy consumption assumptions than the Ameren Missouri study due to the pending imposition of a plethora of new residential and business equipment efficiency standards. In addition, the Illinois Statewide TRM has significantly different baseline energy values than does Ameren Missouri.

Q. What were the results of the AIC DSM Potential Study program potential?

A. The results are shown in the Executive Summary on page 5 in Table 2 as follows:

Table 1 Summary of Cumulative, Net, Program-Level Electric Energy Efficiency Potential

	2014	2015	2016
Baseline Projection (GWh)	35,861	35,792	35,973
Annual Savings (GWh)			
Program Low Potential	341	667	992
Program High Potential	449	880	1,308
Energy Savings (% of Baseline)			
Program Low Potential	0.9%	1.9%	2.8%
Program High Potential	1.3%	2.5%	3.6%
Energy Costs (Million $)			
Program Low Potential	$86.1	$171.2	$263.9
Program High Potential	$177.7	$353.0	$542.8

These actual program level results appear to be meaningfully less than the results that Mr. Mosenthal has put in his bar graph in his testimony.

Q. Do the same differences in key driver variables cited in the COMED DSM Potential Study that drive differences with the Ameren Missouri DSM Potential Study apply to the AIC study?

A. The answer is generally "yes" but there are exceptions. For example, AIC did not use a Delphi approach to estimate customer participation rates in programs that ultimately yielded a 300% increase in participation from 2013 to 2018 – at least not in the case of the COMED DSM Potential Study. Rather, AIC conducted AIC customer primary psychographic market research to estimate the likelihood of AIC customer participation rates in programs as a function of the timeliness of the expected payback of the incremental cost

associated with an efficient piece of equipment. The other key difference is that the AIC study reported program level potential, similar to what Ameren Missouri reported, whereas the COMED study reported measure level potential.

XI. NEW YORK STATE DSM POTENTIAL STUDY

Q. Are there comparisons to other DSM potential studies that Mr. Mosenthal cites in his testimony that may provide additional insights into the robustness of the results of the Ameren Missouri DSM Potential Study?

A. Yes. Mr. Mosenthal states the following on page 3, lines 1-8 of his testimony:

> "I have also completed or directed numerous studies of efficiency potential and economics in many locations, including China, Colorado, Kansas, Maine, Massachusetts, Michigan, New England, New Jersey, New York, Quebec, Texas, and Vermont. These studies ranged from high level assessments to extremely detailed, bottom-up assessments evaluating thousands of measures among numerous market segments. Recent examples of the latter are analyses of electric and natural gas efficiency and renewable potential along with the development of suggested programs for New York State, on behalf of the New York State Energy Research and Development Authority (NYSERDA)."

Q. Did you issue a data request to Mr. Mosenthal to request a copy of his recent NYSERDA DSM Potential Study?

A. Yes. Data Request 1.1 requested the NYSERDA study and all supporting documentation, modeling and analyses that Mr. Mosenthal relied upon to support the study.

Q. Did Mr. Mosenthal provide the study and other requested documentation?

A. No. Mr. Mosenthal's attorney objected to the data request and Mr. Mosenthal did not provide anything as a response.

Q. Were you able to find a copy of Mr. Mosenthal's NYSERDA study in the public domain?

A. I was able to find the study in the public domain. However, I could not locate the workpapers and documentation that supported the study.

Q. Please describe the electric energy efficiency DSM potential study that Mr. Mosenthal completed for NYSERDA.

A. The NYSERDA DSM Potential Study, directed by Mr. Mosenthal, issued a final report in April of 2014 and a revised report in January of 2015. Co-contributors to the study included ACEEE and the Vermont Energy Investment Corporation ("VEIC"). The study presented the potential for increased adoption of energy efficiency and renewable energy technologies in New York State. It focused on the long-term potential using a 20-year study period of 2013–2032. Efficiency potential results were presented in terms of "achievable potential" and "economic potential" (the cost-effective energy savings).

Q. What were the results of the NYSERDA DSM Potential Study directed by Mr. Mosenthal?

A. The results are shown on page 16 in Table 2 of the NYSERDA report. Table 2 is shown below:

Table 2. Summary of Economic and Achievable Electric Efficiency Potential Relative to Sales Forecast and NYS EEPS, 2020 and 2030

	2020	2030
Statewide Forecast (GWh)	182,406	202,397
Economic Potential (GWh)	66,123	91,856
% of Forecast	*36%*	*45%*
Achievable Potential (GWh)	21,748	36,328
% of Forecast	*12%*	*18%*
Savings from EEPS (GWh)	11,230	17,013
% of Forecast	*6%*	*8%*

Mr. Mosenthal estimated a cumulative 18% load reduction attributable to electric energy efficiency for New York by 2030. Since the study started with the year 2013, the average annual load reduction would be 18%/17 years = 1.06% per year.

Q. What was Mr. Mosenthal's recommendation in his Ameren Missouri MEEIA 2016-2018 rebuttal testimony as to what he considers reasonable annual load reductions goals for Ameren Missouri for 2016-2018?

A. Mr. Mosenthal's testimony is on pages 27-28 of his rebuttal testimony. Mr. Mosenthal's testimony is shown below:

> **Q. Given that you think Ameren's savings targets in the 2016-2018 MEEIA plan are too low, what would be reasonable targets?**
>
> A. The minimum savings targets in the MEEIA rules provide a reasonable ramp rate for Ameren's DSM programs. These rules require 0.5% annual savings as a percent of load in 2013, with a ramp up of an additional 0.2% per year until reaching 1.9% savings in 2020. MEEIA rules state that "[t]he commission shall use the greater of the annual realistic achievable energy savings and demand savings as determined through the utility's market potential study or the following incremental annual demand-side savings goals." Since the savings goals in the MEEIA rules are greater than the potential determined through Ameren's market potential study, which I have shown to be unreasonably low, these rules clearly provide that the savings targets should be viewed as a

floor and reflect the ramp up rate of 0.2% savings as a percent of load per year.

Following Mr. Mosenthal's testimony, his opinion is that Ameren Missouri should be required to achieve the MEEIA aspirational load reduction goals of 1.1% in 2016, 1.3% in 2017, and 1.5% in 2018.

Q. Why do you think Mr. Mosenthal would recommend higher annual load reduction goals for Ameren Missouri than what he recently calculated for the state of New York?

A. It appears that Mr. Mosenthal directed the NYSERDA DSM Potential Study in one manner but reviewed the Ameren Missouri study in a different, more aggressive manner. There should be no doubt that his recommendation for annual energy efficiency load reduction goals for Ameren Missouri is far higher than for the study he directed for the state of New York.

Q. Please address the methodologies used by Mr. Mosenthal to conduct the NYSERDA DSM Potential Study relative to the Ameren Missouri study. Start with whether both studies assessed potential at the program or measure levels.

A. Both studies reported DSM potential in terms of program potential. Yet Mr. Mosenthal questioned the appropriateness of the Ameren Missouri DSM Potential Study reporting program potential. His rebuttal testimony in the Ameren Missouri MEEIA 2016-2018 filing states the following on page 4, lines 13-14:

> "…the potential study then inappropriately and significantly lowers the measure-level potential study to estimate a "program potential,"…"

Within the NYSERDA report, Mr. Mosenthal clearly states that he also estimated program potential for NYSERDA. He also speaks to the adjustments he made to go from measure-

level to program-level potential for NYSERDA. The following excerpt can be found on page 5 of the NYSERDA study report:

> Our analysis accounts for interactions between measures installed in the same space. Individual measure savings are not necessarily additive. Because of interactions between measures, the total potential for all measures is less than the sum of individual measure opportunities. For example, building envelope improvements will reduce the cooling load and will thus lower the savings opportunities for high-efficiency air conditioning. The potential estimates take into account all the interactions between measures. This therefore represents the total economic savings achievable with maximum measure adoption. Note however, that if some measures were eliminated, the potential for remaining measures might increase depending on their original interactions with the removed measures.

Q. Does Mr. Mosenthal explain how Ameren Missouri DSM programs should assess all forms of free ridership, spillover and market effects for the Ameren Missouri MEEIA 2016-2018 portfolio of programs?

A. Mr. Mosenthal did not address the issues of free ridership, spillover and market effects for the Ameren Missouri MEEIA 2016-2018 implementation plan in his Ameren Missouri MEEIA 2016-2018 rebuttal testimony. However, he has explicitly stated his thoughts about the issues of free ridership, spillover and market effects in the NYSERDA study. Mr. Mosenthal's thoughts are on page 10 and 11 of the NYSERDA study. The pertinent excerpt from the NYSERDA study is:

1.7.3 Free Ridership and Spillover Assumptions

Efficiency programs provide various incentives to promote the adoption of efficiency measures. Of course, some people or businesses take advantage of incentives for efficient equipment that they would have bought without the incentive – these are *free riders* to the efficiency program. The savings from free riders' efficiency measures should not be attributed to the efficiency program since they would have installed the measure without the program.

At the same time, efficiency program activities tend to have a *spillover* effect, whereby they encourage adoption of efficiency measures by people who would not have done so without the program, but who for various reasons never collect an incentive. The savings of their measures should be attributed to the program since they would not have installed the measure without the program.

The balance between free ridership, which decreases program savings relative to the number of program participants (who receive an incentive), and spillover, which increases savings relative to the number of participants, is hotly debated within the industry. Program evaluations often find free ridership to be a greater factor, but many argue that free ridership is easier to measure and spillover is often ignored, and that the broader impacts of spillover take place over longer time horizons.[6,7]

This achievable scenario is focused on the longer-term potential for well-funded programs operating over two decades, with an expectation of a significant level of market transformation. We have also assumed that the savings from naturally occurring efficiency, much of which would typically be attributed to free riders, are embedded in the underlying econometric energy sales forecasts. As such, our top-down methodology considers the savings from those "naturally occurring" free riders as unavailable for energy efficiency. Given these factors, we have therefore assumed for this study that the effects of free ridership and spillover cancel each other out. We believe any uncertainty introduced by this assumption will be small relative to the overall uncertainties in a study of this duration and scope.

Based on Mr. Mosenthal's work for NYSERDA, it appears that he is a firm believer in deeming net equal to gross or NTG = 1.0 for purposes of planning, implementing and evaluating DSM programs.

Q. Is Ameren Missouri in alignment with Mr. Mosenthal in the Ameren Missouri MEEIA 2016-2018 filing in terms of deeming net = gross?

A. Yes. Section 4.3 beginning on page 64 of the Ameren Missouri MEEIA 2016-2018 filing describes the Ameren Missouri rationale, analysis and recommendation to deem net equal to gross for the MEEIA 2016-2018 implementation period.

Q. What does the preceding excerpt from Mr. Mosenthal's NYSERDA DSM Potential Study imply as to whether Mr. Mosenthal reported either gross or net estimates of DSM potential for NYSERDA?

A. The preceding excerpt shows that Mr. Mosenthal did not attempt to estimate naturally-occurring energy efficiency potential for NYSERDA. He reported gross potential for NYSERDA. This means that the NYSERDA potential is reported on a different basis, as in double counting naturally-occurring energy efficiency, relative to the Ameren Missouri DSM Potential Study.

Q. What is another significant criticism Mr. Mosenthal has of the Ameren Missouri DSM Potential Study?

A. Mr. Mosenthal states the following on page 16 of his rebuttal testimony:

> **Q. What specific factors do you think caused EnerNOC to underestimate the available potential?**
>
> A. One significant contributor to EnerNOC's low potential estimate is its approach for estimating take rates. Take rates are the maximum rates at which cost-effective efficiency measures will be adopted by the public. In the potential study, EnerNOC estimated that take rates for the RAP scenario are between 29% and 39% for the residential sector and 38% and 49% for the commercial sector. These numbers are well below documented

program participation rates in a recent ACEEE study that examined take rates throughout the country. The study found that efficiency programs have increased the market share of Energy Star products to nearly 90%, participation rates in the absence of budget caps for small business direct install programs to between 60-80%, and participation rates for commercial custom programs targeting larger customers to nearly 90% over 3-4 years. These numbers are significantly higher than the rates used for the potential study and are one of the primary reasons the EnerNOC potential is lower than the savings estimated in other studies and that are already being achieved by Ameren.

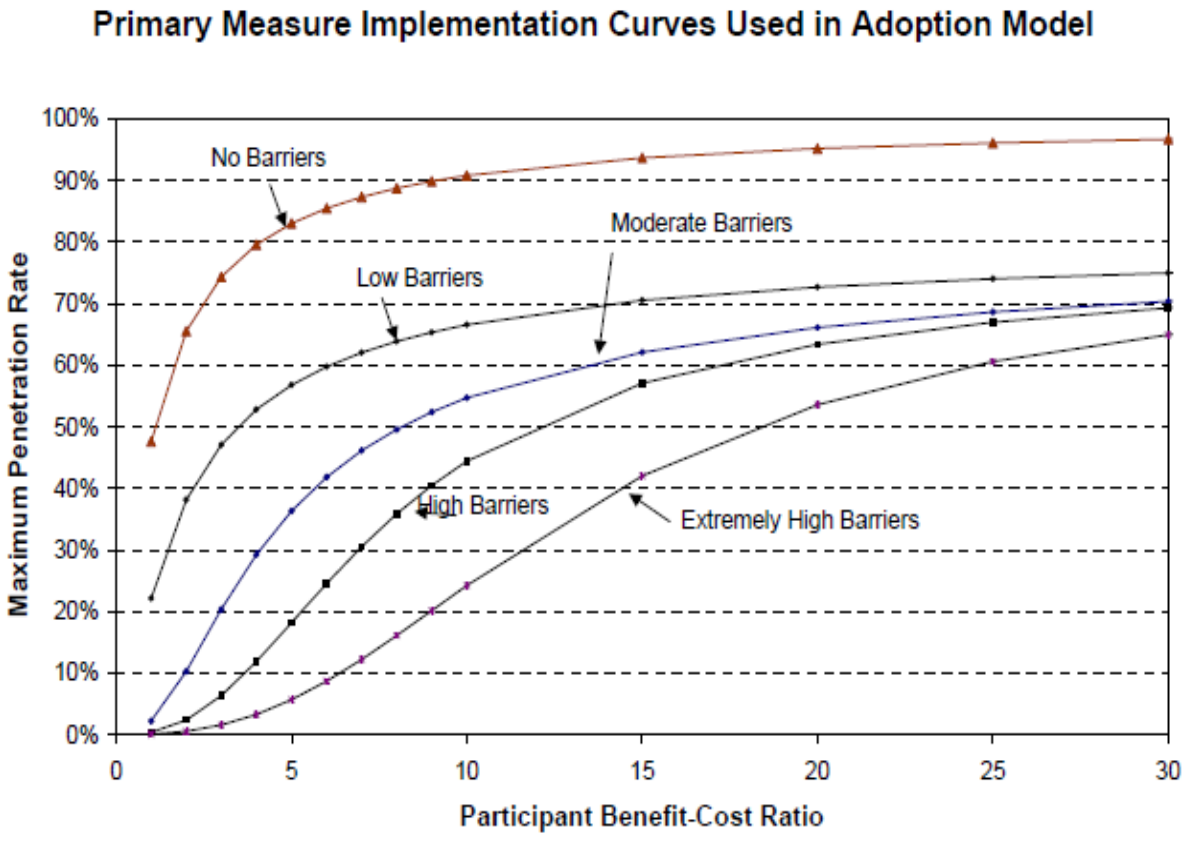
Q. Discuss the statistical precision and accuracy associated with estimating customer participation rates for purposes of a DSM potential study.

A. There are three core elements in any DSM potential study. The three core elements are: (1) the calculation of technical potential; (2) the calculation of economic potential; and (3) the calculation of achievable potential. Technical potential is the quantification of all energy efficiency potential if the most efficient equipment possible is installed in 100% of all places where electricity is used - regardless of cost or feasibility. Economic potential is a subset of technical potential and reflects only the cost effective equipment potential subset of technical potential. Achievable potential is a subset of economic potential and reflects what customers are likely to purchase in terms of efficient equipment given imperfect information, customer budget restrictions, and other customer market barriers.

Technical and economic potential are based on statistically-valid science. Both can be determined with quantifiable statistical accuracy and precision. The estimation of achievable potential is an art and cannot be determined with quantifiable statistical accuracy and precision. Consequently, when there is criticism of a potential study, it generally focuses on the estimation of customer participation rates used to calculate achievable potential.

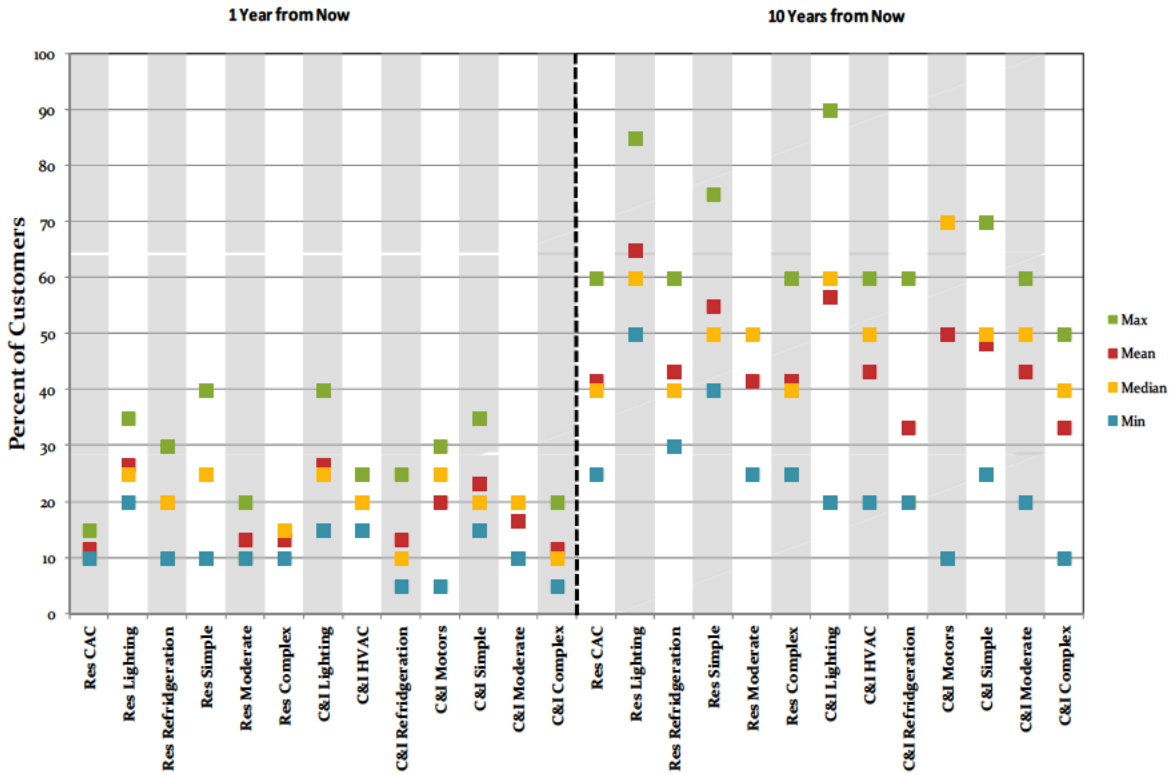
Q. Please describe alternative approaches to estimating customer participation rates in electric utility energy efficiency programs.

A. At a high level, there are four generally recognized approaches to estimating customer participation rates. The first is the application of a generic, academic product adoption curve for all products, not just energy efficiency products and services. These curves generally have the format shown below:



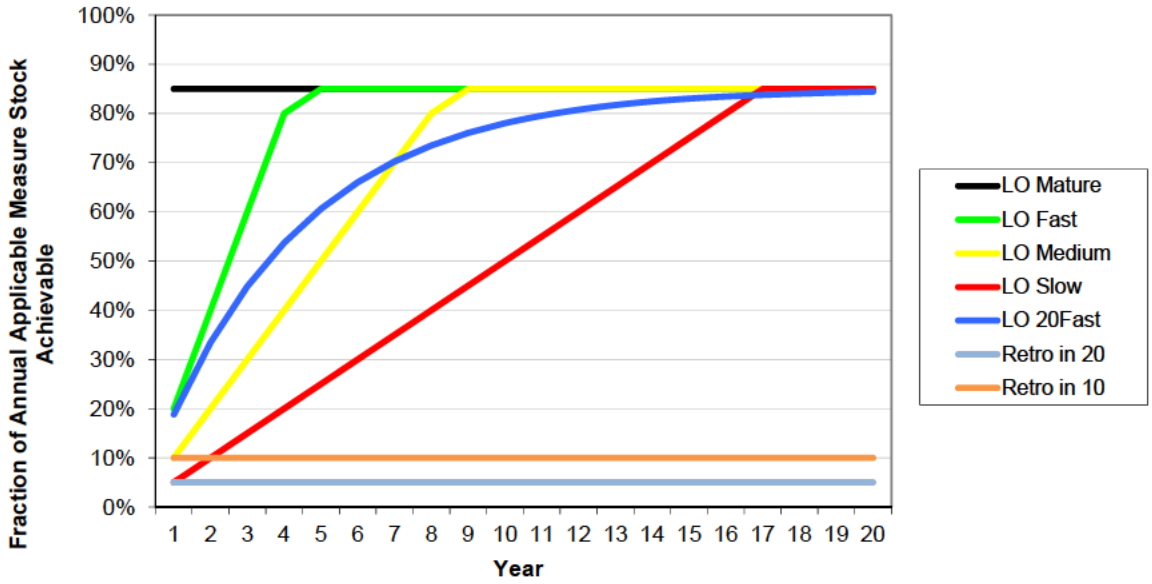
It is worth noting that the Missouri Public Service Commission hired a DSM potential study contractor to do a statewide DSM Potential Study in 2011 for Case No. EW-2011-0136. The contractor proposed using the academic product adoption curve methodology to estimate Missouri customer participation rates in DSM programs. The Commission asked the contractor how these curves were developed and if any Missouri-specific information was used in the development of these curves. The contractor could not articulate the basis for these curves derived from academia but stated that the curves were not based on any Missouri-specific data. The Commission subsequently directed the contractor to use the customer participation rates that Ameren Missouri used in its 2009 DSM Potential Study. These customer participation rates were based on Ameren Missouri customer primary market research that asked customers how willing they would be to participate based on the timeliness of the payback of the customer investment in incremental energy efficiency savings.

The second method is the Delphi, or council of experts, approach that I previously discussed relative to the 2013 COMED DSM Potential Study. The Delphi approach generally has the format shown below:



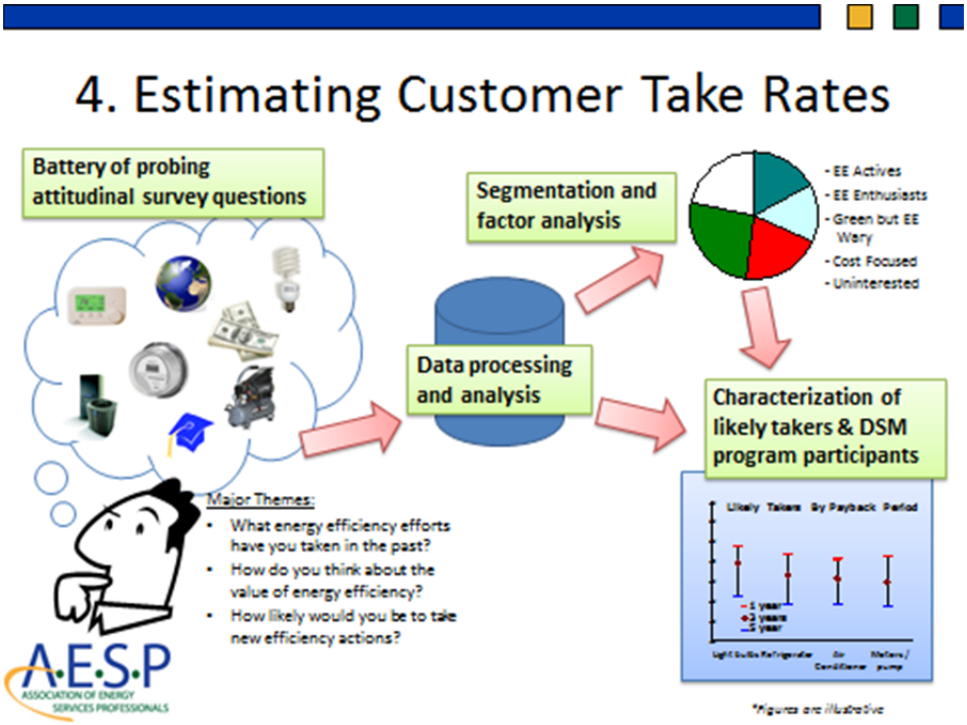
The Delphi approach simply reflects the subjective judgments of the panelists. There is little science or primary market research to support the recommended participation rates.

The third method, for lack of a more academic description, I refer to as the "hope and pray" approach to estimate customer participation rates. The Northwest Power Conservation Council is an example of a region that requires DSM potential studies to use this approach. The "hope and pray" approach has the format shown below:



The distinguishing feature of the "hope and pray" methodology to estimate customer participation rates is the assumption of 80+% customer participation in utility energy efficiency programs in as little as year four of program life to year seventeen of program life. There is no primary or secondary customer research associated with this methodology. It simply represents the aspirational customer participation rates of the Northwest Power Conservation Council at the time a DSM potential study is performed. Ameren Missouri is not aware of any utility DSM program that has ever achieved 80+% market share. Ameren Missouri is also not aware of any non-energy efficiency consumer product or service that has achieved 80+% market share.

The fourth method is the customer primary market research method employed by the Ameren Missouri DSM Potential Study contractors. This methodology is based on customer psychographic surveys that attempt to understand how customers make energy efficient product and services purchase decisions based on payback. The primary market research format has the following characteristics:



This approach is firmly grounded in Ameren Missouri customer primary market research. It is based on asking customers how willing they would be to purchase energy efficiency products and services from Ameren Missouri depending on how quickly customers could recoup their investments in energy efficiency. Knowing that surveys which ask customers basically "if they would do the right thing, i.e. purchase energy efficient products and services" have customer say/do discrepancies, the Ameren Missouri DSM Potential Study contractor engaged an expert market research subcontractor to adjust responses based on national market research that tracked how customers actually performed relative to their responses to similar surveys. This approach also involves customer segmentation analysis that categorizes customers according to their interest in energy efficiency. While the customer segmentation data is not used in the actual calculation of customer participation rates, it is used as a sanity check against which to assess that the calculated customer take rates are reasonable.

Q. Knowing Mr. Mosenthal's criticism of the methodology used by the Ameren Missouri DSM Potential Study contractors to estimate customer participation rates, how did he estimate customer participation rates for his NYSERDA DSM Potential Study?

A. Mr. Mosenthal describes the method he used to estimate customer participation rates for NYSERDA on page 7 of the NYSERDA study. He considers the following categories of market barriers to customer participation in utility DSM programs:

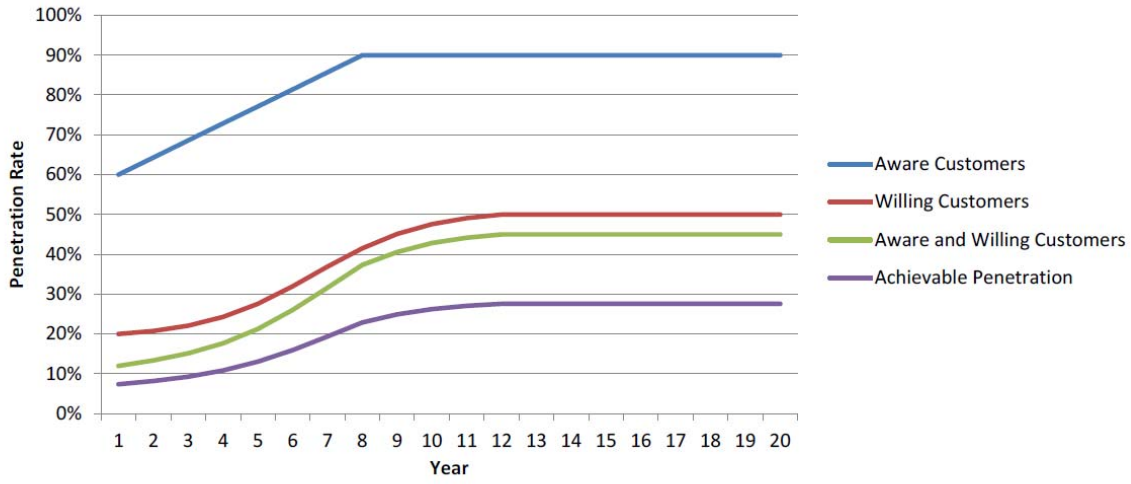
- **Awareness:** of efficiency measures' potential application, benefits, and possible incentives.
- **Willingness:** due to magnitude of lifetime benefits, personal/organizational practices, split incentives, uncertainty or distrust of performance/benefits, fear of unintended consequences, hassle factor, irreversibility, etc.
- **Availability:** of equipment or installation contractors.
- **Costs:** initial cost, operation and maintenance costs, access to financing.

Mr. Mosenthal did not employ primary market research in the estimation of the magnitude of the four market barriers. All assessments were based on subjective judgments.

Mr. Mosenthal assessed the fourth market barrier (costs) on the basis of simple payback of the incremental cost of energy efficient products and services. This is similar, if not identical, to the approach taken by the Ameren Missouri DSM Potential Study contractor.

Subjectively assessing how to value each of the four categories listed above, Mr. Mosenthal developed market penetration rates for bundles of measures that have the following form and format. This graph can be found on page 9 of Mr. Mosenthal's NYSERDA report:

Figure 1. Example of Estimating Measure Penetration Rates



Q. Is Mr. Mosenthal's approach to estimate customer participation rates for NYSERDA in the January 2015 NYSERDA report either scientific or based on primary market research?

A. No.

Q. Can Mr. Mosenthal's approach to estimate customer participation rates result in either lower or higher estimates of customer participation in different DSM programs relative to the Ameren Missouri DSM Potential Study?

A. It can go both ways. Mr. Mosenthal can subjectively change his assumptions about customer perceptions on awareness, willingness, availability and cost and can put the customer participation rates at whatever level he chooses.

Q. The NYSERSDA DSM Potential Study shows a cumulative electric energy efficiency potential of 18% for the period 2013-2030. Discuss the measure mix associated with the NYSERDA achievable energy efficiency potential study.

A. Table 12 on page 33 of the NYSERDA report describes the 2030 residential measure mix of programs and associated cumulative energy savings. The table is shown below:

Table 12. Distribution of Residential Electric Efficiency by End-Use, Economic and Achievable Scenarios, 2030

Other appliances include clothes washers, dryers and dishwashers.

End Use	Economic		Achievable	
	Savings (GWh)	% of Total	Savings (GWh)	% of Total
Lighting	5,761	20%	3,427	36%
Thermal Comfort	7,295	26%	2,310	25%
Refrigerators	4,338	15%	1,070	11%
Electronics and Controls	3,916	14%	966	10%
Other Appliances	3,886	14%	958	10%
Water Heating	3,357	12%	684	7%
Total	**28,553**	**100%**	**9,415**	**100%**

Electronics and other appliances make up 20% of the cumulative 2030 residential energy efficiency potential for NYSERDA. Neither of these categories of programs is close to being cost effective for Ameren Missouri. If they were cost effective, Ameren Missouri stakeholders and the Commission would have to consider if offering such programs would be in the best interest of all customers and would actually contribute toward the building of the equivalent of a supply-side generation resource.

Q. Why is there a concern about whether or not a category such as consumer electronics may contribute towards the building of a supply-side resource?

A. Purchasing an Energy Star LED TV or PC monitor, for example, does not necessarily translate into lower energy consumption. Larger screen sizes, more hours of use, and other features may actually contribute to more energy consumption. In addition, electronics have a relatively short life span of six years or less – regardless of whether the technology actually fails after six years. Innovations in electronics continuously move the

bar higher in terms of features that customers want. Finally, Mr. Mosenthal makes the assumption that customers who purchase efficient electronics will revert back to purchasing inefficient electronics at the end of current electronics effective useful lives. In other words, limited, if any, market transformation is assumed as a direct result of the NYSERDA DSM programs. Consequently, the consumer electronics potential is re-upped every six or fewer years as electronics technologies evolve and improve and replace prior vintages of similar consumer electronics. Such a perspective reflects energy efficiency potential from an end use of consumer electronics that never diminishes.

Q. What are the NYSERDA DSM Potential Study results for the commercial sector?

A. Table 22 on page 49 describes the NYSERDA commercial potential. Similar to consumer electronics for the residential class, there is a significant commercial program for commercial office equipment. Office equipment accounts for 8% of all achievable business potential by 2030 for NYSERDA. Office equipment may not be a suitable program option for an electric utility DSM program.

Table 22. Distribution of Commercial Economic Electric Efficiency by End-Use, Economic and Achievable Scenarios, 2030

End Use	Economic		Achievable	
	Savings (GWh)	% of Total	Savings (GWh)	% of Total
Indoor Lighting	22,464	38%	8,976	35%
Cooling	14,640	25%	6,022	24%
Ventilation	7,428	13%	3,430	14%
Refrigeration	6,405	11%	3,420	13%
Office Equipment	4,282	7%	1,966	8%
Outdoor Lighting	2,537	4%	1,317	5%
Space Heating	417	1%	128	1%
Water Heating	369	1%	145	1%
Food Preparation	7	0%	2	0%
Total	**58,550**	**100%**	**25,407**	**100%**

Q. What are the NYSERDA DSM Potential Study results for the industrial sector?

A. Table 34 on page 62 of the NYSERDA report provides the industrial results as follows:

Table 34. Distribution of Industrial Electric Efficiency by End-Use, Economic and Achievable Scenarios, 2030

Other end uses include HVAC, non-process water heating, miscellaneous plug loads, etc.

End Use	Economic		Achievable	
	Savings (GWh)	% of Total	Savings (GWh)	% of Total
Process	2,827	59%	1,000	66%
Other	1,002	21%	290	19%
Lighting	924	19%	216	14%
Total	**4,753**	**100%**	**1,506**	**100%**

Unlike Missouri, NYSERDA industrial electric load is small relative to residential and especially commercial load. NYSERDA industrial energy efficiency achievable potential represents less than commercial office equipment achievable potential.

Q. What do you conclude about the NYSERDA DSM Potential Study relative to the Ameren Missouri DSM Potential Study?

A. Without the workpapers that went into the development of the NYSERDA study, it is impossible for me to make an exact assessment. However, we have information about two of the key driver variables in the NYSERDA and Ameren Missouri DSM Potential Studies. Here is what we know:

1. Gross Potential: We know the NYSERDA study is reported in terms of gross potential. Ameren Missouri reports on net potential. At a minimum, there is about a 20% difference between the two. Consequently, the average annual load reduction of 1.06% for NYSERDA would decline to 0.85% if reported on a net basis.

2. Electronics: We know NYSERDA has substantial contributions to annual load reductions from consumer electronics, appliances, and office equipment

> – none of which are cost effective in Missouri. We can assume approximately a 10% decrease in NYSERDA potential to account for this discrepancy. Consequently, the average annual load reduction would decline from 0.85% to 0.76%.

We do not know the differential in avoided costs, measure baseline characterizations, true-ups of measure-level incremental energy savings with the latest EM&V results, and the role of natural gas benefits in the cost effectiveness of electric measures.

It is fair to assume that multiple other adjustments are needed to compare the NYSERDA and Ameren Missouri DSM Potential Studies on a normalized basis. Those adjustments include downward adjustments to reflect higher NYSERDA avoided costs, downward adjustment to account for NYSERDA assuming that customers revert to purchasing inefficient products and services at the end of the useful life of efficient products or services, slight downward adjustment to reflect opt-out customers and other adjustments as required. It is fair to assume that when all adjustments are made, the NYSERDA average annual achievable load reduction potential would decline from 0.76% to a lower value.

XII. AMEREN MISSOURI DSM POTENTIAL STUDY DATED JANUARY 2014

Q. When did Ameren Missouri begin the process that culminated in the completion of the Ameren Missouri DSM Potential Study used to support its MEEIA 2016-2018 filing?

A. The process began in June 2012 with the development of a Request For Proposal ("RFP") for a contractor to perform the study. The RFP was vetted with the entire Ameren Missouri DSM regulatory stakeholder advisory group. Shown below is the exact memo that was sent to stakeholders requesting input of the draft RFP:

June 27, 2012

To all Ameren Missouri IRP Stakeholders:

Ameren Missouri is preparing to begin the development of a new DSM potential study to support our 2014 IRP development and the filing of a new three-year DSM plan under the MEEIA rules by early 2015. Attached is a final draft RFP that will be sent to bidders on July 11th, for which responses are due by August 8th with work commencing on September 4th. Please note that the required scope of work is significantly greater than that performed for our 2009 DSM Market Potential Study, including assessments of potential for distributed generation and demand-side rates. Also attached is a list of potential bidders to whom Ameren Missouri will send the RFP.

It is critical that the RFP be issued by mid-July to ensure that the necessary work can be completed to support both the 2014 IRP and 2015 MEEIA plan filings. We therefore ask that you please review the RFP and proposed bidders list to provide comments no later than **July 6th**.

Sincerely,

The fact is that Renew Missouri was the only stakeholder that submitted comments on the draft RFP. Sierra Club, NRDC, OPC and industrial stakeholders did not submit comments. The Missouri Department of Natural Resources (at that time) responded that they did not have any comments.

Q. What was the next step in the DSM potential study process?

A. In August 2012, Ameren Missouri, in collaboration with all stakeholders, reviewed and evaluated the bids to the RFP. In fact, on August 27, 2012, Ameren Missouri and stakeholders met for four hours to discuss bids and next steps.

Q. When did all Ameren Missouri stakeholders reach consensus to award the DSM potential study to EnerNOC Energy Solutions ("EnerNOC")?

A. The collaborative decision was made in September of 2012. In September, the statement of work ("SOW") and project schedule for the study was finalized in collaboration with stakeholders.

Q. Who is EnerNOC?

A. EnerNOC, which subsequently was acquired by the AEG, is the national leader in the development of DSM potential studies. AEG has successfully completed more than fifty DSM potential studies over the past five years in North America. In addition, AEG was the contractor for the Ameren Missouri 2009 DSM Potential Study, the 2012 and 2015 Ameren Illinois DSM Potential Studies and two MISO DSM Potential Studies. In short, AEG is most familiar with the Ameren Missouri service territory.

On a national scale, AEG has performed the *"Assessment of Electricity Savings in the U.S. Achievable through New Appliance/Equipment Efficiency Standards and Building Efficiency Codes" for the Institute For Electric Efficiency"* – among other nationally focused work.

Q. What was the cost of the study?

A. The original cost of the study was $990,338. However, in July of 2013, the cost was changed to $1,044,744 due to the addition of a multi-family landlord focus group research effort at the request of OPC.

Q. Of the $1,044,744, approximately how much of that cost was allocated to the gathering of Ameren Missouri customer primary market research to support the study and make it truly representative of the entire Ameren Missouri service territory?

A. Approximately $537,000, or 51%, of the entire study budget was allocated to the gathering of Ameren Missouri primary market research data.

Q. Speaking of Ameren Missouri customer primary market research, discuss the number of surveys that were administered to customers to gather the data needed to complete the study.

A. Ultimately, approximately 3,200 surveys were administered to customers plus 100 site visits to the largest industrial customers. The majority of surveys were administered online rather than via telephone or U.S. mail.

Q. Please discuss the level of collaboration that went into the development of the study.

A. As I stated earlier, there were over 70 interactions with stakeholders during the development of the study. Those interactions took various forms including face-to-face meetings, WebEx™ meetings, webinars, teleconferences, e-mail exchanges, data requests and document reviews.

Q. The identification of energy efficiency measures to screen for cost effectiveness is one of the core technical aspects of the DSM potential study. Discuss the level of collaboration in identifying measures to screen for cost effectiveness.

A. The DSM potential study contractor developed the initial list of measures to be screened based upon the Ameren Missouri MEEIA 2013-2015 TRM and added other measures that were in their database of measures but were not in the TRM. The next step was to send the draft list to all Ameren Missouri DSM Potential Study stakeholders and request stakeholder review, comment and input into the draft measure list. With relatively few exceptions, most of the revisions recommended by stakeholders were included in the final measure list for the study.

Q. If an energy efficiency measure screened as cost effective, does that mean that the measure will be included in a DSM program when estimating program potential?

A. No. There are a variety of factors that go into including measures within programs. Those factors include the following:

1. Marginal Cost Effectiveness: if the measure has a benefit/cost ratio of close to 1.0, when program and portfolio costs are added to the measure, the measure in the context of a specific program may no longer be cost effective.
2. Interactive Effects: if the measure interacts with other measures in a specific program such that its energy efficiency incremental energy savings on a standalone basis are reduced, the measure in the context of a specific program may no longer be cost effective.
3. Lack of fit: the measure simply may not have a logical fit in the context of any of the DSM programs in the portfolio. Examples of such measures are: duct sealing, certain types of room air conditioners, commercial steam cookers.
4. Codes and Standards: if new codes and standards are imminent that will make the measure not pass the cost effectiveness screening, the measure may be excluded from programs.
5. Implementation Experience: If there is feedback from the implementation team that a measure is not accepted by customers, the measure may be excluded from programs.

Q. What would you consider to be the key "takeaway" in assessing the quantity of measures that pass cost effectiveness screening and then are either being put into programs or being omitted from programs?

A. The key "takeaway" is that when it comes to DSM program design, the Pareto principle is usually in force. The Pareto principle (also known as the 80–20 rule, the law of the vital few, and the principle of factor sparsity) states that, for many events, roughly 80% of the effects come from 20% of the causes. For DSM program design, this means that about 20% of the possible cost effective energy efficiency measures account for about 80% of the energy savings in the MEEIA 2016-2018 implementation plan. In fact, AEG illustrates this fact in the Ameren Missouri DSM Potential Study, Volume 3: Energy Efficiency on page 5-5, Table 5-5 as follows:

Residential Top Measures in RAP in 2018

Rank	Measure	End use	2018 Savings	% of Total
1	Interior Lighting Screw-in – LED lamps	Int. Light	63.9	25%
2	Cooling Central AC – SEER 15	Cooling	18.7	7%
3	Exterior Lighting Screw-in – LED lamps	Ext. Light	17.6	7%
4	Central AC - Maintenance and Tune-Up	Cooling	13.5	5%
5	Refrigerator - Remove Second Unit	Appliances	13.2	5%
6	Windows - Install Reflective Film	Heat & Cool	12.2	5%
7	Ducting - Repair and Sealing	Heat & Cool	10.9	4%
8	Water Heater - Low-Flow Showerheads	Water heat	9.0	4%
9	Windows - High Efficiency/ENERGY STAR	Heat & Cool	8.9	4%
10	Freezer - Removal	Appliances	6.9	3%
11	Electronics Personal Computers	Electronics	6.9	3%
12	Pool/Spa cover	Misc.	5.6	2%
13	Electronics Set-top Boxes/DVR	Electronics	5.5	2%
14	Thermostat - Clock/Programmable	Heat & Cool	5.1	2%
15	Insulation - Infiltration Control	Heat & Cool	4.6	2%
16	Miscellaneous Air Purifier/Cleaner	Misc.	4.1	2%
17	Water Heater - Thermostat Setback	Water heat	4.0	2%
18	Room AC - Removal	Cooling	3.9	2%
19	Central AC - Early Replacement	Cooling	3.5	1%
20	Insulation – Ducting	Heat & Cool	3.4	1%
Total			221.4	88%

Q. Mr. Mosenthal states, on page 13 of his rebuttal testimony, that the fact that linear LED lighting is not part of program potential proves in and of itself that the Ameren Missouri 2016-2018 program potential is underestimated. Is there any merit to this statement?

A. There is absolutely no merit to this statement. As shown previously in Table 5-5 from the potential study, a single measure has minimal, if any, impact on the magnitude of annual load reductions. When it comes to business lighting, there are other complimentary cost effective measures that will capture the same levels of potential. In addition, Mr. Mosenthal appears to jump to the conclusion that linear LEDs are cost effective for Ameren Missouri because, as he states on page 12 of his testimony, "this measure is

typically highly cost effective and achieves significant penetration in other jurisdictions." Yet, the fact is that Mr. Mosenthal has done absolutely no analysis on the cost effectiveness of this measure for Ameren Missouri.

Q. Is Mr. Mosenthal's assertion, in his rebuttal testimony on page 22, lines 18-23, that "neither the EnerNOC potential nor Ameren's MEEIA plan goals took into account the precipitous decline in LED cost" correct?

A. No, his assertion is not correct. The cost effectiveness analysis workbooks that were prepared by Ameren Missouri prove this point. The decline in LEDs was considered and incorporated in Ameren Missouri's Plan and potential study.

Q. Can you provide an example showing that Ameren Missouri did take into account the declining cost of LED lighting technology?

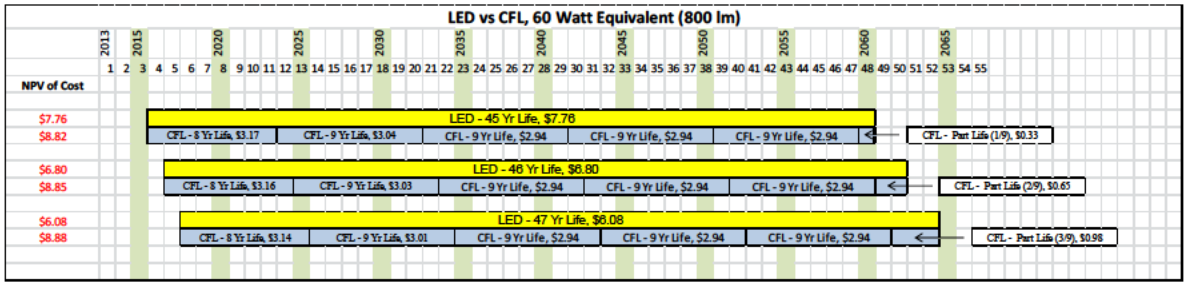
A. Yes. When reviewing the Ameren Missouri Analysis workbook for the Residential Lighting Program, it is clear that Ameren Missouri actually considers the cost of LED lights to be lower than the cost of alternative technologies, such as CFLs and Halogen lighting.

Q. How can you state that the efficient lighting technology, such as LEDs, is less expensive than the less efficient lighting technologies, such as Halogens or CFLs, that are being sold in stores?

A. In the case of lighting, although the more efficient lighting technologies have a higher first cost, these technologies have an effective useful life that is considerably longer than their lower efficiency alternatives. So, not only must the first cost of the lighting technology be considered, but also the lifetime cost of the technology, when determining the incremental cost of the equipment.

Q. Is this something that you can illustrate?

A. Yes. The chart below illustrates the expenditures that would be encountered for lighting technologies representing "60 watt equivalent" for the 2016-2018 timeframe based on 2013 estimates of future lighting technology costs and effective useful lives ("EULs"). As can be seen, the NPV of the LED lighting technology cost is lower than the NPV of the CFL lighting technology cost.



Q. Can you provide a brief description of the bars shown within the above chart?

A. Yes. The yellow bars represent the purchase of a single LED bulb, the bulb cost, and the EUL of the bulb. The grey bars represent the purchase of CFL bulbs, the bulb costs over time, and the EUL of the CFL bulbs purchased over time. As can be seen, the bulb life increases over time and the cost of the bulb decreases over time, for both technologies. However, LED bulb EUL values are much higher than CFL bulb EUL values and the cost of LED bulbs is decreasing much more rapidly than the cost of CFL bulbs over time.

Q. Is the lighting technology EUL information readily found for the various bulb technologies?

A. Yes. The lighting products that are found within the local stores state how long they are expected to last on their packaging. For incandescent bulbs and halogen bulbs

this value is approximately 1,000 hours (which equates to approximately one year for bulbs that are used approximately three hours per day). Some more expensive versions of the bulbs will even indicate a life of up to 2,000 hours. CFL lighting is typically indicated as having a life of approximately 9,000 hours. LED lighting typically has between 25,000 hours to 50,000 hours. The life of the equipment is increasing as the technologies are maturing.

Q. How does a lower NPV cost for LED lighting technology impact the screening of the LED lighting technology?

A. The lower NPV for LED lighting means that the efficient LED technologies are cost effective without the consideration of the energy savings associated with their use. This is possible because the more efficient LED technology has an EUL that is multiples of the less efficient lighting technologies.

Q. What is the impact on the cost effectiveness when these technologies are placed into programs for delivery?

A. When evaluating the program cost effectiveness of energy efficient technologies, Ameren Missouri contrasts both the program benefits from measures to the measure incremental costs and program delivery costs. For the TRC, the cost of incentives that are less than or equal to the incremental measure costs are not included as these are used to offset the incremental costs of the measures. A negative value in the denominator of the equation will result in a negative, nonsensical TRC result. Therefore, to correct for this, the negative value is replaced with a very small value which indicates an incremental cost that is very low, although not less than or equal to zero. Ameren Missouri has chosen the value of $0.000001 as this very low value. This value prevents the generation of a negative TRC result.

Q. Describe another Ameren Missouri DSM Potential Study collaborative effort – similar in magnitude to the development of the measure list to screen for cost effectiveness.

A. The development of customer survey instruments and analysis methodology used to develop customer participation rates or take rates in programs involved extensive collaboration.

The process started in December of 2012, when AEG sent all stakeholders the draft customer survey instruments and accompanying draft survey marketing plans for review and comment. The process continued through September of 2013 when a meeting was held with all stakeholders to review all primary market research data that was compiled and put into useful forms for the potential study. In November of 2013, Staff requested additional information regarding documentation used to adjust customer responses to program interest surveys to account for customer "say/do" bias. Multiple exchanges of documentation on the "say/do" adjustment methodologies were exchanged between AEG and stakeholders through December of 2013.

Q. Was the 2013 Ameren Missouri DSM Potential Study the first time that AEG employed the customer public survey and associated take rate information as the basis for estimating take rates for Ameren Missouri DSM Potential programs?

A. No. The same methodology was used by AEG for the 2009 Ameren Missouri DSM Potential Study.

Q. Mr. Woolf states on page 26, lines 1-23 of his rebuttal testimony, that Ameren Missouri made two downward adjustments to customer program interest survey responses regarding take rates. He states the first adjustment is to account for

the "say/do" survey response bias. He states the second adjustment is to account for responses to "psychographic segmentation questions." Is Mr. Woolf correct?

A. Mr. Woolf is 50% correct. AEG did make an adjustment to account for customer "say/do" survey response bias. AEG did not make an adjustment to account for "psychographic questions." This point has been made at stakeholder meetings, in response to data requests, and in AEG documentation on its take rate methodology. In addition, Volume 3 of the final DSM Potential Study report makes this point explicitly on pages 2-12, 20 and E-1.

Q. Did OPC witness Dr. Geoff Marke make the same erroneous observation as Mr. Woolf that two adjustments were made to customer program interest survey responses?

A. Yes. Dr. Marke's response is the same as Mr. Woolf's.

Q. Mr. Mosenthal states on page 16, lines 2-4 of his rebuttal testimony, that "These numbers (AEG take rates) are well below documented program participation rates in a recent ACEEE study that examined take rates throughout the country." Is Mr. Mosenthal accurately representing either in whole or in part what the referenced ACEEE study showed?

A. No. Even if the most creative interpretation of the ACEEE study was used, the conclusion Mr. Mosenthal reached that AEG program participation rates are well below documented program participation rates is not even close to the conclusions of the ACEEE study. To set the record straight, the ACEEE study was emphatic that there is insufficient data and no known standards on which to benchmark participation in utility DSM programs. Rather, ACEEE made a single point in time estimate of what program participation was at a

given utility for a given year for a given product. Table 3 in the ACEEE study is an example of the very limited participation that they found for residential HVAC programs. This type of data has no value in the context of a DSM potential study.

The ACEEE study Table 3 is:

Table 3. Participation rates for selected residential HVAC programs

Program	Year	Annual participation (highest achieved in period 2010–2013)	Number of residential customers*	Annual participation as % of residential customers
Potomac Edison Company: HVAC and water heaters	2013	4,654	205,880	2.3%
Sacramento Municipal Utility District: HVAC residential cooling	2011	18,108	533,393	3.4%
NSTAR: residential cooling and heating equipment	2013	5,919	781,310	0.8%
Xcel Energy, Minnesota: residential cooling	2013	11,493	1,098,341	1.0%
National Grid, Massachusetts: residential heating & water heating	2012	25, 942	1,012,559	2.6%
Baltimore Gas & Electric: HVAC rebates	2010	15,498	833,783	1.9%
CenterPoint Energy, Minnesota: heating system rebates	2013	42,009	748,740	5.6%

*EIA 2013a; EIA Form 176 for natural gas utilities.

The ACEEE study reaches the following conclusion:

Overall Conclusions and Recommendations

Program participation is simple in principle, but complex in practice. The variety of program types and markets served has made it difficult to develop and apply common participation metrics applicable to all programs. Participation may need to be measured in different ways for different types of programs. Achieving high participation, though, is key to achieving high energy savings goals for most types of programs.

To state as succinctly as possible, ACEEE has absolutely no recommendation as to reasonable customer participation rates in DSM potential studies in its whitepaper.

Q. Both Mr. Mosenthal and Mr. Woolf attempt to show that the AEG DSM Potential Study customer participation rates are low because the potential study did not look at alternate ways to increase take rates. Both state that "upstream" programs can significantly increase program participation. Please discuss.

A. There are three common methodologies to deliver utility DSM programs – upstream, midstream and downstream delivery channels. Upstream refers to dealing directly with the manufacturer, midstream refers to dealing directly with the retailer or distributor, and downstream refers to dealing directly with the customer. Each methodology has strengths and weaknesses. No single approach represents a panacea or is the Holy Grail to achieve the highest energy efficiency potential. Ameren Missouri uses all three. Decisions on when to use any one or all three delivery channels are based on markets conditions and in collaboration with the implementation teams, trade allies, and customers.

Q. Please provide examples of where Ameren Missouri uses specific delivery channels in delivering its residential energy efficiency programs.

A. The Ameren Missouri Residential Lighting program markets the majority of its CFL light bulbs in a combination upstream/midstream delivery channel. However, the program also uses the downstream delivery program to reach customer segments that are hard to reach.

The Ameren Missouri residential HVAC markets most of its HVAC equipment using a downstream approach. Starting with program ramp-up in December of 2012, the Heating and Cooling program has coordinated training for participating contractors through distributors. This approach took advantage of a centralized, trusted, and economic channel for recruitment. This allowed the program quick ramp-up to enroll more contractors in the

first six weeks of 2012 than had participated in the prior HVAC program, and nearly 2.5 times the prior HVAC 15-month program total within the first five months.

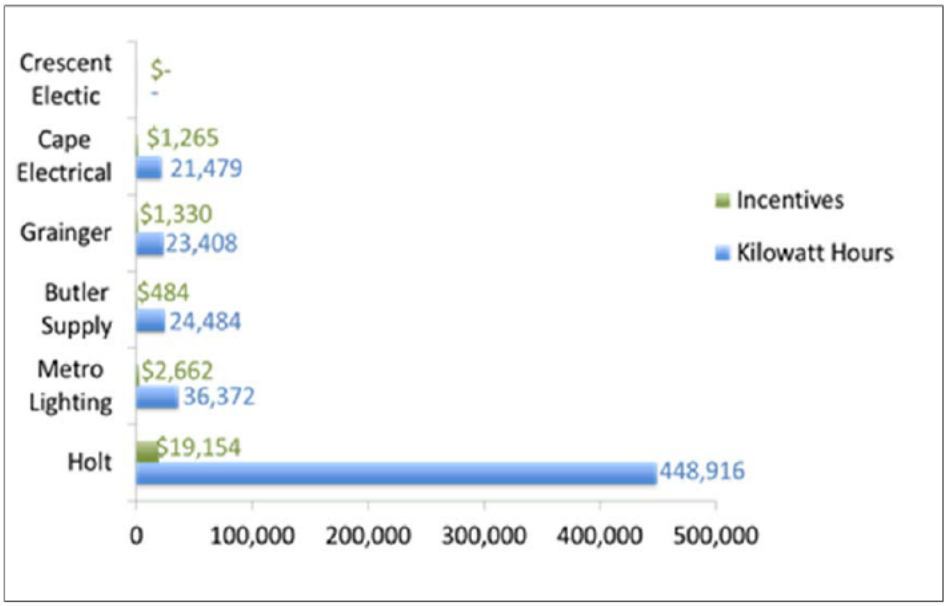
In 2014, the Ameren Missouri HVAC implementation account managers prepared reports to discuss with HVAC distributors on the number of units sold through Ameren Missouri programs via their participating contractors. This prompted many contractors to step up their high-efficiency sales as a result of distributor pressure to utilize Ameren Missouri incentives to sell more products.

In 2015, the program hired a dedicated account manager to work solely with area distributors with the goal of leveraging their contractor relationships and their own interest in promoting the installation of high-efficiency equipment to increase program participation. To that end:

- Distributor level goals were set to achieve 2015 targets;
- Consistent and regular one-on-one site visits were conducted, including status on how their brands were performing in the program and their progress towards goals;
- The program coordinates with distributors to identify non-participating contractors or contractors who have potential for a higher level of program participation;
- Program training and coaching of distributor territory managers, who have direct contact and sales relationships with contractors;
- Exploration of opportunities for co-branded marketing; and
- A distributor incentive program funded through the program administrative budget to encourage distributor partnership towards the above goals.

Q. Please provide an example of when Ameren Missouri uses specific delivery channels in delivering its business energy efficiency programs.

A. The following chart (previously prepared and presented at DSM stakeholder meetings) provides information concerning the performance of Ameren Missouri's Business Standard program relative to the largest component of that program – commercial lighting technologies:



The Distributor Partnership Program (launched in January of 2014) is one form of an upstream program that has been deployed in the Ameren Missouri service territory. It was designed to encourage walk in customers at local distributors to make efficient choices utilizing point of sale marketing materials and a simplified application process for walk-in customers. The effort also included multiple trainings of counter personnel at each location. The campaign has had mixed quantitative results but has served well qualitatively to further educate and inform target customers, particularly those at small to medium businesses that are the most frequent users of walk-in, over-the-counter distribution locations.

Q. How successful are the upstream programs at increasing Ameren Missouri customer participation in energy efficiency programs?

A. Upstream programs may or may not produce additional uptake in technologies and measures that have been difficult with respect to customer participation – but not in terms of multiples of additional participation. Specifically, HVAC measures with a relatively low savings to incremental cost ratio as discussed in many of the success stories for upstream programs. A more detailed study would be required to determine how many MWh could be

harvested from these and other measures. However, it is the Ameren Missouri energy efficiency implementation team's belief that additional participation can be spurred simply by increasing the incentive associated with these same measures in the range currently within the 2016-2018 filing. This same incentive increase would be a necessary component of any upstream incentive program that would be expected to have an impact similar to that shown in the Southern California HVAC program example in Mr. Mosenthal's rebuttal testimony. This more simplistic approach of adjusting incentive levels for certain measures to get them closer to or within the participation "sweet spot" relative to simple payback and incentive as a percentage of total cost would be a more cost effective way to increase participation. This was a significant component of the additional business incentive budget allocation associated with the 2016-2018 MEEIA filing.

Q. Is there any empirical EM&V data from the 2014 Ameren Missouri energy efficiency programs that speaks to the reasonableness of the AEG customer participation rates in the DSM Potential Study?

A. The customer participation rates in the 2014 Ameren Missouri residential HVAC program provide a powerful example of how reasonable, perhaps aggressive, the AEG customer participation rates in the Ameren Missouri DSM Potential Study are.

Q. Please explain.

A. The 2014 Ameren Missouri residential HVAC report states the following on page 6:

Program Activity

In PY14, 15,838 participants received a total of 25,869 measures through the HVAC Program (many program participants received multiple rebates). This represented a 28% increase in rebates from PY13. Table 2 summarizes results from the three primary measure types.

Table 2. HVAC PY14 Program Activity of the Measures with Highest Participation

Measure	Number of Systems/Measures	Homes Receiving More than One of This Measure
Air Source HPs (ASHP)	1,362	5.1%
CACs	7,288	6.3%
Tune-Ups*	8,894	24.0%

*Total number of HVAC systems receiving a tune-up. Total does not match total number of tune-up measures because some systems receive multiple tune-up measures.

In addition, on pages 14-15 of the EM&V report, the EM&V contractor described the level of aggressiveness of the marketing of the 2014 Ameren Missouri residential HVAC program as follows:

Program Marketing

According to the Cadmus team's assessment of PY14 marketing expenditures, Ameren marketed the HVAC Program more aggressively than all of its residential energy-efficiency programs combined (58% of total PY14 marketing). The following list represents some of the primary methods Ameren and ICF used to market the HVAC Program in PY14:

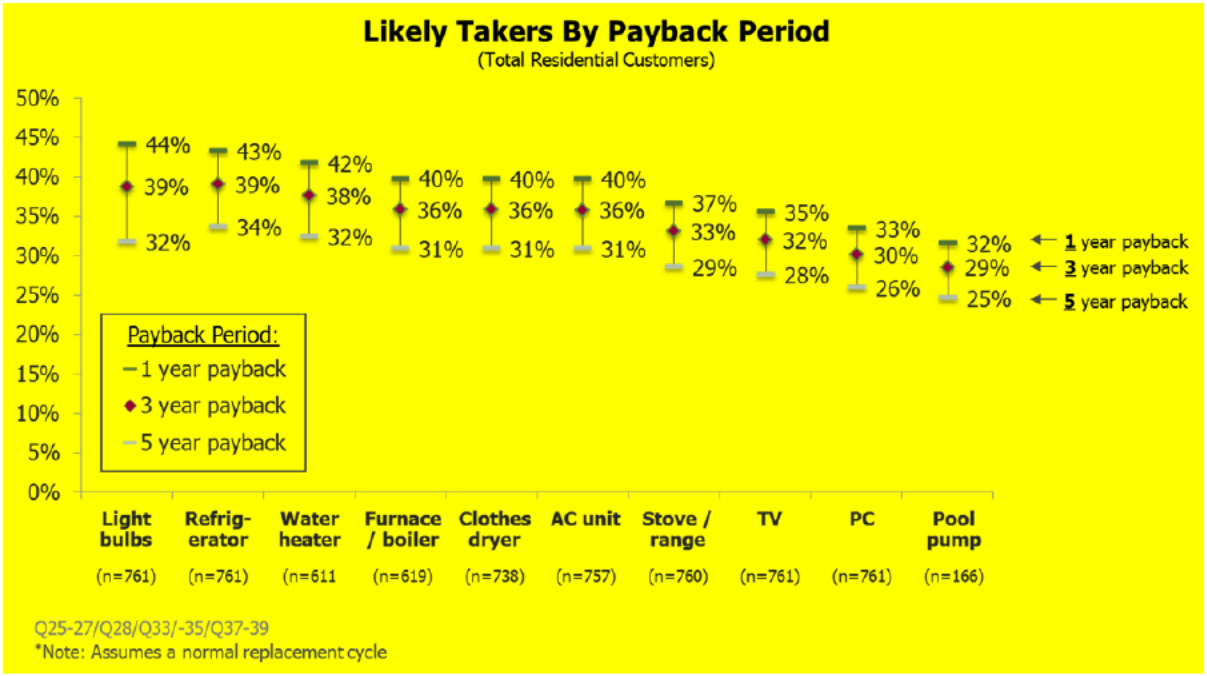
- *E-mails to customers*
- *Website banners and Ameren's website*
- *Gas pump toppers*
- *Newspaper advertisements*
- *Utility bill inserts, including personal energy reports*
- *Newspaper advertisements*
- *Radio advertisements*
- *Internet radio ads (e.g., Pandora)*
- *Television commercials*
- *Shelf marketing campaign*

The EM&V report states that the 2014 residential program marketing budget was $882,041.

From Table 4 above, there were a total of 15,838 participants in the 2014 residential HVAC program.

To get an idea of the size of the potential market for efficient HVAC in 2014, the first metric is to have an understanding of the average EUL of HVAC equipment. The EUL for HVAC equipment, as stated in the Ameren Missouri TRM, is 18 years. This means that, on

average, 1/18 of Ameren Missouri residential air conditioners are replaced every year. For a residential population of approximately one million customers, this means that 1/18 x 1,000,000 ~ 56,000 HVAC units are replaced each year. The 2014 Ameren Missouri residential HVAC program had 15,838 customer participants. Therefore, the approximate customer participation rate for the 2014 residential HVAC program was 15,838/56,000 = 28%.



As is shown in the column above the heading "AC unit," the realistic achievable potential take rate is 36%.

Q. Please compare and contrast the actual 2014 EM&V customer participation results for the aggressively-marketed Ameren Missouri residential HVAC program with the program participation rates from the AEG DSM Potential Study.

A. Ameren Missouri aggressively pursued residential HVAC market share of efficient products and services in 2014. The $882,041 marketing budget for this program

alone accounted for 58% of total residential program marketing in 2014. These aggressive implementation strategies yielded a 28% customer participation rate.

The AEG DSM Potential Study estimated a 36% customer participation rate. Therefore, the AEG customer participation rates when measured against real world, best practice residential HVAC marketing strategies, should be considered aggressive.

Q. Are there any other misconceptions about the Ameren Missouri DSM Potential Study?

A. Yes. There is the misconception that AEG was hired to do program design for Ameren Missouri for both the 2014 IRP filing and the MEEIA 2016-2018 filing.

Q. Was program design a component of the scope of work for the Ameren Missouri DSM Potential Study?

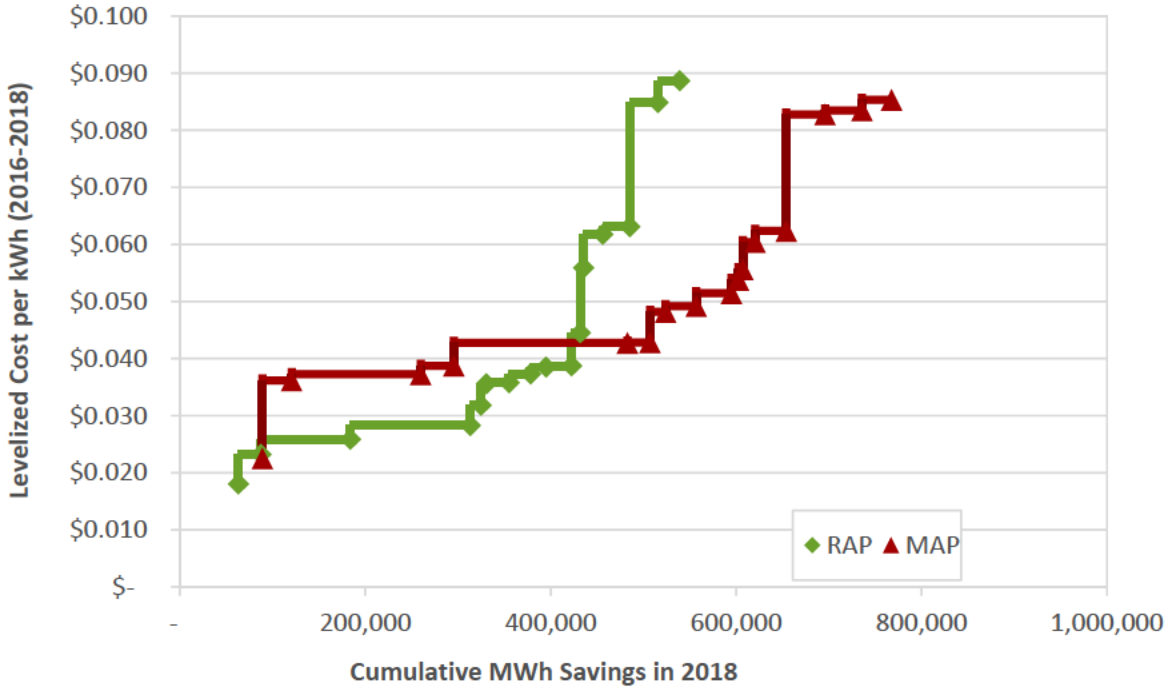
A. No, it was not.

Q. If program design was not a component of the scope of work, how did AEG estimate program potential which was part of the final reports for the DSM Potential Study?

A. Program design is a complex collaborative process involving the Ameren Missouri program design staff, implementation teams and contractors and trade allies, EM&V team and contractors, and stakeholders. AEG did not have the charge to have those types of interactions for Ameren Missouri specific program design. Rather AEG was charged with using "generic" program design parameters to develop a representative program potential energy efficiency supply curve that Ameren Missouri could use as a benchmark in the development for its 2014 IRP and MEEIA 2016-2018 energy efficiency load reduction

goals and budgets. A copy of the DSM Potential Study program energy efficiency supply curve shown in Volume 3, page 6-13, Figure 6-6 is shown below:

Levelized Cost Supply Curves, 2016–2018, RAP and MAP Portfolios



Q. Beginning on page 40 of his rebuttal testimony, Mr. Woolf cites several programs that were generically modeled in the Ameren Missouri DSM Potential Study but are not included in the Ameren Missouri MEEIA 2016-2018 filing. Please discuss.

A. As discussed previously, AEG's scope of work for the DSM potential study did not include any program design for Ameren Missouri's MEEIA or IRP filings. Rather AEG included placeholders using generic costs for programs to estimate an Ameren Missouri program energy efficiency supply curve.

In addition, Ameren Missouri provided Mr. Woolf, through data requests, all of the workpapers associated with analyzing the cost effectiveness of the various programs he cites beginning on page 40 of his rebuttal testimony. In addition to the response to the data

requests, Ameren Missouri had a teleconference with Mr. Woolf on March 12, 2015, further explaining where in the workpapers Mr. Woolf could find the cost effectiveness analyses of the programs he states were excluded from the MEEIA 2016-2018 filing.

To set the record straight, Ameren Missouri analyzed each of the so called "excluded" programs. The following list provides a synopsis of each program cited by Mr. Woolf.

Residential New Construction: The benefit to cost ratio for the program was 0.28 for the TRC and 0.36 for the Utility Cost Test ("UCT"). With MEEIA 2016-2018 avoided costs being approximately 50% of the level of MEEIA 2013-3015 the benefit to cost ratio for this program for MEEIA 2016-2018 is 0.14 for the TRC and 0.18 for the UCT. This program was excluded from MEEIA 2016-2018 on the basis of not being cost effective.

Home Energy Performance (HEP): This program was excluded from MEEIA 2016-2018 on the basis of not being cost effective. The TRC was 0.42.

Consumer Electronics: This program was excluded from MEEIA 2016-2018 on the basis of not being cost effective using the Massachusetts incremental measure energy savings and incremental costs as the database. TV measure level screening had a TRC of 0.51. PC measure level screening had a TRC of 0.76. If the results had been cost effective in a program cost effectiveness analysis, Ameren Missouri would have had discussions with the Ameren Missouri regulatory stakeholder advisory group to consider the pros and cons of including consumer electronic in the Ameren Missouri energy efficiency portfolio of programs.

Small Business Direct Install ("SBDI"): SBDI has well known program logic and delivery mechanisms. There are a multitude of implementation contractors who specialize in SBDI – therefore the program costs are relatively transparent. This program was excluded from the MEEIA 2016-2018 portfolio on the basis of not being cost effective with a TRC of 0.64.

Multi-Family Direct Install: The MEEIA 2016-2018 Low Income and Energy Efficiency Kits programs include reaching multi-family customers with direct installed measures. Mr. Woolf may have missed reading Appendix A of the MEEIA 2016-2018 filing.

Q. Does Mr. Mosenthal cite other programs that are not in the Ameren Missouri MEEIA 2016-2018 portfolio that he thinks should be?

A. Yes. Beginning on page 35 of his rebuttal testimony, Mr. Mosenthal cites CHP, LED street lighting, and behavioral programs in addition to most of the programs cited by Mr. Woolf.

Q. What does Mr. Mosenthal say about CHP for Ameren Missouri?

A. On page 35, lines 3-5, Mr. Mosenthal states: "The Company does not include any combined heat and power (CHP) in its MEEIA plan for 2016-2018, nor is it included in the MAP or RAP scenarios in the potential study."

Q. Is Mr. Mosenthal correct?

A. No. Volume 4 of the Ameren Missouri DSM Potential Study exclusively covers CHP and distributed generation ("DG") potential. CHP was analyzed extensively as part of the DSM Potential Study process. The combined potential of CHP and DG is shown in Table 4-3 from Volume 4 as follows:

Table 4-3 DG-CHP Energy Impact Results

	2016	2017	2018	2025	2030
Baseline Forecast (GWh)	**30,249**	**30,449**	**30,694**	**32,228**	**33,721**
Cumulative Energy Savings (GWh)					
Realistic Achievable	6	7	9	43	488
Maximum Achievable	8	10	13	60	672
Economic Potential	57	72	90	389	4,159
Technical Potential	720	898	1,119	4,729	10,946
Energy Savings (% of Baseline)					
Realistic Achievable	0.0%	0.0%	0.0%	0.1%	1.4%
Maximum Achievable	0.0%	0.0%	0.0%	0.2%	2.0%
Economic Potential	0.2%	0.2%	0.3%	1.2%	12.3%
Technical Potential	2.4%	2.9%	3.6%	14.7%	32.5%

As Table 4-3 shows, CHP is not cost effective for MEEIA 2016-2018. Relatively minor amounts of potential become cost effective in 2025.

Q. But Mr. Mosenthal says CHP is cost effective in Massachusetts on page 35, line 11 of his rebuttal testimony, and goes on to state that Missouri can do what he states Massachusetts, or at least one utility in Massachusetts, appears to be doing with CHP. Please discuss.

A. Throughout his testimony, Mr. Mosenthal equates Missouri with Massachusetts. The comparison is not appropriate. A key driver to the business case for CHP to the customer is the level of the industrial electric rate that the customer is currently paying and would have expected to pay over the life of the CHP facility.

In the 2014 ACEEE State Scorecard, ACEEE includes Table 28 - Installed CHP capacity and fuel prices by state, 2012–13. Table 28 includes the industrial average electric rates for each state. Table 28 is replicated through Missouri below:

Table 28. Installed CHP capacity and fuel prices by state, 2012–13

State	Number of new CHP installations in 2013	Total new capacity installed in 2013 (kW)	Number of new CHP installations in 2012	Total new capacity installed in 2012 (kW)	2013 industrial electricity price (cents/kWh)	2013 industrial gas price ($/1,000 cubic ft.)
Alabama	0	0	1	500	5.99	5.00
Alaska	2	770	7	16,750	15.77	5.11*
Arizona	0	0	3	1,036	6.69	6.32
California	32	50,322	62	214,505	11.17	5.77*
Colorado	0	0	5	33,330	7.22	5.76
Connecticut	10	3,000	11	18,560	12.68	6.85
Delaware	1	104,000	0	0	8.50	11.61*
Florida	1	5,400	3	32,500	7.68	6.96*
Georgia	2	41,100	1	6,500	6.11	5.28
Hawaii	0	0	1	60	29.87	27.81
Idaho	0	0	4	10,765	6.12	5.73*
Illinois	1	138	3	3,110	5.73	5.91
Indiana	1	1,200	1	15,000	6.59	6.19*
Kansas	0	0	1	30	7.07	4.87
Louisiana	0	0	2	51,400	5.89	3.91
Maine	3	610	3	53,630	8.32	10.35*
Maryland	1	24,500	0	0	8.36	8.01*
Massachusetts	10	12,920	10	4,245	13.09	9.82*
Michigan	3	101,095	1	1,000	7.78	6.89
Minnesota	1	300	0	0	7.06	5.09
Missouri	1	16,000	1	5,000	6.14	7.93*

The Massachusetts average industrial electric price is $0.1309/kWh and the Missouri average industrial electric price is $0.0614/kWh. Therefore, Massachusetts industrial customers pay more than twice the electric rate as Missouri industrial customers.

Q. What does Mr. Mosenthal have to say about LED street lighting for Ameren Missouri?

A. Mr. Mosenthal states on page 36, lines 17-21: "In Section 8.13.4 of its IRP, Ameren states that there is savings potential available from LED street lighting. However, this potential is not included in the RAP or MAP scenarios, since the street lights are primarily utility-owned and Ameren is concerned about a potential lag in cost recovery. However, the fact remains that this represents additional cost effective potential that should have been included in the potential study."

Q. Please comment.

A. Ameren Missouri has analyzed an extensive business case for LED street lights on multiple occasions. Mr. Mosenthal's comments are not based upon knowledge specific to energy efficiency planning, implementation and evaluation at Ameren Missouri, MEEIA legislation or under the Commission's MEEIA rules.

Mr. Mosenthal may be unaware that Ameren Missouri conducted an LED street light technology pilot in conjunction with the Electric Power Research Institute on a St. Louis County suburban road from 2009 through 2012. Furthermore, in an order in File No. ER-2011-0028, the Commission required that Ameren Missouri further study the economics for a potential LED street light conversion. The Company filed its first LED street lighting report with the Commission in July of 2013. The Company updated the LED street lighting report in December of 2014. The report acknowledges that approximately 70% of the Company owned street lights have a cost effective LED alternative. Potential energy savings associated with the 70% of street lights converting to LED technology is approximately 59,000 MWh.

DSM potential studies address demand-side or customer premise energy efficiency – not utility infrastructure energy efficiency opportunity. Ameren Missouri reviews end-to-end efficiency opportunities as part of its IRP planning process. The Ameren Missouri Energy Delivery team leads this effort. However, in the case of LED street light business case development, my team led the effort for the 2013 and 2014 reports.

MEEIA legislation addresses energy efficiency opportunities on the customer side of the meter. There are concerns about whether, absent a legislative change, a Company-owned street lighting change out program could be done under the MEEIA construct. Even more importantly, the Company is still analyzing the pros and cons of a street light conversion program under either MEEIA or the traditional utility infrastructure capital regulatory framework.

Mr. Mosenthal states that the MEEIA plan is the place for Ameren Missouri to develop and propose creative mechanisms to overcome what he refers to as regulatory lag. Regulatory lag is addressed by the MEEIA through a Demand-Side Investment Mechanism ("DSIM") that can be adjusted between rate cases, but MEEIA is more broadly focused on creating incentives to utilize *cost effective* demand-side resources alongside traditional generation to meet load requirements. In my view, the focus of MEEIA is on incentivizing utility-sponsored energy efficiency in a vertically-integrated regulatory construct. When it comes to Company-owned street lights, there are more issues than regulatory lag to consider. There are significant rate design, regulatory, and potential stranded cost issues (not to mention the MEEIA statute itself) associated with LED street lights that have to be vetted in a much broader context than MEEIA plans.

Q. What is Mr. Mosenthal's testimony on customer behavior programs?

A. On page 42, lines 23-24 of his rebuttal testimony, Mr. Mosenthal states: "Ameren could achieve significant additional savings through a behavior program for the residential sector."

Q. Did Ameren Missouri analyze the cost effectiveness of a customer behavior program for residential customers as part of its program design process for MEEIA 2016-2018?

A. Yes. The Company analyzed the OPower program, described by Mr. Mosenthal, for cost effectiveness.

Q. Was OPower cost effective?

A. No. OPower was not cost effective when considered for Ameren Missouri. OPower has been shown to be marginally cost effective for Ameren Illinois, but there are important differences between the two states.

Q. Why is OPower not cost effective for Ameren Missouri but is cost effective for Ameren Illinois?

A. There are two reasons. The first is that Illinois statutes allow for the inclusion of natural gas benefits in the calculation of electric program cost effectiveness. Missouri does not. The second is that Ameren Illinois has to enroll the highest usage customers in the OPower program to make the program cost effective. To further clarify, OPower savings, as a percentage of customer annual energy consumption, are relatively small. Therefore, to reach the magnitude of annual energy savings necessary to make OPower cost effective requires that the program be directed to the residential customer segment that has the highest annual energy consumption characteristics.

Q. On page 35, lines 6-12 of his rebuttal testimony, Mr. Woolf states: "Ameren assumes a significant increase in the cost of saved energy for the MAP portfolio relative to the RAP portfolio, where the MAP portfolio budget is roughly twice that of the RAP savings. This increase in the cost of saved energy is in direct contrast to the experience of many energy efficiency program administrators, who find that increased energy efficiency savings levels can be achieved for similar, or even reduced, cost of saved energy." Please comment.

A. In my experience, the Maximum Achievable Potential (MAP) represents the hypothetical upward bound of energy efficiency performance. Achieving maximum potential is unlikely and attempting to do so would be a costly endeavor. The Ameren Missouri potential study appropriately represents this key concept, and the proposed plan is correctly premised on realistic achievable potential, and not maximum potential.

The first premise of MAP is that the utility pays up to 100% of incremental measure costs as well as maximizes its program marketing budgets. The increase in the financial incentive budget for MAP is directly proportionate to the increase in financial incentives paid to customers.

As an example, consider one of the ten DSM potential studies used in the development of annual load reduction goals in the EPA Clean Power Plan ("CPP") against which to measure Mr. Woolf's statements.

Attached is an excerpt from the Colorado Xcel Energy DSM Potential Study used by the EPA in the determination of an average annual 1.5% load reduction for the EPA CPP Building Block 4 (energy efficiency):

Table 1-2
Average Annual Achievable Potentials and Program Costs from All Sources—2010-2020

Fuel	Source of Potential	Savings by Scenario			Costs ($ Millions) by Scenario		
		100% Incentives	75% Incentives	50% Incentives	100% Incentives	75% Incentives	50% Incentives
Electricity GWh	Base Energy Efficiency	444.8	255.1	163.8	$247.7	$87.0	$43.1
	Conservation	16.0	9.8	4.0	$6.2	$3.0	$0.8
	Total	460.8	264.8	167.8	$253.9	$90.0	$43.9
Electricity MW	Base Energy Efficiency	109.0	49.0	29.8	*Shown above under GWh*		
	Demand Response	43.5	43.5	27.3	$48.6	$48.6	$31.2
	Conservation	3.9	2.4	1.0	*Shown above under GWh*		
	Total	156.3	94.8	58.1	*Equals GWh total plus DR costs*		
Natural Gas Million Dth	Base Energy Efficiency	2.2	0.8	0.4	$113.3	$32.4	$13.5
	Conservation	0.2	0.1	0.0	$4.6	$2.6	$0.7
	Total	2.4	0.9	0.4	$118.0	$35.0	$14.2
Emerging Technologies	*GWh*	*90.1*	*30.5*	*10.8*	*$68.6*	*$14.1*	*$4.6*
	MW	*23.8*	*8.6*	*4.3*	*Shown above under GWh*		

Also, see notes for Table 1-1.

The 100% incentive column represents MAP. The 50% incentive column represents RAP. According to Xcel, the electric budget for MAP is $253.9 million and $43.9 million for RAP. The MAP budget is almost six times greater than the budget for RAP. MAP incremental energy savings are 444.8. RAP incremental energy savings are 163.8 gigawatt-hours ("GWh"). MAP incremental energy savings are almost three greater than RAP savings.

Xcel also has quite a bit to say about the risk and uncertainty associated with MAP relative to RAP. Again, quoting from the Xcel study[5]:

[5] Colorado Xcel Energy DSM 2010 Potential Study, p. 1-20.

1.2.8 Uncertainty of Results

We want to caution the reader that there is inherent uncertainty in the results presented in this report because they are forecasts of what could happen in the future. Our estimates of technical and economic potential have the lowest degree of uncertainty. These are estimates that account for savings, costs, and current saturations of DSM measures but do not factor in human behavior.

The achievable program estimates do take into account behavior, as our modeling efforts try to predict program participation levels while factoring in measure awareness and economics, as well as barriers to measure uptake. Hence, the uncertainty in our achievable potential estimates is greater. This uncertainty is lowest in the 50-percent incentive scenario as these results are most consistent with current program experience. Uncertainty is higher in the 75-percent and 100-percent incentive scenarios, as these are projections that extend beyond the bulk of historical experience. This uncertainty is greatest for the 100-percent incentive scenario because we have no "real world" program experience where all the incremental measure costs are paid for by the utility over an extended period of time. Typically, a utility may offer the equivalent of 100-percent incentives for limited measures and customer segments in order to overcome high barriers in specific markets and to gain a high level of program participation while limiting program costs.

Q. How do the uncertainty risks differ for RAP and MAP?

A. RAP risks are associated with a more likely scenario than achieving MAP results. RAP represents a forecast of likely customer behavior under realistic program design and implementation. It takes into account existing market, financial, political, and regulatory barriers that are likely to limit the amount of savings that might be achieved through energy efficiency programs. RAP considers more realistic incentives (i.e., less than 100% of incremental cost), defined marketing campaigns, and internal budget constraints. MAP establishes a maximum target for the savings and involves incentives that represent up to 100% of the incremental cost of energy efficient measures above baseline measures, combined with high administrative and marketing costs. MAP also considers a maximum participation rate by customers, which is one of the reasons for the larger downside risk relative to RAP.

Q. Should the risk factors for RAP and MAP be the same?

A. No, because achieving savings associated with a more realistic portfolio is more probable and less risky than a portfolio which achieves idealistic results under optimal conditions.

Q. How was the uncertainty risk determined for RAP?

A. Scalars were determined for the upper and lower limits of risk associated with the RAP portfolio. The scalars were based on a formulaic approach where the PY2013 EM&V realization rates for the top measures were applied to the pre-EM&V 2018 GWh savings per the EnerNOC/2013 DSM Potential Study. The top residential measures represented 91% of the savings associated with the 2018 RAP residential portfolio prior to applying the 2013 EM&V results. After the 2013 EM&V results were applied, those measures only represented 73% of the savings associated with the 2018 RAP residential portfolio. Similarly, the top commercial and industrial measures represented 77% of the savings prior to applying the 2013 EM&V results. After the 2013 EM&V results were applied, those measures represented 100% and 94% for commercial and industrial savings respectively. Comparison of the total portfolios of measure savings associated with the 2018 RAP for pre-EM&V and post-EM&V applications resulted in a 91.2% ratio. The remaining 8.8% was used as the basis for the RAP risk scalar. Since RAP is modeled as the probable portfolio, the scalars were evenly applied for the upper and lower limits. The table below shows a summary of the formulaic approach.

RAP Portfolio	Pre-EM&V Top Measures GWh and % of Total Measures		Pre-EM&V Total GWh	PY 2013 EM&V RR for Top Measures	Post-EM&V Total GWh	Overall RR	Risk Scalar
			A	B	C = A x B	D = C / A	= 1 - D
Residential	228.97	91%	250.97	72.7%	182.52		
Commercial	403.91	77%	523.00	100.0%	522.89		
Industrial	24.50	77%	31.67	93.8%	29.71		
Total			805.64		735.12	91.2%	**8.8%**

Q. How was the uncertainty risk determined for MAP?

A. Since MAP yields the maximum or ceiling for potential, then by logic, there should be no potential above the MAP savings so a 0% scalar was assigned to the risk for achieving MAP High. The MAP Low scalar was assigned based on doubling the RAP Low scalar since MAP presumes conditions that are ideal and are not typically observed, in addition to the fact that there is more EM&V risk and customers are harder to reach.

Q. How does Ameren Missouri's high and low risk assignments for RAP and MAP compare to other utilities' assumptions?

A. They are consistent with what we are seeing in other studies. For example, the 2010 Colorado Xcel DSM Potential Study, one of the ten DSM potential studies used by the EPA in the development of its CPP plan, states the following about MAP risk and uncertainty on page 1-20 of the report[6]:

[6] Colorado Xcel Energy DSM 2010 Potential Study, p. 1-20.

1.2.8 Uncertainty of Results

We want to caution the reader that there is inherent uncertainty in the results presented in this report because they are forecasts of what could happen in the future. Our estimates of technical and economic potential have the lowest degree of uncertainty. These are estimates that account for savings, costs, and current saturations of DSM measures but do not factor in human behavior.

The achievable program estimates do take into account behavior, as our modeling efforts try to predict program participation levels while factoring in measure awareness and economics, as well as barriers to measure uptake. Hence, the uncertainty in our achievable potential estimates is greater. This uncertainty is lowest in the 50-percent incentive scenario as these results are most consistent with current program experience. Uncertainty is higher in the 75-percent and 100-percent incentive scenarios, as these are projections that extend beyond the bulk of historical experience. This uncertainty is greatest for the 100-percent incentive scenario because we have no "real world" program experience where all the incremental measure costs are paid for by the utility over an extended period of time. Typically, a utility may offer the equivalent of 100-percent incentives for limited measures and customer segments in order to overcome high barriers in specific markets and to gain a high level of program participation while limiting program costs.

Q. How did Ameren exceed goals in MEEIA Cycle 2013-2016 which were based on realistic potential?

A. The potential study determines the quantity of energy efficiency savings that are obtainable, under the RAP, MAP, Economic, and Technical scenarios, and distributes those savings over a period of time. In the Ameren Missouri IRP case, it is over a 20-year period of time. This distribution is made to arrive at a relatively uniform level of annual energy savings over time. In the case of MEEIA Cycle 2013-2015, Ameren Missouri achieved potential savings identified for future years by implementing low cost energy savings measures that were identified by the potential study for implementation in future years, thereby shifting savings from the future to the present and creating a less balanced portfolio of measures in the future.

I will discuss the specific MEEIA 2016-2018 energy efficiency program design parameters in detail in the next section of my testimony.

XIII. AMEREN MISSOURI ENERGY EFFICIENCY PROGRAM DESIGN PROCESS FOR MEEIA 2016-2018 (PART 1)

Q. Describe the MEEIA 2016-2018 program design planning process.

A. Program design follows the completion of the DSM potential study. The program design process takes approximately 3-6 months. The process includes the following components.

1. Update the DSM potential study as required. The DSM potential ptudy used to do program design for the MEEIA 2016-2018 implementation period started in 2012. Consequently, there is up to a 6-year gap between the start of the study and the end of the program implementation period. Major program drivers can change during such a 6-year period.
2. Develop revised annual load reduction goals as a result of updates to the DSM potential study.
3. Work with Ameren Missouri implementation teams and EM&V teams to address inconsistencies between components of proposed annual load reductions goals to actual implementation experience in the marketplace.
4. Work with Ameren Missouri implementation teams to refine individual program administration and incentive costs based on actual program experience and projected changes in key drivers for costs.
5. Work with stakeholders to keep all apprised of program design status. Seek input on new program design concepts.
6. Finalize program design.

Q. Describe the key drivers that resulted in updating the DSM potential study.

A. The DSM potential is a snapshot of realistic achievable load reductions at a point in time. Examples of key driver changes include:

- Avoided costs change
- New building codes and appliance efficiency standards get promulgated and revised
- The DSM potential study derives individual measure energy savings on the latest Ameren Missouri TRM. The TRM gets informed and updated with the most recent program year EM&V results

- New program designs are introduced

Q. Did avoided costs change between the time when the DSM potential study was completed and the time the MEEIA 2016-2018 filing was completed?

A. Yes. However, the changes were relatively small and did not have a meaningful impact on program design.

Q. Speaking of avoided costs, what does Mr. Woolf say about avoided costs in his rebuttal testimony?

A. On page 22, lines 15-16, of his testimony, Mr. Woolf states: "In addition, in calculating the TRC benefits, the study authors (AEG) do not include the benefits associated with fossil fuel savings or other resources such as water. These benefits can be significant and can make a material difference in the results of the TRC test."

Q. Please respond.

A. Ameren Missouri provided the avoided costs to AEG to use in the Ameren Missouri DSM Potential Study. The study contractor, AEG, had no role in the determination of avoided costs. For the study and for the MEEIA filing, avoided costs are determined by the Ameren Missouri IRP team. The same avoided costs are used, where applicable, for both supply and demand-side options.

MEEIA law SB 376 393.1124 – 2.(6) and MEEIA rules 4 CSR 240-20.093-1(DD) and 240-20.094 -1(Y) define "Total Resource Cost Test" as a test that compares the sum of avoided utility costs and avoided probable environmental compliance costs to the sum of all incremental costs of the end-use measures that are implemented due to the program, as defined by the Commission rules. While Ameren Missouri is open to discussing the role and

possible quantification of non-energy benefits, the inclusion of such benefits is not part of the Ameren Missouri MEEIA 2016-2018 filing.

Q. Did new building codes and appliance efficiency standards come into effect even after the Ameren Missouri DSM Potential Study was completed?

A. Yes. For example, new efficiency standards pertaining to commercial building rooftop air conditioner minimum efficiency standards became more stringent – after the completion of the Ameren Missouri DSM Potential Study.

Q. Mr. Mosenthal states on page 11, lines 14-17, of his rebuttal testimony that *"In reality, public sector buildings are highly budget constrained, have a hard time implementing even those projects with very attractive paybacks due to budget constraints and long backlogs of needed repairs, and often are unable to meet those goals."* Mr. Mosenthal expresses the opinion that federal and state public sector buildings ignore federal and, in the case of Ameren Missouri, Missouri mandates to install the most energy efficient options.

A. We issued a data request to Mr. Mosenthal to request the documentation he relied upon to make this statement. Mr. Mosenthal has none. Federal requirements include Executive Order (EO) 13514, the Energy Independence and Security Act of 2007 (EISA), the 2009 Omnibus Appropriations Act which codified EISA into law, and EO 13423. The EISA requirements exemplify how significant the federal building energy efficiency mandates are listed below:

- **Energy Efficiency**: EISA requires federal agencies to reduce energy intensity by 3 percent per year, or 30 percent by FY 2015 (compared to an FY 2003 baseline):

  9 percent by FY 2008**
  12 percent by FY 2009
  15 percent by FY 2010

18 percent by FY 2011
21 percent by FY 2012
24 percent by FY 2013
27 percent by FY 2014
30 percent by FY 2015

On April 23, 2009, Missouri Governor Nixon issued Executive Order 09-18 which states:

Executive Order 09-18

WHEREAS, in recognition of the importance of energy efficiency and the use of clean, domestic energy resources, and of the importance of the leadership role of state government; and

WHEREAS, the State of Missouri commits to managing operational costs and sustaining resources for future generations; and

WHEREAS, the prudent utilization of energy conservation is of prime importance for the continued economic and environmental progress of the State of Missouri; and

WHEREAS, the energy required for the operation of state government buildings is a significant portion of the energy consumption of Missouri State Government; and

WHEREAS, the reduction of energy use in state government buildings will result in cost savings and the preservation of valuable natural resources; and

WHEREAS, the State of Missouri has the duty and opportunity to moderate energy use.

NOW THEREFORE, I, JEREMIAH W. (JAY) NIXON, GOVERNOR OF THE STATE OF MISSOURI, by virtue of the authority vested in me by the Constitution and laws of the State of Missouri, do hereby order that all state agencies whose building management falls under the direction of the Office of Administration shall institute policies in consultation with the Division of Facilities Management, Design and Construction and the Department of Natural Resources' Energy Center that will

result in reductions of energy consumption by two percent per year for each of the next 10 years.

All new state construction, buildings being constructed for lease by the state, and significant renovations and replacement of energy-using equipment shall be at least as stringent as the most recent energy efficiency standards of the International Energy Conservation Code (IECC). Exemptions shall be limited to those listed in the IECC and exemptions approved by the Director of Facilities Management, Design and Construction.

Energy efficiency shall be made a priority in design, construction and operation of state government buildings. The Office of Administration shall develop and adopt a State Building Energy Efficiency Design Standard that establishes and prioritizes energy efficient design techniques specific to the needs and operations of state facilities. The State Building Energy Efficiency Design Standard shall incorporate as goals the energy recommendations and practices presented in the American Society of Heating, Refrigerating and Air-Conditioning Engineers' (ASHRAE) Advanced Energy Design Guide for Small Office Buildings. The State Building Energy Efficiency Design Standard shall also be made available for adoption by other state agencies whose building management does not fall under the direction of the Office of Administration.[7]

Q. Have there been any recent Missouri filings that speak to the success that Missouri has had under Governor Nixon's leadership to increase state office building energy efficiency?

A. Yes. In a March 2015 grant application to develop a Missouri statewide TRM, the Missouri Department of Economic Development, Division of Energy, stated the following in the grant application:

[7] https://governor mo.gov/news/executive-orders/executive-order-09-18

"Missouri state agencies have reduced energy use by more than 22 percent since a 2009 executive order directing agencies to reduce their energy use by two percent each year."[8]

Q. Why are federal and state office building energy efficiency mandates pertinent to the Ameren Missouri MEEIA 2016-2018 filing?

A. If federal and state office buildings are under mandates to increase the energy efficiency of their buildings, that means that these facilities will invest in energy efficiency with or without the financial assistance from an electric utility energy efficiency program. This means that these facilities may be considered 100% free riders, which means that utilities have the obligation to allow these facilities to participate in utility energy efficiency programs, pay the appropriate financial incentives under the applicable energy efficiency tariffs, but may not claim the energy savings associated with these projects. Since the EM&V methodology to estimate free ridership for these types of federal and state projects is through customer self-reporting surveys, free ridership is a function of the specific types of questions asked in the survey and the knowledge of the individual responding to the survey.

Q. Therefore, the free ridership associated with energy efficiency projects and federal and state office buildings may likely result in costs to Ameren Missouri customers but yield little, if any, commensurate energy savings, is that correct?

A. Yes, that is correct. However, it does depend on EM&V – specifically on the type of questions asked to determine free ridership in customer self-reporting surveys and the person answering the survey. Energy savings from those specific categories of buildings are already factored into the Ameren Missouri commercial sales forecasts. To count them again

[8] Technical Volume – State of Missouri – Statewide TRM / DE-FOA-0001222, p. 5.

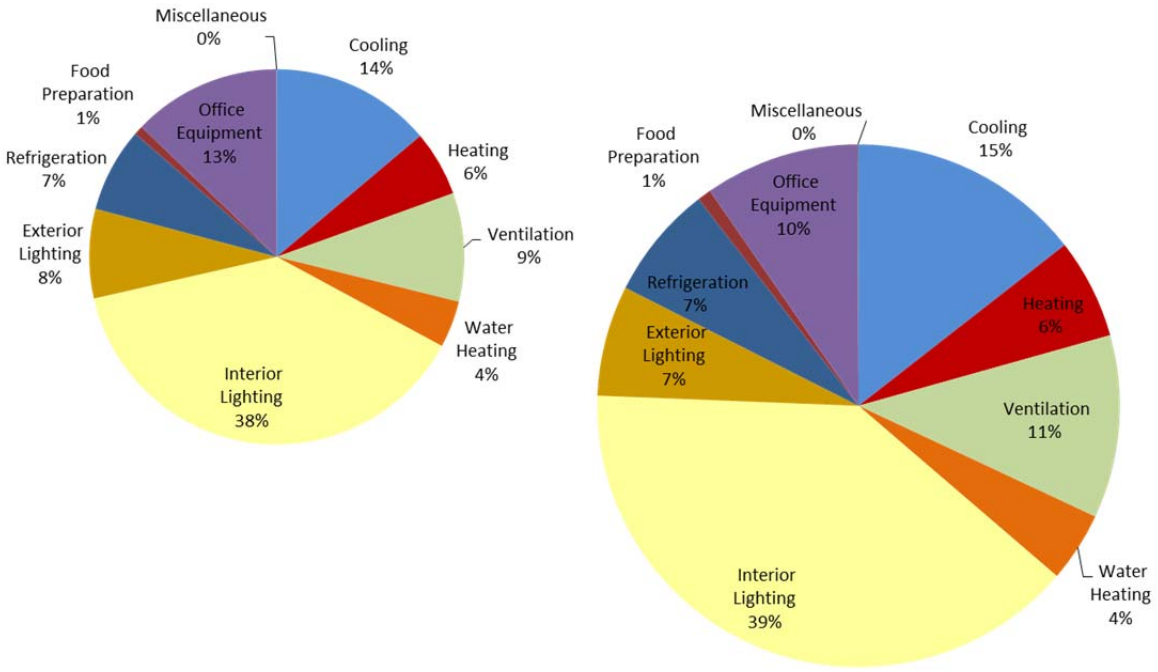
as part of the Ameren Missouri energy efficiency program would result in a double counting of energy savings – in terms of building the equivalent of a demand-side resource.

Q. Please describe the commercial building rooftop air conditioner minimum efficiency change.

A. In 2014, the Department of Energy issued proposed new rules for commercial building rooftop air conditioners that are expected to go into effect during MEEIA 2016-2018. The new standards would slash commercial rooftop air conditioner energy use by about 30%. The proposed standards would achieve the largest national energy savings of any standard ever issued by the U.S. Department of Energy.

The bad news is that the new baselines would eliminate rooftop air conditioners as a cost effective business energy efficiency measure for Ameren Missouri for MEEIA 2016-2018. Since this federal rule was not on the books at the time of the Ameren Missouri DSM Potential Study, business program potential is overstated for MEEIA 2016-2018. To provide an idea of the magnitude of removing this measure from potential, Volume 3 of the Ameren Missouri DSM Potential Study, page 5-11, Figure 5-7, shows the measure-level potential for commercial building end uses. Figure 5-7 is reproduced below:

Figure 5-7 Commercial Measure-level RAP Savings by End Use in 2018 and 2025



Q. Please describe the metal-halide lighting efficiency standard change.

A. A metal-halide lamp is an electric lamp that produces light by an electric arc through a gaseous mixture of vaporized mercury and metal halides. It is a type of high-intensity discharge ("HID") gas discharge lamp. Developed in the 1960s, a metal-halide lamp is similar to mercury vapor lamps but has better efficacy and color rendition of the light. Metal-halide lighting is a meaningful component of the business lighting end-use segment. New standards have been promulgated to take effect in 2017 which will lower the consumption of energy for metal-halide lamps. We are still working to quantify the magnitude of the effective energy savings associated with the new standard.

XIV. IMPACT OF EM&V ON PROGRAM DESIGN AND PROGRAM POTENTIAL

Q. What are some of the most significant insights from the EM&V of the Ameren Missouri 2013 DSM programs that resulted in significant changes to the measure energy savings used in the development of the 2013 Ameren Missouri DSM Potential Study?

A. Significant EM&V findings that had a meaningful impact on DSM potential relative to individual energy efficiency measure incremental energy savings values from the Ameren Missouri TRM filed as part of MEEIA 2013-2015 were presented to Ameren Missouri MEEIA 2016-2018 case interveners at a MEEIA Technical conference on January 16, 2015. A replication of the slide presented on January 16th that depicts the measures that had meaningful revisions to incremental energy savings as a direct result of 2013 EM&V measurements is:

	Cycle 2 kWh Savings	TRM kWh Savings	% Diff
Setback thermostat - full setback_SF	125.23	752.54	-83%
.Setback thermostat - moderate setback_SF	90.42	543.35	-83%
Occupancy Sensor	37.54	217.00	-83%
Indoor Coil Cleaning	184.02	638.10	-71%
Smart Strip - Kit - Load sensing	53.88	184.00	-71%
Smart Strip for Direct Install	53.88	184.00	-71%
Smart Strip - Online - Load Sensing	59.16	184.00	-68%
Smart Strip - Online - Motion Sensing	64.48	184.00	-65%
Energy Star Room AC	49.60	115.00	-57%
Window Replacement_SF	485.51	1,103.39	-56%
Window Replacement_MF	941.74	2,140.22	-56%
Outdoor Coil Cleaning	231.87	515.10	-55%
Basement Wall Insulation_SF	159.48	336.19	-53%
Duct Sealing Level 1	641.10	1,351.50	-53%
Duct Sealing Level 2	1,113.13	2,346.60	-53%
Geothermal HP Desuperheater	730.51	1,540.00	-53%
Infiltration reduction - 30%_MF	372.12	751.21	-50%
Infiltration reduction - 50% and attic insulation_MF	688.71	1,390.31	-50%
Infiltration reduction - 50% and attic insulation_SF	514.92	1,039.49	-50%
Infiltration reduction - 50%_SF	366.47	739.80	-50%
Infiltration reduction - 30% and attic insulation_MF	425.60	859.16	-50%
Infiltration reduction - 30% and attic insulation_SF	369.16	745.23	-50%
Infiltration reduction - 30%_SF	221.68	447.50	-50%
Infiltration reduction - 50%_MF	631.44	1,274.70	-50%
Freezer Recycling	717.18	1,429.00	-50%
Refrigerator Recycling	750.00	1,440.00	-48%
SEER 16+ Replace at Fail	379.96	710.41	-47%

This table speaks to the magnitude of some of the more significant changes to program annual load reductions – solely attributable to the most recent Ameren Missouri customer primary EM&V data and analyses.

Q. Please address the importance of some of the EM&V results in the preceding table and how they impact program annual load reduction goals for MEEIA 2016-2018 relative to MEEIA 2013-2015.

A. The refrigerator re-cycling program was impacted such that average annual energy savings per unit re-cycled in MEEIA Cycle 2016-2018 are approximately 50% of

what they were in MEEIA Cycle 2013-2015. This is due to two factors. The first is a relatively new EM&V approach to assess energy savings using actual metered results from similar programs in place in California and Michigan. The second is due to the fact that aggressive refrigerator and freezer energy efficiency standards have been in place for a long time. This means that the energy consumption of the refrigerators collected over time declines significantly.

Measures such as setback thermostats, occupancy sensors, most smart power strips, energy efficient windows, HVAC coil cleaning and duct sealing are no longer cost effective measures to include in Ameren Missouri programs.

Q. Mr. Mosenthal states on page 19, lines 1-2, that *"As seen, EM&V has a fairly minor impact, creating a 5% reduction in cumulative 2018 savings."* Please comment.

A. The impact of 2013 EM&V on the MEEIA 2016-2018 plan is meaningful and large. The impact of draft 2014 EM&V individual measure impacts to further refine the MEEIA 2016-2018 plan appear to be equally meaningful and large. 2013 EM&V results led to 50% reductions in savings from the residential refrigerator re-cycling program and 20% annual reductions from the residential HVAC program – due solely to 2013 EM&V impact measurements.

XV. CFL COST EFFECTIVENESS FOR MEEIA 2016-2018

Q. Even though the downward adjustments to MEEIA 2016-2018 for the examples presented above are meaningful, doesn't residential lighting in the form of CFLs account for the majority of annual load reductions – similar to MEEIA 2013-2015?

A. CFLs are not cost effective for Ameren Missouri for MEEIA 2016-2018. The replacement technology for CFLs is LED technology. LEDs are only marginally cost effective for MEEIA 2016-2018 – thereby providing minimal net benefits to customers. In addition, the first cost of a standard 60-watt equivalent LED is closer to $9.00 than to $2.00 for a comparable CFL – thereby limiting retailers' ability to move LEDs in 6-pack packages as was the case with the majority of CFLs. Finally, 2014 EM&V draft impact results for CFLs or efficient residential lighting in general showed the average daily hours of use ("HOU") for efficient lighting technology declined from 2.9 hours per day to 2.2 hours per day – resulting in approximately a 24% reduction in first year energy savings.

Q. What are HOU and how are they measured?

A. HOU, in this case, is the average daily hours that CFLs and/or LEDs in a home are turned on in an average day. Ameren Missouri EM&V contractors measure HOU by installing lighting loggers in a statistically valid sample of homes. These lighting loggers measure the hours each CFL is on per day. The lighting loggers report average HOU by room for the typical home.

Q. Was an Ameren Missouri HOU study conducted with lighting loggers prior to 2014?

A. Yes. A similar study was conducted by EM&V contractors in 2010.

Q. Please provide a side-by-side comparison of the HOU estimates by room for 2010 and 2014.

A. The side-by-side comparison is shown in the following table:

HOUs by Program and Year		
	Lighting	
Room Type	2010	2014
Basement	4.6	1.9
Bathroom	1.9	1.2
Bedroom	1.6	1.2
Closet	0.9	0.4
Dining Room	1.4	1.6
Garage	1.2	1.4
Hallway	1.3	1.1
Kitchen	5.3	3.2
Living Room	4.4	2.4
Office	2.6	1.5
Exterior	2.9	2.5
Overall (Weighted)	**2.91**	**2.2**

Q. Please explain how the average CFL HOU could change so dramatically by room from 2010 to 2014.

A. The decline in HOU is directly attributable to large volume of CFLs that Ameren Missouri customers purchased from the Residential Lighting program from 2010 to 2014. Approximately 10 million CFLs were purchased by Ameren Missouri customers from the program between 2010 and 2014. From in-home inventories conducted by EM&V auditors, we know that the average Ameren Missouri home has a total of 56 light sockets that are suitable for CFLs. Therefore, moving 10 million CFLs is equivalent to increasing the saturation of CFLs in the average home by 10/56 = 18%.

Due to the high first cost of CFLs relative to the cost of incandescent light bulbs, Ameren Missouri residential customers typically install CFLs in the highest usage light sockets first. When the high usage light sockets are filled, then lower usage light sockets get filled with CFLs. Hence, when the lower usage sockets are averaged with the higher usage sockets, the overall HOU for CFLs declines.

The following illustration of a typical living area in a typical Ameren Missouri home may give a better example of how the math works in calculating HOU for CFLs:

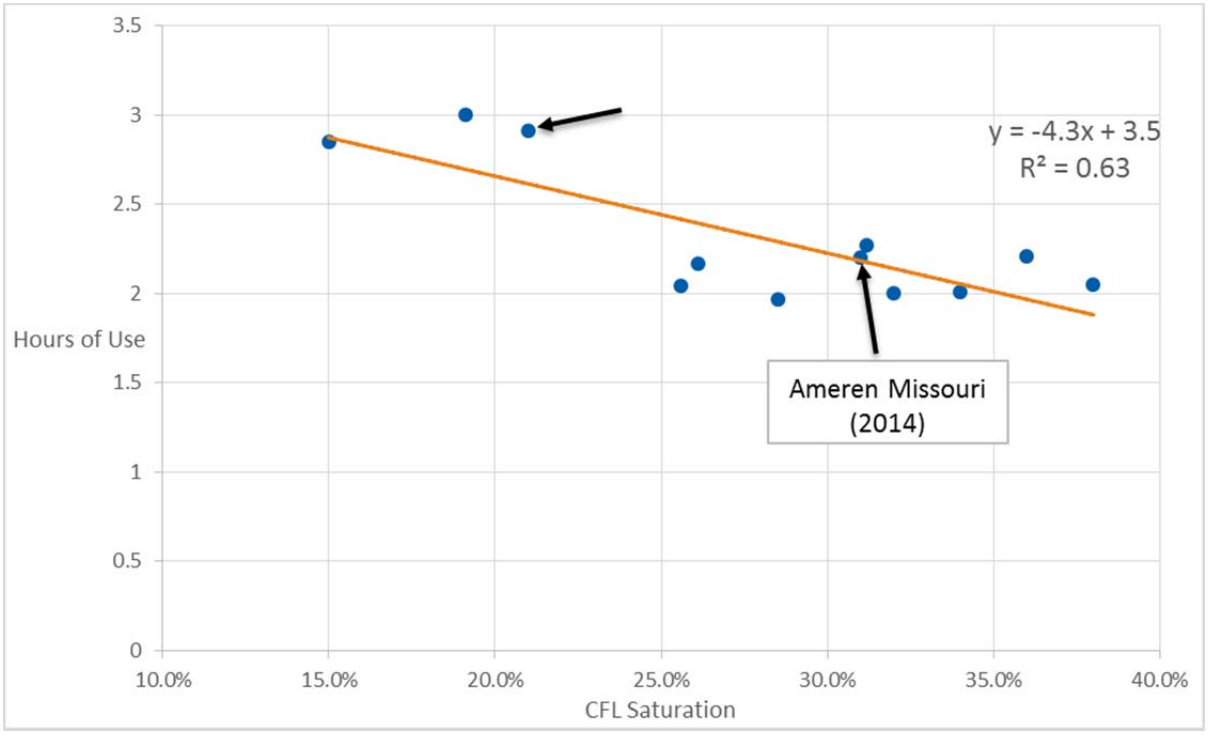
In this illustrative example, assume the customer installed CFLs in the reading lamps in this room in 2010 because that it where the customer usually turns on the lights – hence the largest bill savings from the installation of CFLs. If so, in 2010 the average HOU for the CFLs installed would have been four hours per day. Next assume that in 2014, as a result of the marketing and financial incentives provided by the Ameren Missouri Residential Lighting program that the customer proceeded to install CFLs in the ceiling can lights that the customer uses less frequently at the rate of one hour per day. If so, the new average HOU for CFLs for the entire room, reading lamps and ceiling can lights, becomes two hours per day – a significant drop from the four hours per day calculated in 2010. Repeat this same occurrence in the other rooms of a home and it becomes clear how the HOU for CFLs or

other efficient lighting technology such as LEDs declines as the saturation of efficient lighting increases.

Q. How is HOU for the Ameren Missouri Residential Lighting program expected to change for the MEEIA 2016-2018 implementation period and beyond?

A. The 2014 EM&V report on the Ameren Missouri Residential Lighting program provides guidance. The EM&V contractor used data from the 2010 and 2014 Ameren Missouri customer lighting logger studies to develop a regression equation that speaks to the relationship of efficient lighting saturation and corresponding average HOU. Figure 5 on page 39 of the 2014 draft Residential Lighting EM&V report shows the following relationship of HOU to saturation of efficient lighting technology:

Figure 1. Hours of Use by CFL Saturation



Q. Please interpret Figure 5 as it pertains to residential lighting program design for MEEIA 2016-2018.

A. At the conclusion of MEEIA 2013-2015, Ameren Missouri will have sold enough CFLs and LEDs to be in the 35-40% CFL saturation range for the average Ameren Missouri home. If so, from Figure 5 we can expect average HOU to further decline to approximately 1.8 hours per day. If we compare the HOU of 2.9 used in the design of the MEEIA 2013-2015 Residential Lighting program to 1.8 for the MEEIA 2016-2018 program, that represents a 38% decline in first year load reductions due solely to HOU.

Q. Why is the EM&V analysis of HOU for the Ameren Missouri Residential Lighting program critical to the design of the MEEIA 2016-2018 Residential Lighting program and other residential programs where efficient lighting is a component?

A. First, HOU drives first year savings for lighting. If EM&V states that average HOU for efficient lighting technology has declined by 38%, this translates directly into 38% less first year energy savings. Second, if the Residential Lighting program sold enough efficient lights to result in, for example, a 5-10% increase in the saturation of efficient lighting in the average Ameren Missouri customer home but the EM&V in-home audit of actual lighting installed indicates less than 5-10% increase in saturation – that is equally informative to future Residential Lighting program design. If in-home inventories of efficient lighting are not changing commensurately with the sales of utility-sponsored Residential Lighting efficient technologies, it is important to understand why. Are new CFLs or LEDs replacing existing CFLs rather than incandescent or halogen lights? If so, this implies that the existing CFL is the baseline lighting technology against which incremental energy savings should be measured. If CFLs replace CFLs, the incremental energy savings are zero. If LEDs replace CFLs, the incremental energy savings are very small – perhaps 3 watts per bulb.

Q. Is it common for utility Residential Lighting programs to experience an unexplained "ceiling" for the saturation of efficient lighting technologies?

A. Yes, the situation is very common. I will provide two examples. First, in the EM&V impact report on the 2012 Ameren Missouri Residential Lighting program, the EM&V contractor made the following statement on page 8 of the 2012 report:

> Cadmus recommends maintaining the discounts on standard CFLs at least until either 2015 or standard CFL saturation exceeds 30%, as there are still savings to be captured. However, note that those savings opportunities will continue to diminish as CFL saturation increases and codes and standards affect the types of bulbs available in the market. There is some evidence that saturation around 30% has historically been the maximum achievable for standard CFLs.[1] Other
>
> [1] Cadmus coordinated home inventory studies across 14 different areas in 2010 and found that even the longest running programs had standard CFL saturations below 30%. Further, during Ameren home inventories in 2010, we found that 76% of total sockets accepted medium screw-based bulbs. This total potential would be reduced by those sockets that would require specialty bulbs (dimmers, 3-way, flood shape [amount unknown for
>
> The Cadmus Group, Inc. / Energy Services Division 8

The Ameren Missouri EM&V contractor provided guidance that CFL saturation has a history of hitting a ceiling at something in the 30% saturation range.

Second, Massachusetts is a state that had been running Residential Lighting programs offering CFLs for longer than Ameren Missouri. In 2012, the Massachusetts Residential Lighting EM&V contractor issued a report on the "*Results of the Massachusetts OnsiteCompact Fluorescent Lamp Surveys.*" Page IV of the Massachusetts report states the following:

> This still begs the question, "Where have all the program CFLs gone?" As discussed below in this Executive Summary and in more detail in the main body of the report in Section 2, Section 3, and Appendix B, we hypothesize—and provide empirical evidence to support this hypothesis—that newly purchased CFLs replacing other CFLs may account for many, if not most, of the "missing" CFLs. Put another way, when a CFL burns out, many consumers appear to be replacing that CFL with another CFL, thereby preventing a decrease in saturation if

Massachusetts' CFL saturation appears to be capping out in the 30% saturation range. Massachusetts' CFLs appear to be replacing CFLs. Massachusetts' Residential Lighting program design will have to factor this critical EM&V assessment into future Residential Lighting program design.

Q. Why has it been important for your testimony to address the HOU details for Residential Lighting program design for MEEIA 2016-2018?

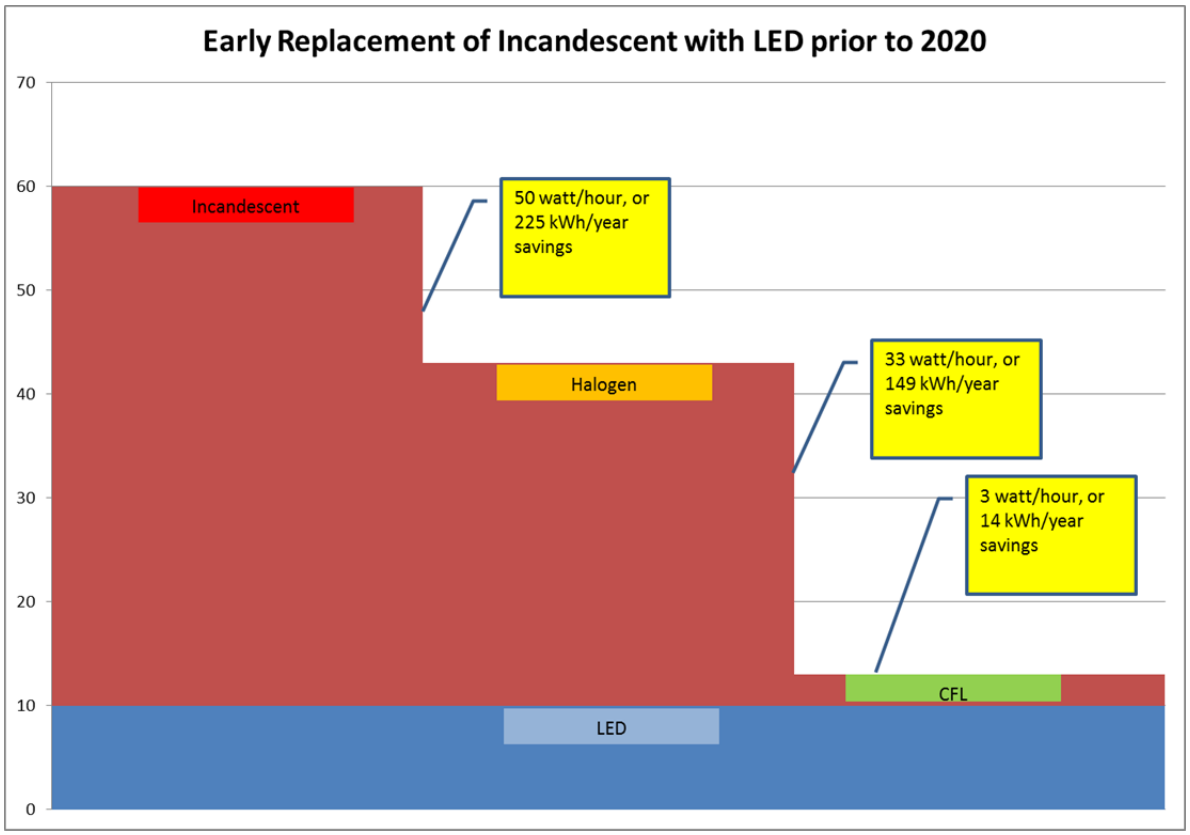
A. It is important because intervenors' rebuttal testimonies state that MEEIA 2016-2018 Residential Lighting program designs and annual first year load reductions should be similar to those achieved for MEEIA 2013-2015. The implication is that the future should resemble the past for the Residential Lighting program. The hard evidence and associated analyses, however, show that more stringent lighting efficiency standards accompanied by Ameren Missouri specific EM&V impact assessments show significant declines in first year load reductions for Residential Lighting.

Q. Why after approximately 30 years of being a staple in electric utility energy efficiency programs are CFLs no longer cost effective during MEEIA 2016-2018 for Ameren Missouri?

A. The short answer is that federal lighting efficiency standards promulgated in EISA 2007 have set the baseline lighting efficiency standards at such a level that CFLs are no longer cost effective. While CFLs may have been a significant source of savings in the past, this will no longer be the case going forward due to the important milestones embodied in the EISA 2007 law with respect to lighting.

Q. Please explain.

A. The following bar chart illustrates the effect of EISA lighting technology efficiency standards on residential efficient light technology incremental energy savings:



The column under the word "incandescent" shows a highlighted area with the energy savings in going from a 60-watt incandescent light bulb to a CFL is approximately 47 watts. Hence, this is the reason why CFLs were the foundation on which all electric utility energy efficiency programs were developed.

EISA, however, mandated the phase out of most standard incandescent lighting technology as of January 1, 2014. This should not be interpreted to imply that CFLs are the only lighting technology that complies with EISA between 2014 and 2020. There is a window of opportunity to consider the continued promotion of cost effective CFLs between 2014 and 2020 due to the fact that EISA-compliant halogen light bulbs are an option for

customers. EISA-compliant halogen light bulbs are expected to cost less than CFLs but consume more energy and have shorter effective useful lives than CFLs. EISA-compliant halogens have the look and feel, in terms of lumen output, of incandescent light bulbs.

With this background, the column under the word "Halogen" represents the incremental energy savings associated with EISA-compliant halogens after January 1, 2014. The savings with a halogen rather than an incandescent baseline represent approximately 33 watts.

Finally, on January 1, 2020, EISA effectively mandated that CFL technology become the baseline energy standard for residential lighting beginning in 2020. Citing specific EISA language:

> **…If the final rule does not produce savings that are greater than or equal to the savings from a minimum efficacy standard of 45 lumens per watt, effective beginning january 1, 2020, the secretary shall prohibit the sale of any general service lamp that does not meet a minimum efficacy standard of 45 lumens per watt.**[9]

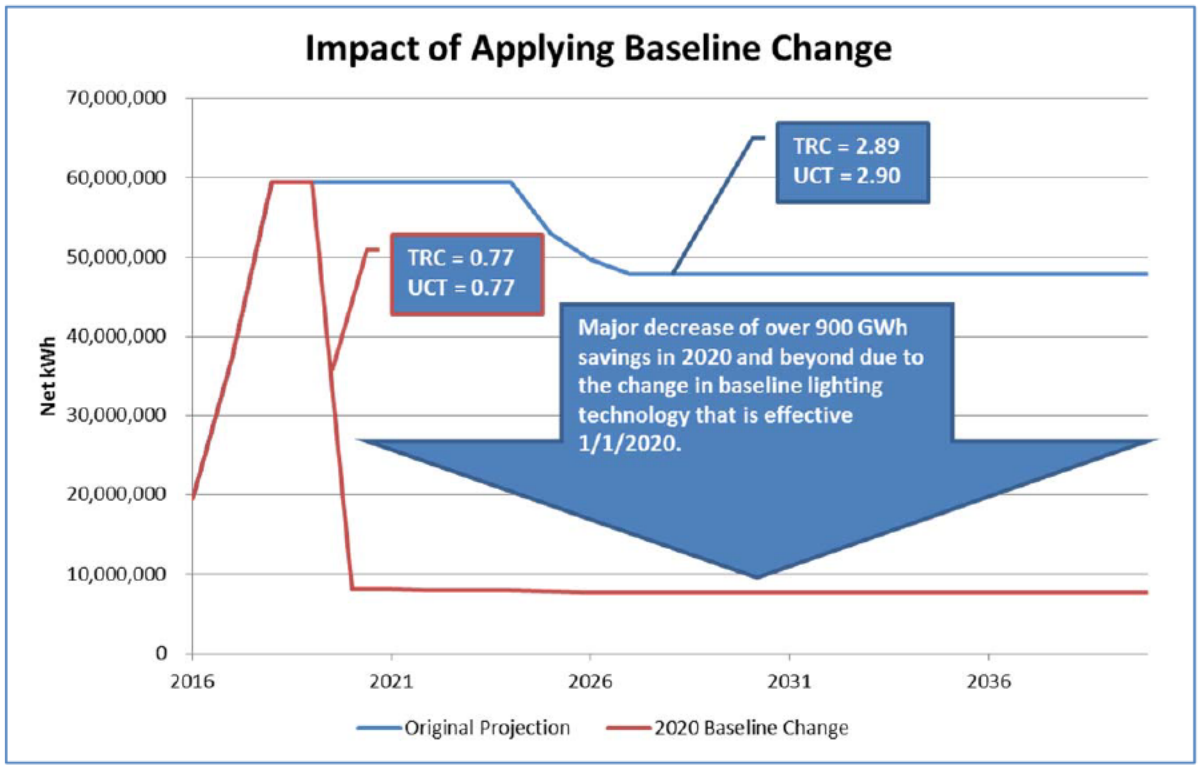
With this background, the column under the word "CFL" represents the incremental energy savings associated with an LED with a CFL rather than a halogen baseline. The savings with a CFL baseline rather than a halogen baseline represent 3 watts. Compare/contrast 2020 Residential Lighting program average light savings of 3 watts to 2013 Ameren Missouri Residential Lighting average watt savings of 47 watts. It becomes readily apparent why Residential Lighting program savings are declining rapidly due solely to EISA lighting mandates.

Q. Is Mr. Mosenthal's claims (his rebuttal testimony on page 23, lines 18-19), that "Ameren has stated that the most significant reason for the decline in the MEEIA

[9] http://www.gpo.gov/fdsys/pkg/PLAW-110publ140/html/PLAW-110publ140.htm

plan's savings is that most CFLs fail the TRC cost-effectiveness test." Is Mr. Mosenthal correct?

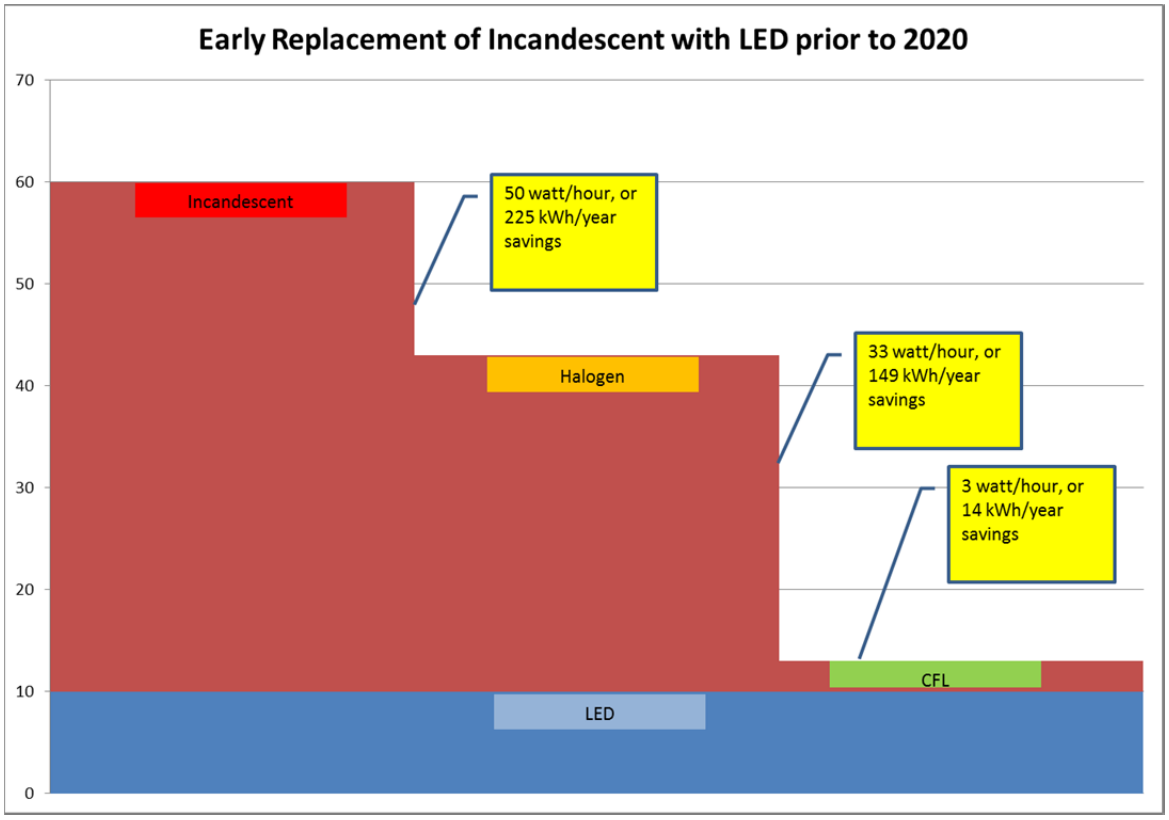
A. No, Mr. Mosenthal's assertion is not correct. As can be seen in the chart shown below, the actual reason for a decline in the savings is attributed to the EISA phase-in of a 2020 efficacy baseline change (the efficacy requirements in 2020 and beyond are equivalent to that produced by CFL lighting technologies), effectively making CFLs the baseline technology at that time.



Q. Mr. Mosenthal continues stating on page 23, lines 19-21, that "Ameren is not planning any standard A-base CFLs in 2016-20 and will instead only promote LED technology." Is this correct?

A. Yes, this is correct. As can be seen from the chart below, LED lighting technology provides more savings opportunities than CFL technology since CFL incremental

energy savings go to zero on January 1, 2020. However, the savings from the transition between CFLs and LED lighting is currently minimal at approximately 3 watts/hour.

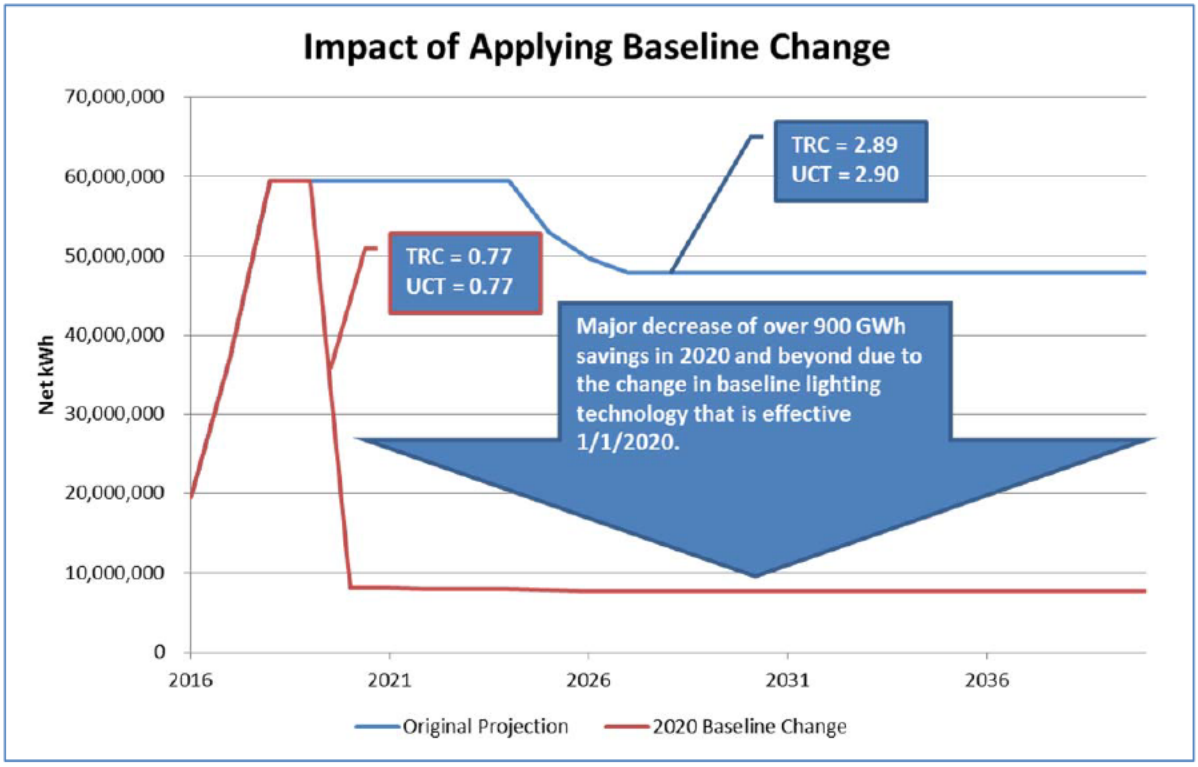


Q. On page 24, lines 1-4, Mr. Mosenthal indicates that switching from CFLs to LEDs should increase savings. Is this correct?

A. Yes. This is shown in the previous chart and is accounted for within the Ameren Missouri modeling of MEEIA Cycle 2016-2018.

Q. Mr. Mosenthal states on page 24, lines 2-4, that "since LEDs achieve higher savings than CFLs, the potential should actually increase after the switch, thereby eliminating this as a plausible reason for the savings declines." Is Mr. Mosenthal's statement factually correct?

A. No, it is not. As is shown in the graph below,



the decrease in savings that is attributable to the EISA baseline change in 2020 is over 900 GWh. Since CFLs become the baseline in 2020, there are no savings associated with CFL technology that can be claimed for the period of 2020 and beyond. Only savings associated with LED technology as the efficient technology can be obtained in 2020 and beyond.

Q. On page 24, lines 5-10, Mr. Mosenthal claims, "It also appears from Ameren's DSMore files that they are not performing the cost effectiveness screening properly. For example, the DSMore cost-effectiveness ratio for 30-watt CFLs is 0.34. However, this ratio appears to be due in large part to an assumed cost of $9.27 per bulb. A quick web search tells you that this amount is more than double the actual price of a 30-watt CFL and more in line with current LED costs, as shown by the NEEP study." Please comment.

A. I have not been able to identify the source of the information that Mr. Mosenthal is referencing. As he mentioned earlier in his rebuttal, Ameren Missouri used LED lighting technology as the preferred technology for residential lighting. 30 watt CFLs would typically be used as replacement for lighting with the equivalent efficacy of a 120 watt incandescent bulb. A search on the internet from one of the local suppliers of this type of bulb on April 13, 2015, yielded the following (a price of $9.97/bulb for a 30 watt CFL):

Q. Mr. Mosenthal states on page 24, lines 10-11, that "In fact, given the MEEIA plan is analyzing 2016-2018, this CFL cost is likely even too high if it were applied to LED expected pricing in that timeframe." Is this statement correct?

A. No, the statement is incorrect. The CFL lighting cost projections used within the Ameren Missouri MEEIA Cycle 2016-2018 analysis were based on inputs from the implementation vendors on the cost of the lighting technology and the installation cost where applicable. This also applies for the LED lighting technology costs. Where the vendor did not have available information, DOE projections of lighting costs were used.

Q. Mr. Mosenthal states on page 24, lines 11-13, that "Further, CFLs have much longer expected lives than the EISA compliant halogens and are often cheaper." Is this statement correct?

A. The statement is correct with the addition of some qualifiers. It is true that CFLs have much longer livers that the EISA-compliant halogens. It is also true that the "NPV" of the CFLs is less than the "NPV" of the EISA-complaint halogen alternative, over the life of the CFL. However, as mentioned earlier, the effective life of the CFL as the efficient technology, and not the base technology, is quickly coming to an end as the imminent EISA baseline change of 2020 comes into play. On a first cost basis, CFLs typically are not cheaper than halogens. Again, using the internet search of a local supplier as a reference point, the least expensive halogen to be found was priced at slightly less than $1.75/bulb (requires a 4-pack purchase) and the least expensive CFL to be found was priced at slightly less than $2.00/bulb (again, requires a 4-pack purchase).

Q. Mr. Mosenthal indicates, on page 24, lines 13-14, that "In order to properly screen the measure, the cost from the future stream of avoided incandescent replacement bulbs needs to be included in the base case." Is Mr. Mosenthal correct?

A. No. The correct statement would be that "… the cost from the future stream of avoided baseline replacement bulbs needs to be included…" The baseline changes over the life of the efficient bulb. Incandescent bulbs are not the baseline currently, and halogens will no longer be the baseline in 2020 and beyond.

Q. On page 24, lines 18-22, and page 25, lines 1-2, Mr. Mosenthal states "Further, the CFL is given a measure life of 2 years, presumably under the assumption that savings will drop to zero after two years because of EISA. However, the evidence

cited above that EISA is taking longer than expected to phase in and that halogen bulbs will form a significant portion of the post-EISA market contradicts this assumption. In 2020, even though the halogen bulbs may be phased out by EISA, this phase-out can be expected to happen gradually over the course of a few years and should not be applied to the 2016-2018 installations." Do you agree with these statements?

A. No. The two year life is only applied to CFLs that are installed in 2018 and represents the timeframe that halogens are the baseline. The life is set to three years for those CFLs that are installed in 2017, and four years for those CFLs that are installed in 2016. Cost effectiveness analysis of the CFLs that would be installed in 2018, with a two year life, shows that they are not cost effective. The baseline change assumption that Mr. Mosenthal states is correct. When planning for future programs, changes in baselines that have been clearly identified through regulations such as EISA, are used to guide the plan. The changes that are seen in hind-sight are not known at the time that the plan is developed, and are not incorporated into the plan.

Q. On page 25, lines 3-7, Mr. Mosenthal states "Screened properly, the cost-effectiveness of CFLs and all other lighting measures will increase significantly. The table below shows the screening inputs for a 30-watt commercial CFL replacing a halogen incandescent used by Ameren Missouri compared to the suggested inputs in the Illinois TRM which Ameren Illinois uses."

	Cost	Annualized O&M Savings	kWh saved
Missouri	$9.27	0	31
Illinois	$1.6	$3.02	163

Q. Do you agree with Mr. Mosenthal?

A. No. As mentioned in my previous answer to Mr. Mosenthal's rebuttal testimony on page 24, lines 5-10, we have not been able to identify the source of the information that Mr. Mosenthal is referencing. Regarding Mr. Mosenthal's screening comment, he uses his erroneous information to incorrectly imply that Ameren Missouri did not properly screen any lighting measures. To the contrary, Ameren Missouri is quite capable of correctly performing the screening process and has taken into account all of the known impending code changes to assure that the measures are screened correctly and that ratepayer funds are not wasted on measures that did not screen as cost effective.

Q. On page 25, lines 8-9, Mr. Mosenthal states "Ameren Missouri uses highly unfavorable screening assumptions compared to Illinois." Is this a correct statement?

A. No. Ameren Missouri and Ameren Illinois use similar avoided cost assumptions for the screening process. A difference in the screening is that utilities delivering energy efficient measures in Illinois, through an agreement with the Illinois Commerce Commission, continue to promote CFLs even though the EISA standard is changing in the future.

Q. On page 25, lines 9-16, Mr. Mosenthal continues with his discussion regarding the benefits of CFLs in Illinois, the payback of half a year based on O&M savings, and a multiple of five times the savings when compared to Ameren Missouri's DSMore screening. He continues by stating that he is unclear of the assumptions used by Ameren Missouri, but Illinois uses "reasonable assumptions for commercial applications of 3,198 hours per year, 72-watt halogen baseline, and a waste heat factor

of 1.24 to account for the reduced cooling need from the more efficient bulbs." He further states that these assumptions are in agreement with those used in other jurisdictions. Do you agree with his position?

A. No. It is clear that Mr. Mosenthal is not comparing analyses of the same measures. He conflates Residential lighting with Commercial lighting in order to support his position. To be clear, Residential and Commercial uses of lighting technologies differ considerably. Residential lighting is used, on average, approximately 1,000 hours per year. Commercial use of lighting, on the other hand, is typically in the 3,000 – 6,000 hours per year band.

Q. Do you have other concerns with Mr. Mosenthal's statements regarding CFL cost effectiveness analysis as he sees it?

A. Yes. If commercial CFLs have a payback of a half year based solely on O&M, it seems that the commercial facilities would readily replace with CFLs without utility assistance. The apparent reason for the need for utility assistance in these cases is to overcome the first cost hurdle, as the first cost of the CFL is higher than the first cost of a halogen light. This is also true for LEDs versus CFLs or halogen lights. Also, LEDs are still the efficient technology in the timeframe beyond 2019, when CFLs become the baseline. This is why LEDs are the technology that Ameren Missouri is promoting.

Q. Mr. Mosenthal states on page 25, lines 16-20, that he was not provided screening files for the residential programs but he feels it is safe to assume that residential CFLs had questionable screening inputs. Do you agree with Mr. Mosenthal?

A. No. It appears that Mr. Mosenthal is basing the majority of his testimony on this subject of innuendos and suppositions, and not on factual review of the analyses. He has stated repeatedly that he does not even have the analysis work, but he does not hesitate to make statements about the validity of the analysis work. To assess the accuracy of each analysis that was performed, each analysis needs to be reviewed individually. Ameren Missouri's assumptions regarding the cost effectiveness analysis of plan programs are all contained within the MEEIA Cycle 2016-2018 workpapers.

Q. Mr. Mosenthal states, on page 26, lines 2-13, he believes that not only is Ameren Missouri's screening of CFLs deficient, but that the LED screening is also deficient. He continues by stating that he believes even though he doesn't know the specifics of the analyses that Ameren Missouri performed, given his perception of screening deficiencies, that all of Ameren Missouri's analyses are deficient. Do you agree with Mr. Mosenthal's perception?

A. No. Mr. Mosenthal's assessment of the Ameren Missouri MEEIA Cycle 2016-2018 measure screening and cost effectiveness analysis is stereotypical in nature. Clearly this type of stereotyping has no place in an evidentiary hearing, nor does Mr. Mosenthal's assumptions and statements about the validity and accuracy of the Ameren Missouri MEEIA Cycle 2016-2018 measure screening and cost effectiveness analysis based on his lack of understanding of the DSMore modeling process for measure, program and portfolio cost effectiveness.

Q. Do you have any other concerns about Mr. Mosenthal's position on page 26, lines 2-13?

A. Yes. Mr. Mosenthal states, "… there are significantly more savings going from an incandescent or halogen incandescent to a CFL than going from a CFL to an LED." While this statement is true, Mr. Mosenthal appears to be making an incorrect assumption about a baseline change when an LED is considered as the efficient technology versus a CFL. To the contrary, the same "halogen incandescent" is the baseline from 2016 until the baseline is changed by codes and standards, which in this case is the EISA rule which changes the baseline to CFL beginning in 2020. To be clear, the production of standard "incandescent" bulbs is no longer possible under EISA rules and the standard incandescent bulbs not considered as the baseline for any of the analysis work supporting the MEEIA Cycle 2016-2018 filing.

Q. A significant portion of your testimony addresses the importance of EM&V to program design and how EM&V impacts realistic achievable potential – if established using pre-EM&V incremental measure energy savings. Why are these issues important to the Ameren Missouri MEEIA 2016-2018 filing?

A. Ameren Missouri and the Ameren Missouri Stakeholder Advisory Group learned a tremendous amount during MEEIA 2013-2015 in terms of improvement opportunities for MEEIA 2016-2018 relative to MEEIA 2013-2015. One area for improvement is greater program flexibility. Specifically, the ability to adjust annual deemed measure energy savings to reflect the latest EM&V results for purposes of the calculation of the throughput disincentive and the ability to make a symmetrical adjustment to the annual load reduction goals.

The flexibility to adjust deemed measure savings annually to reflect the most recent EM&V assessments would be in customers' best interests as it would prospectively align the throughput disincentive calculation with any changes in deemed measure savings based on actual EM&V results on an annual basis. The flexibility to adjust annual load reduction goals determined by the DSM potential study using MEEIA 2013-2015 TRM is fair to all parties because if annual load reduction goals are a function of deemed measure savings and those deemed measure energy savings change as a result of the most current Ameren Missouri customer primary EM&V data collection, then the corresponding annual load reduction goals should be prospectively adjusted to correspond to the most recent information. Therefore, it is important that the Commission understand the magnitude of the EM&V issue and how it impacts the totality of the DSIM over the MEEIA 2016-2018 implementation period.

Q. Mr. Mosenthal, on page 5 of his rebuttal testimony, states, *"I argue that Ameren's proposal to use self-adjusting savings targets for the purpose of determining the performance incentive undermines the whole purpose of the performance incentive in that it eliminates the risk that Ameren may not reach the target and get the full incentive."* Please comment.

A. Mr. Mosenthal is of the opinion that Ameren Missouri has the ability to control any risk related to the performance of its energy efficiency program. This is not the case, there are risks facing the Company that are outside of its control. The Company does not have the ability to manage risk that is outside of its control.

There are energy efficiency business risks that Ameren Missouri always has and always will continue to manage. These risks involve aspects of the business over which Ameren Missouri has the ability to influence the outcome. Examples of such risks include:

1. **Performance risk** – The risk that due to program design implementation flaws or unexpected operational factors, the program does not deliver energy savings as expected.
2. **Technology risk** – This risk is concentrated in programs that target emerging technologies, systems that are aggregates of existing technologies, and/or systems in which energy use is strongly influenced by technological or equipment factors.
3. **Market Risk/Customer Acceptance** – The risk that because of poor customer uptake, a poor economic climate, or the availability of better investments, customer participation is lower than expected.

Conversely, there are other risks that Ameren Missouri cannot control. Examples of such risks include:

1. **EM&V risk** – The risk that due to differences in assessments of individual measure savings developed through EM&V relative to the assessment of the same measure savings used in the DSM potential study that annual load reduction targets may not be met.
2. **Avoided Cost risk** – The risk that avoided costs change continuously. Therefore, if a program is analyzed for cost effectiveness using one vintage of avoided costs but evaluated for performance using a different vintage of avoided costs then programs may not be cost effective if avoided costs change.

Q. Would Ameren Missouri be willing to assume either the EM&V risk or avoided cost risk in MEEIA 2016-2018 as both factors into a financial performance opportunity?

A. No. Since Ameren Missouri has absolutely no control over either of these types of risks, Ameren Missouri is not willing to assume either risk.

XVI. AMEREN MISSOURI ENERGY EFFICIENCY PROGRAM DESIGN PROCESS FOR MEEIA 2016-2018 (PART 2)

Q. Clearly the MEEIA 2016-2018 program design process was not completed concurrently with the Ameren Missouri DSM Potential Study. There were a multitude of adjustments that were made due to major changes since there was a time lapse between the time the study was conducted and MEEIA 2016-2018 plan was developed. After the appropriate adjustments were made, what were the next steps to build prototype program templates for the MEEIA 2016-2018 implementation plan?

A. The next step was to transfer a multitude of updated information from the DSM potential study databases into the DSMore model that Ameren Missouri uses for DSM program design.

Q. Describe the transfer process.

A. One of the tools provided by EnerNOC was a Data Migration tool that extracts the measure-level data from the EnerNOC LoadMAP tool and places it into an EnerNOC Program Design tool. This Data Migration tool was used to migrate the measure-level data for subsequent program design.

Q. Isn't this the same program design file that was created by EnerNOC for the purposes of developing supply curves?

A. No. Although the file template is the same, the content is different. The EnerNOC Program Design tool is configured to allocate measures into programs that are intended for delivery. The file used by Ameren Missouri for program design differs from the file used by EnerNOC for preliminary designs, which were subsequently used to generate supply curves. Ameren Missouri's version of the file allocated measures to programs in the

manner that Ameren Missouri anticipates traction will occur, using past program delivery experience as a guide in measure allocation for ultimate delivery.

Q. Can you provide more detail about the design process for the residential programs?

A. Yes. A copy of the program design tool, created using the residential RAP measure-level data extracted from LoadMAP, was used by the program manager of the residential segment to develop the initial versions of the program-level potential for the Ameren Missouri residential programs. Results from 2013 EM&V were applied to the measures that were identified by EnerNOC's RAP measure-level potential. The residential program manager allocated the updated residential savings to proposed residential programs. This served as the targeted savings for the residential programs to be further designed collaboratively with the Ameren Missouri energy efficiency program implementation team.

Q. Why is the residential program design different from the RAP residential measure-level potential?

A. The following list provides reasons why the residential program-level potential differs from the residential measure-level potential:

1. Rearrangement or deferral of 3 programs:
    a. Residential Consumer Electronics
    b. Residential New Homes
    c. Residential Home Energy Performance
2. Application of 2013 EM&V results
3. Removal of unlikely segmentation
4. Application of Ameren Missouri's EE program implementation, expertise, and history

Q. Why was the Residential Consumer Electronics program not included in the program design?

A. The Consumer Electronics program was not included in the program design due to the results of Ameren Missouri's review of:

-The Massachusetts Consumer Electronics plans for 2013-2015
-The CEE database on consumer electronics
-Review of other utility for efficient electronics
-Concerns with the fit of a consumer electronics program in a utility energy efficiency portfolio

All of the above led to a quantitative analysis using DSMore that showed the program was not cost effective for Ameren Missouri.

Q. Why was the Residential New Homes program not included in the program design?

A. The Residential New Homes program was not included in the program design due primarily to the 2013 EM&V report on the program that showed the realization rate for energy efficiency measures energy savings was approximately 50% of what was used for program design. In addition, EM&V contractors assigned less than a 30% NTG to the program further denigrating the already low savings.

Q. Why was the Residential Home Energy Performance program not included in the program design?

A. The HEP program did not pass the cost effectiveness test for MEEIA 2016-2018.

Q. Can you provide more detail about the business program design process?

A. The process was similar to the residential program design process. A copy of the program design tool was prepared with the business RAP measure-level data that was extracted from LoadMAP. The program manager of the business segment used this data to develop the initial versions of the program-level potential for Ameren Missouri Business programs. Results from 2013 EM&V were applied to measures generated by EnerNOC's

RAP measure-level potential. The business program manager allocated the updated business savings to proposed business programs. This served as the targeted savings for the business programs to be further designed collaboratively with the Ameren Missouri energy efficiency program implementation team.

Q. Why did the business program design differ from the business RAP measure-level potential?

A. The following list provides reasons why the business program-level potential differs from the business measure-level potential:

1. Potential associated with the Small Business Direct Install program was removed because the program was not cost effective.
2. Removal of measures that meet the current efficiency standards. This was especially true of electronics such as laptops, desktop computers, and printers.
3. Application of Ameren Missouri's EE program implementation, expertise, and history.

Q. What information does the final version of the Ameren Missouri program tools contain?

A. The primary information is the energy efficiency measure allocation quantities and savings by year.

Q. Can you explain further how cost effectiveness is determined during the process?

A. The information is migrated from the program design tools to the Ameren Missouri cost effectiveness analysis modeling tool – DSMore. Specifically, measure and program delivery specifics are migrated into DSMore Batchtools. Program levels of incentives and administrative costs are then developed and added to the DSMore Batchtools, for each program, which are in alignment with past program delivery experience for continuity purposes, when the program has existed previously. Then the DSMore Batchtools

are analyzed and the cost effectiveness is determined for the program. Where measures are shown as cost ineffective, they are removed from the mix.

Q. Can you explain in greater detail the role of the Ameren Missouri implementation teams and evaluation, measurement and verification teams in the MEEIA 2016-2018 program design process?

A. The program implementation and evaluation teams play a significant role in MEEIA 2016-2018 program design. The draft program templates, as prepared by Corporate Planning, from the DSM Potential Study are passed to the implementation team to critique the program design, and inform it with their experience in the field, as well as the experience of Ameren Missouri contractors. They review the information, adjust measures, define actual budget and incentive levels, and return the results of their review to the design team for additional analyses of cost effectiveness. This is an iterative process – repeated multiple times until the final design is complete.

XVII. AMEREN MISSOURI PROGRAM DESIGN RELATIVE TO DRAFT EPA CPP

Q. Please discuss MEEIA 2016-2018 program design in more of a strategic context. Specifically, on page 12, Figure 3-3, of Mr. Woolf's rebuttal testimony, Mr. Woolf attempts to show that Ameren Missouri's MEEIA 2016-2018 implementation plan achieves lower percent annual load reductions than those ascribed to Missouri by the EPA's CPP for Building Block 4 on energy efficiency.

A. The EPA CPP proposal was issued in June of 2014 – after the completion of the MEEIA 2016-2018 program designs. However, the timing of the CPP release did not stop Ameren Missouri from doing a thorough review of Building Block 4. We focused on analyzing the source documents and workpapers developed by the EPA in order to gauge the

breadth and depth of the analytics used by the EPA to develop Building Block 4 aspirational annual load reductions for Missouri.

Q. What were the results of your review of the CPP?

A. The EPA's CPP Building Block 4 is based on the simplistic assumption that the future of energy efficiency, in terms of achievable potential, is as much or more than it was in the past. It appears that EPA did minimal analysis underlying the 1.5% per year annual load reduction goals for Building Block 4. Rather, the EPA took the simplistic, statistically invalid approach of reviewing ten disparate DSM potential studies, extracting MAP estimates from each study, calculating an annual average MAP load reduction rate for each of the ten DSM potential studies, and then took "the average" of the annual averages for each study to arrive at a 1.5% load reduction rate.

Q. Similar to Mr. Mosenthal's rebuttal testimony where Mr. Mosenthal did no analyses of the DSM potential studies that he compared to the Ameren Missouri DSM Potential Study, do you mean that the EPA also did not analyze the details underlying each of the ten DSM potential studies from which they determined the 1.5% annual load reduction aspirational goal?

A. Yes. That is correct.

Q. Did you review each of the ten DSM potential studies that the EPA CPP used to set Missouri annual load reduction targets?

A. Yes.

Q. Please list the ten DSM potential studies used by the EPA.

A. The following matrix provides an overview of each of the ten studies.

TABLE 1

Summary of Recent (2010-2014) Electric Energy Efficiency Potential Studies

State	Client	Analyst	Study Year	Study Period	End-year Projected Potential as % of Baseline Sales		Average Annual Projected Potential as % of Baseline Sales	
					Economic	Achievable	Economic	Achievable
Arizona	Salt River Project	Cadmus Group	2010	2012-2020	29%	20%	3.2%	2.2%
California	California Energy Commission	California Energy Commission	2013	2014-2024	Not reported	9.6%	N/A	0.9%
Colorado	Xcel Energy	Kema, Inc.	2010	2010-2020	20%	15%	1.8%	1.4%
Delaware	Delaware DNR/DEC	Optimal Energy, Inc.	2013	2014-2025	26.3%	Not reported	2.2%	N/A
Illinois	ComEd	ICF International	2013	2013-2018	32%	10%	5.3%	1.7%
Michigan	Michigan PSC	GDS Associates	2013	2013-2023	33.8%	15%	3.1%	1.4%
New Jersey	Rutgers University	EnerNOC Utility Solutions	2012	2010-2016	12.8%	5.90%	1.8%	0.8%
New Mexico	State of New Mexico	Global Energy Partners	2011	2012-2025	14.7%	11.1%	1.1%	0.8%
New York	ConEd	Global Energy Partners	2010	2010-2018	26%	15%	2.9%	1.7%
Pacific Northwest (Idaho, Montana, Oregon, Washington)	US Department of Energy	Lawrence Berkeley National Laboratory	2014	2011-2021	11%	Not reported	1.9%	Not reported
Pennsylvania	Pennsylvania PUC	GDS Associates and Nexant	2012	2013-2018	27.2%	17.3%	4.5%	2.9%
Tennessee	Tennessee Valley Authority	Global Energy Partners	2011	2009-2030	24.8%	19.8%	1.1%	0.9%
			Range					0.8% - 2.9% per year
			Average					1.5% Per year

Q. What are some of the red flags associated with these studies that are apparent by only reviewing the metrics listed in the previous matrix?

A. The first metric is the year in which each study was performed. Many of the studies were completed in the 2010-2011 time period. That means the average annual load reduction estimates include a substantial amount of CFL light potential. This major component of potential is not a factor for energy efficiency programs in the CPP implementation period.

The next metric is the study period. Several of the ten studies have a study period of ten years or less. These limited study periods, most of which stop by 2021 or before, do not reflect energy efficiency load reduction potential in the CPP implementation period.

Finally, an important metric to note is the last column in the matrix – average annual achievable potential. The EPA chose to extract MAP and then chose to call it "achievable" potential. MAP is defined as the hypothetical upper limit of energy efficiency that has rarely been achieved in the past.

Q. What other issues with the ten studies did your high level review show?

A. The following matrix is a synopsis of my high level review of factors that have a material effect on the magnitude of MAP average annual load reduction percentage used by the EPA in calculating an average annual load reduction of 1.5% for Building Block 4.

Description	Amount
# of studies reviewed and used	10
Miscalculations of avg. potential	2
Gross potential reported	8
Measure level, not program level reported	1
Max. achievable reported	10
Studies reporting prior to 2020	7
Budget omitted	8
Studies based on secondary data	6

Q. Please provide your thoughts on how the parameters listed in the above matrix impact the magnitude of DSM potential?

A. Reporting gross potential overstates actual potential that electric utilities can claim by as much as 20-30%. Reporting measure-level potential overstates actual program potential by approximately 50%. Reporting MAP does not take into account the risk and uncertainty associated with achieving levels of potential that have never been achieved before. There is simply no real world experience where 100% of the full incremental cost is paid to customers over an extended period of time in order to attempt to achieve the highest possible customer participation in energy efficiency programs. Reporting potential for study periods that do not extend beyond 2020 does not factor in the substantial reduction in energy efficiency potential as a result of the enactment of federal codes and standards. With eight of the ten DSM potential studies not reporting budgets that correspond to the MAP load reduction goals, the financial burden on customers to achieve unrealistic load reduction goals is omitted.

Finally, six of the ten studies are based on secondary data sources. No sanity checks were performed to determine how reasonable the secondary data sources used were. The Ameren Missouri DSM Potential Study invested $500,000 in the collection of Ameren Missouri customer specific primary market research to inform its DSM Potential Study.

Q. Did Ameren Missouri present the results of its analyses of the EPA Building Block 4 to the MPSC?

A. Yes. On August 18, 2014, Ameren Missouri along with KCPL and others made presentations to the Commission. On October 21, 2014, Ameren Missouri made another presentation on the same material to the Missouri DSM Statewide Collaborative along with the Commission.

Q. Did Ameren Missouri conclude that the EPA CPP annual energy efficiency load reduction goals for Missouri were not attainable?

A. Yes.

Q. Did KCPL, at the August 18, 2014 presentation to the Commission, conclude that the EPA CPP annual energy efficiency load reduction goals for Missouri were attainable?

A. Yes.

Q. Has KCPL subsequently changed its position regarding the attainability of the EPA CPP annual energy efficiency load reduction goals for Missouri?

A. Yes. As explained in detail earlier in my testimony, KCPL filed an IRP on April 1, 2015. KCPL acknowledged errors in reporting DSM potential from their DSM Potential Study. KCPL's DSM preferred plan in their IRP is referred to as "Option C." Option C is 42% of the realistic achievable potential reported in the KCPL DSM Potential Study.

XVIII. MEEIA RULE ANNUAL LOAD REDUCTION GUIDELINES

Q. Mr. Woolf also uses Figure 3.3 to compare the Ameren Missouri MEEIA 2016-2018 annual load reductions to the MEEIA rule guidelines. Please comment.

A. Since the MEEIA rule guidelines ultimately result in annual load reductions of 1.9% per year, they are more stringent than the proposed EPA CPP rules. The MEEIA annual load reduction guidelines have no analytical basis. Since the MEEIA guidelines exceed both technical and economic potential for Ameren Missouri, the MEEIA guidelines do not provide a credible benchmark for the Ameren Missouri MEEIA 2016-2018 portfolio.

Q. How does Ameren Missouri think of the total MEEIA 2016-2018 portfolio in terms of cost effectiveness thresholds? Specifically, address Mr. Mosenthal's statement on page 12, lines 10-12: "Importantly, the TRC of the program portfolio for RAP is estimated at 1.53 for the 2016-2018 MEEIA Plan cycle. This level of cost-effectiveness means that program costs could increase by almost 50% and the overall portfolio would still remain cost-effective."

A. The issue Mr. Mosenthal raises is that Ameren Missouri should consider the inclusion of program components until such time that program costs equal program benefits or, stated differently, the TRC is equal to 1.0.

Ameren Missouri would hesitate to propose a MEEIA portfolio with a TRC = 1.0. Ameren Missouri has a DSIM or energy efficiency business model based on shared net benefits. This means that the MEEIA 2016-2018 portfolio is required to have positive net benefits such that customers and Ameren Missouri can share benefits in a way that makes investing in energy efficiency beneficial to both customers and Ameren Missouri. Net benefits have to be of a magnitude such that there are sufficient net benefits to customers and sufficient net benefits to Ameren Missouri to recoup the lost throughput disincentive as well as sufficient net benefits to allow the opportunity for Ameren Missouri to earn a financial performance incentive.

Consequently, the theory Mr. Mosenthal discusses on portfolio cost effectiveness being viable when the portfolio TRC is as low as 1.0 is incompatible with the reality of an energy efficiency shared net benefits business model.

XIX. RECONCILIATION OF MEEIA 2013-2015 TO MEEIA 2016-2018 ANNUAL LOAD REDUCTIONS AND BUDGETS

Q. Is it true that the MEEIA 2016-2018 budget is approximately the same as the MEEIA 2013-2015 budget?

A. Yes. The MEEIA 2016-2018 budget is $134,461. The MEEIA 2013-2015 budget is $147,325. Therefore, the MEEIA 2016-2018 budget is 91% of the prior MEEIA budget.

Q. Is it true that the MEEIA 2016-2018 cumulative load reductions are approximately 50% of the MEEIA 2013-2015 plan load reduction targets?

A. Yes. The MEEIA 2016-2018 cumulative load reductions are 426,383 MWh. The MEEIA 2013-2015 cumulative load reduction targets are 821,820 MWh. Therefore, the MEEIA 2016-2018 cumulative load reductions are 52% of the prior MEEIA plan.

Q. Is it true that for 2013 and 2014 that Ameren Missouri exceeded the 2013 and 2014 load reduction targets and did this at less than the MEEIA plan 2013 and 2014 budgets?

A. Yes. In 2013 and 2014, Ameren Missouri achieved 699,283 MWh of savings. The MEEIA plan for 2013 and 2014 showed 514,097 MWh. Therefore, actual MWh savings were 136% of the MEEIA 2013 and 2014 plan. In terms of budget, the actual 2013 and 2014 budget was $75,950,000. The MEEIA 2013 and 2014 plan budget was $81,205,528. Therefore, the actual budget was 94% of the MEEIA 2013 and 2014 plan.

Q. Please show in tabular form the MEEIA 2016-2018 and MEEIA 2013-2015 budgets, annual load reductions, and comparisons to actual performance.

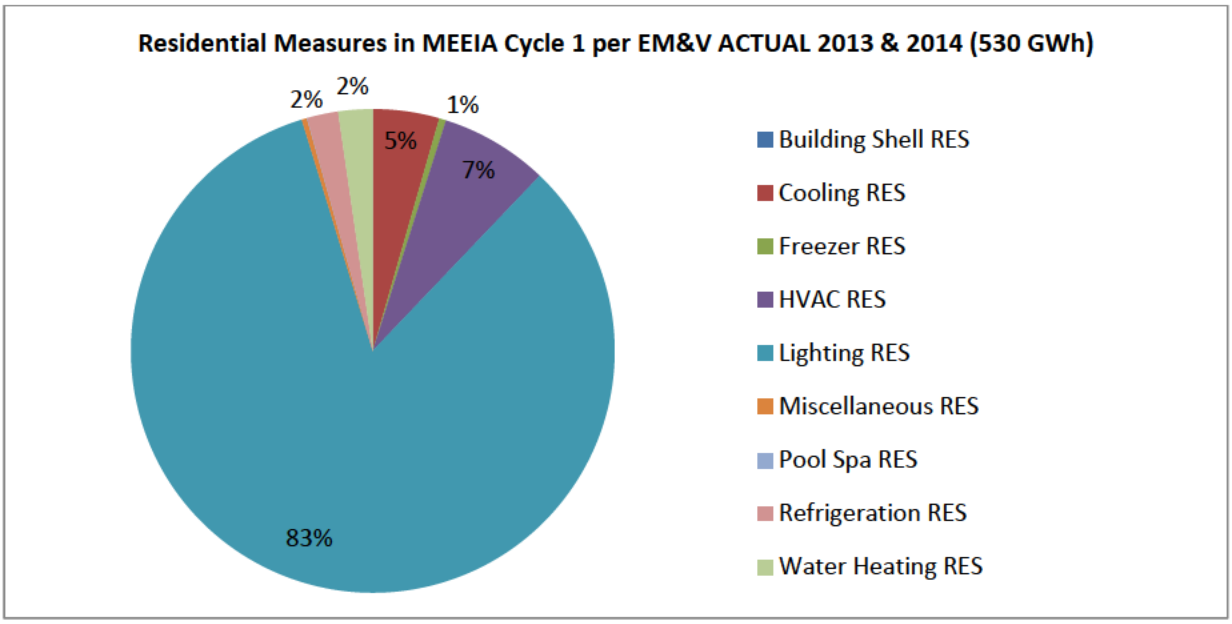
A. See table below[10].

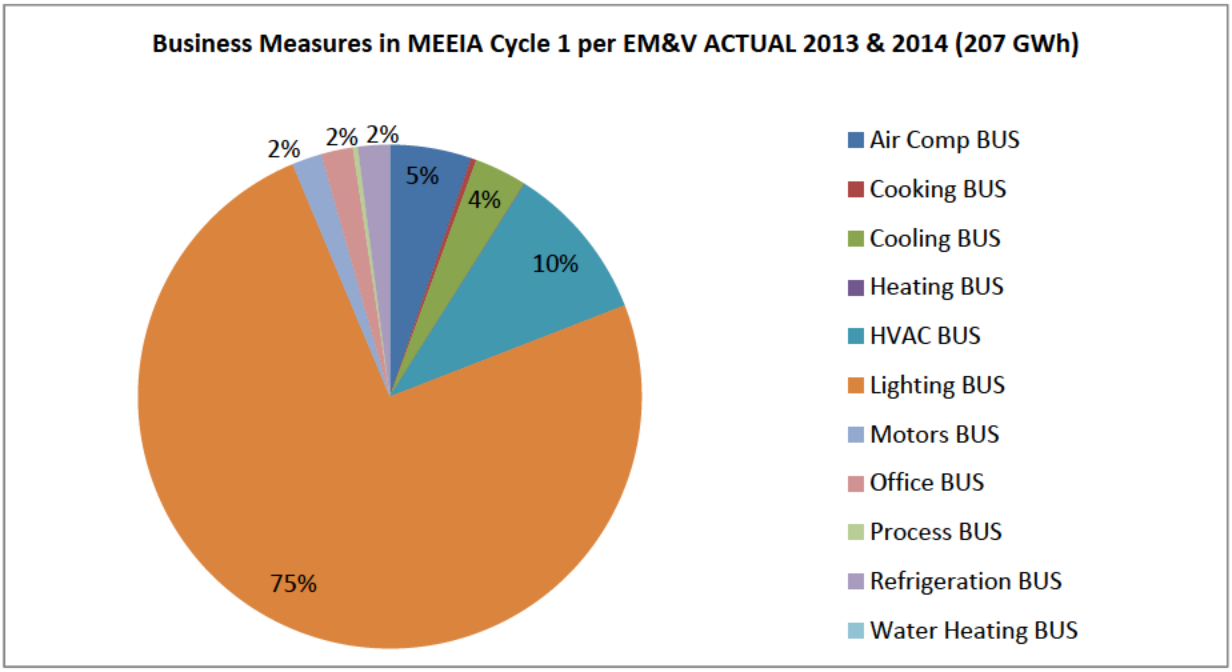
Ameren Missouri Energy Efficiency Programs	MEEIA Cycle 1 2013	MEEIA Cycle 1 2014	MEEIA Cycle 1 2015	3 Yr Total 3 Yr Total	MEEIA Cycle 2 2016	MEEIA Cycle 2 2017	MEEIA Cycle 2 2018	3 Yr Total 3 Yr Total	
Portfolio ACTUAL COSTS ($Millions)	$ 34.432	$ 41.518							
Portfolio PLANNED COSTS ($Millions)	$ 36.117	$ 47.121	$ 64.088	$ 147 325	$ 42 828	$ 43.488	$ 48.145	$ 134.461	-9%
Variance Amount	$ (1.684)	$ (5.603)							
Percent Variance	-4.7%	-11.9%							
Portfolio ACTUAL SAVINGS (MWh)	337,368	361,915							
Portfolio PLANNED SAVINGS (MWh)	250,792	263,305	307,723	821,820	136,720	134,334	155,329	426,383	-48%
Variance Amount	86,576	98,610							
Percent Variance	34.5%	37.5%							
kWh per $ for ACTUAL	9 80	8.72							
kWh per $ for PLANNED	6 94	5.59	4.80	5.58	3.19	3.09	3.23	3.17	-43%
$ per kWh for ACTUAL	$ 0.10	$ 0.11							
$ per kWh for PLANNED	$ 0.14	$ 0.18	$ 0.21	$ 0.18	$ 0.31	$ 0.32	$ 0.31	$ 0 32	76%

Q. Please reconcile the differences. Start with the reconciliation of achieved 2013 and 2014 load reductions and associated budgets with MEEIA 2013-2015 plans.

A. In order to understand the difference in plan versus actual for 2013 and 2014, it is necessary to know the energy efficiency product mix for both years. The following pie charts show where the energy savings came from in 2013 and 2014.[11]

[10] Savings and Costs for MEEIA Cycle 1 as indicated in the DSM Advisory Group Annual Report. Planned Savings for MEEIA Cycle 1 as indicated in the revised MEEIA goals per 2013-2015 Ameren Missouri Energy Efficiency MWh Goal Adjustment for Opt-Out Customers dated January 2015. Savings and Costs for MEEIA Cycle 2 as indicated in the 2016-18 Energy Efficiency Plan dated December 22, 2014.
[11] Pie charts represent data as analyzed by the EM&V Evaluator for the program year.





As the residential pie chart shows, lighting - specifically CFLs - accounted for 83% of all residential energy savings for 2013 and 2014. As the business pie chart shows, lighting accounted for 75% of all business savings for 2013 and 2014. Since both residential and business lighting measures have the lowest first cost in terms of $/kWh and the lowest

levelized cost in terms of $/kWh, the MEEIA 2013 and 2014 actual budgets reflected savings attributable to the focus on lighting.

Q. Why was there such an emphasis on lighting measures in 2013 and 2014?

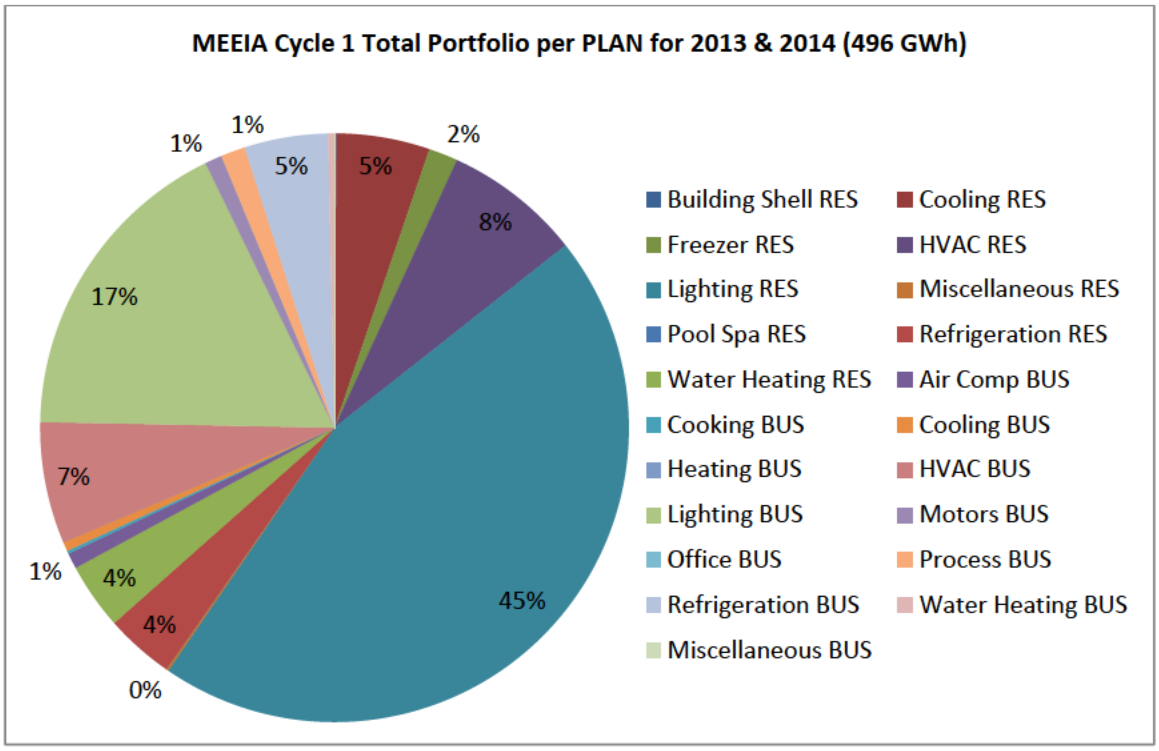
A. Ameren Missouri tried to make it very clear that energy efficiency program implementation is primarily a marketing opportunity. Consequently, any plan that was put together in 2012 for implementation in 2013-2015 would be subject to whatever changes the marketplace dictates. In other words, Ameren Missouri's plan is to listen to its customers and put the emphasis on programs where customers expressed the most interest in participating.

Also, it is equally important to understand that Ameren Missouri's proposed DSIM or business model is a shared net benefits business model. A shared net benefits model encourages Ameren Missouri to maximize customer benefits from energy efficiency programs as well as to minimize costs associated with obtaining benefits. An emphasis on the low cost, high benefit lighting opportunities in 2013 and 2014 is a direct reflection of the incentive structure encouraged by the shared net benefit model.

Q. What was the MEEIA 2013-2015 plan energy efficiency product mix for 2013 and 2014?

A. See the pie chart below.[12]

[12] Pie chart represents data as analyzed for the Ameren Missouri 2013-2015 Energy Efficiency Plan.



Q. If it was possible for Ameren Missouri to exceed 2013 and 2014 load reduction targets at below budget by focusing on lighting opportunities, should it be reasonable to assume that Ameren Missouri can do the same thing for the MEEIA 2016-2018 implementation plan?

A. No. Ameren Missouri will not be able to replicate lighting energy savings and budget performances actually achieved in 2013 and 2014 for the MEEIA 2016-2018 implementation period for at least five reasons.

1. CFLs will not be a cost effective option for Ameren Missouri in MEEIA 2016-2018. The removal of CFLs is a tremendous challenge to address in program planning for MEEIA 2016-2018. Residential CFLs accounted for approximately 60% of total (Residential + Business) kWh savings for 2013 and 2014. Not only were CFLs in the MEEIA 2013-2015 Residential Lighting program, they were significant components of the Efficient Products, Low Income, Home Energy Performance and New Home programs.

An additional point that needs to be made about CFLs concerns the volume of CFLs that can be sold in a given year. Retailers generally sold the majority of CFLs in 4-pack and 6-pack packages. After the buy-down from Ameren Missouri, a 6-pack CFL package was priced in the $2.00 range. Needless to say, the ability to move CFLs in 6-pack packages increased the volume of CFLs sold in the 2013 and 2014. LEDs, on the other hand, are more expensive than CFLs on a first cost basis. After the buy-down from Ameren Missouri, a standard LED should be priced in the $5.00 range. Retailers will likely sell LEDs in single packages – perhaps in multi-packs but likely less than a 6-pack package of LEDs. Hence, it will not be possible to move the volume of residential efficient lights in MEEIA 2016-2018 as were moved in MEEIA 2013-2015.

2. Another unique aspect of the Residential Lighting program was the unique opportunity that existed only in 2013. Per the EISA legislation, 2013 was the last year for the manufacture of standard 60-watt incandescent light bulbs. This presented a one-time only opportunity for Ameren Missouri to shift planned sales of CFLs from 2014 and 2015 to 2013 to take advantage of the larger energy savings attributable to CFLs in 2013 – thereby maximizing benefits for Ameren Missouri customers. Since the phase out of the manufacture of standard incandescent light bulbs is now complete, this same opportunity will not be replicated in MEEIA 2016-2018.

Many of the lighting efficiency standards that have been on the books will be in full force in MEEIA 2016-2018 whereas they were either not in force at all or partially in force in MEEIA 2013-2015. This means that the baseline energy savings against which to assess incremental energy savings for many efficient measures will increase thereby yielding lower incremental energy savings.

3. MEEIA 2013-2015 EM&V results provide the basis for making changes to key drivers for energy savings for key measures going forward. For example, we expect average HOU for residential efficient lighting to decline from 2.9 in 2013 to 2.2 in 2014 to 1.8 beginning in 2016. This change alone would reduce the 2013 Residential Lighting program first year savings by ((2.9-1.8)/2.9) = 38%.

4. Incentive budgets associated with individual programs will increase significantly for MEEIA 2016-2018. New technology, such as LED lighting, will require approximately five times the dollar incentive per unit as did CFLs. Increasing baselines against which to calculate incremental energy savings on a per measure basis do not change the first cost of more energy efficient equipment for customers. Therefore, higher incentives per measure per kWh saved will be necessary to entice customers to consider investing in energy efficient equipment and services.

5. Even though the annual load reductions for the Residential Lighting program for MEEIA 2016-2018 are lower than MEEIA 2013-2015, individual program administration costs are expected to remain relatively flat. The reason is that it takes approximately the same implementation staff to administer a program regardless of whether the annual load reduction target depends on moving four million CFLs or one million LEDs in a given year. As a result, the $/kWh for the fixed or administrative costs associated with this program will increase as a result of lower kWh savings in the numerator with relatively unchanged staffing levels or administration costs in the denominator.

Q. Was there anything unusual about the dominant role of CFLs in Ameren Missouri's 2013 and 2014 program energy savings?

A. No. CFLs have been the overwhelming dominant component of most utilities energy efficiency programs for as long as utilities have been implementing DSM programs. CFLs were one of those rare energy efficiency opportunities to take a ubiquitous commodity, i.e., light bulbs, reduce energy consumption by almost 80% or from a 60-watt incandescent to a 13-watt equivalent CFL, and have pricing, i.e., less than $1.00 per CFL, to make the purchase of a CFL within the economic means of a large number of customers. However, EISA legislation essentially made CFLs the law of the land by 2020 with a phase in beginning in 2012 that ultimately led to a very limited window of opportunity for Ameren Missouri to move CFLs in the MEEIA 2013-2015 implementation planning period.

Q. Are there similar changes to Residential lighting happening to Business lighting?

A. While there are Business lighting changes, they are not similar in magnitude to the changes for MEEIA 2016-2018 that are happening with Residential Lighting. This is due to the fact that Business Lighting is not focused on CFLs in MEEIA 2013-2015.

Q. What are the major changes for Business lighting for MEEIA 2016-2018?

A. There are at least three changes to note. The sum of the three changes is not as significant as the removal of CFLs from the Residential Lighting portfolio due to cost ineffectiveness. The first is Business Lighting efficiency standard changes. Increased efficiency standards for metal halide, a ubiquitous business lighting technology, will increase the baseline by approximately 15%.

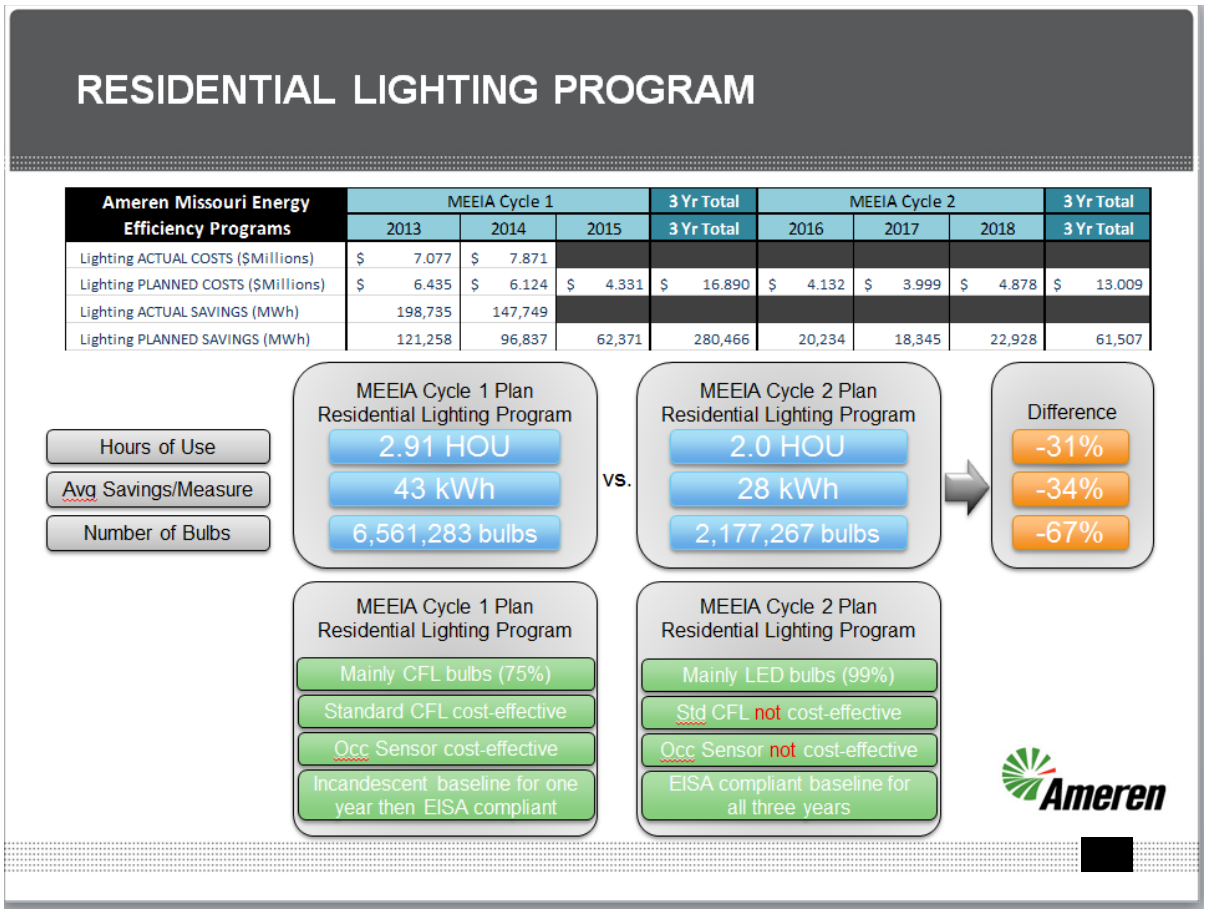
The second is that for Business linear fluorescent lighting, Ameren Missouri received authorization from the Commission to use a T-12 baseline for a limited time in MEEIA 2013-2015.

The third is that for most LEDs installed in Business programs in 2013-2015, EM&V determined that the baseline was incandescent light technology. For MEEIA 2016-2017, the baseline for Business LEDs is based on halogen light technology. The difference in baselines between incandescent lighting and halogen technology will reduce incremental energy savings for Business LED lighting by approximately 30%.

Q. Please provide a more granular, detailed analysis underlying the budget and load reduction targets for the Residential Lighting program for MEEIA 2016-2018 relative to the MEEIA 2013-2015 program.

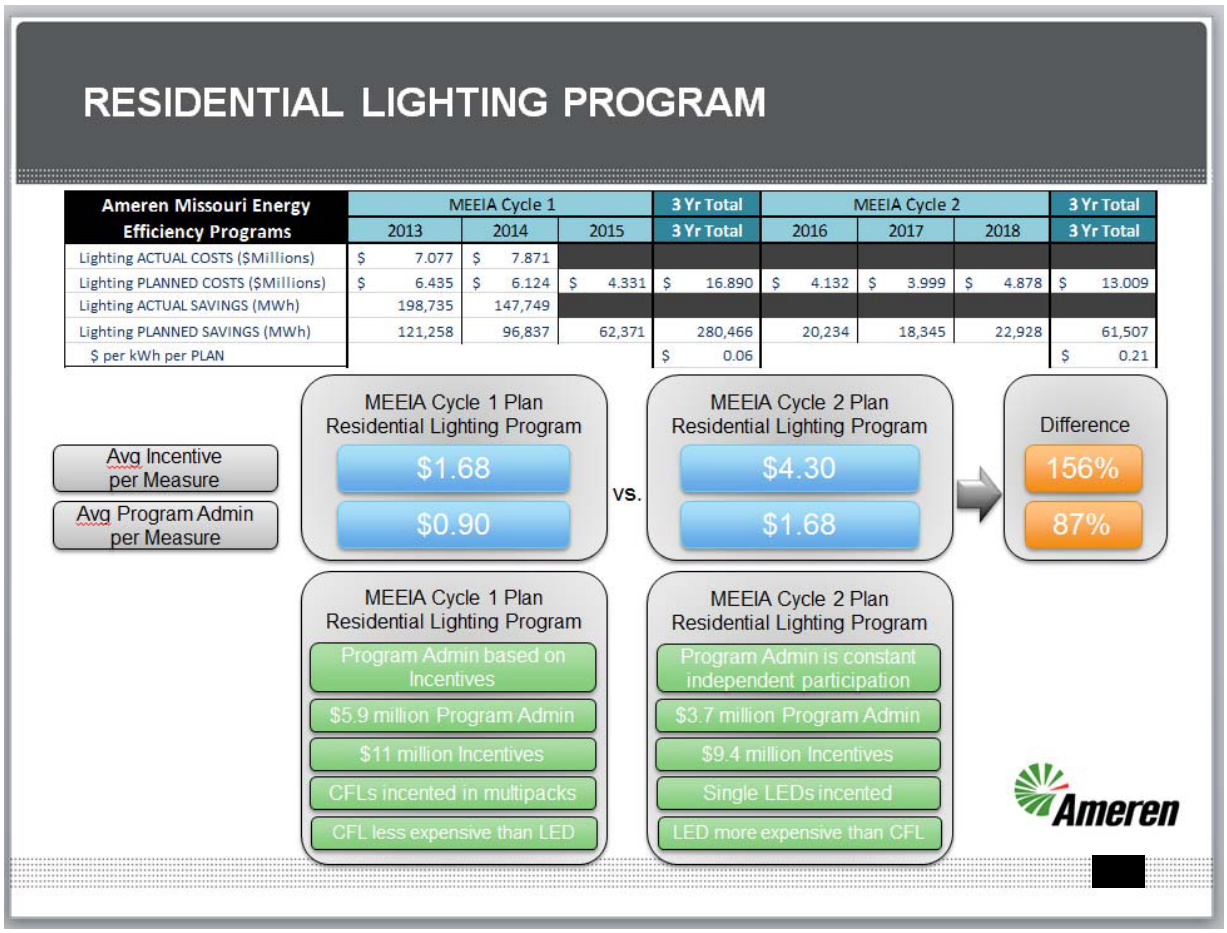
A. The following slide[13] addresses the key drivers for differences in annual load reduction goals for the Residential Lighting program for MEEIA 2016-2018.

[13] Costs shown reflect the program administration and incentive costs. Portfolio costs or below-the-line costs are not included in this data. Savings reflect energy savings at the meter.



The next slide[14] addresses the differences in budgets:

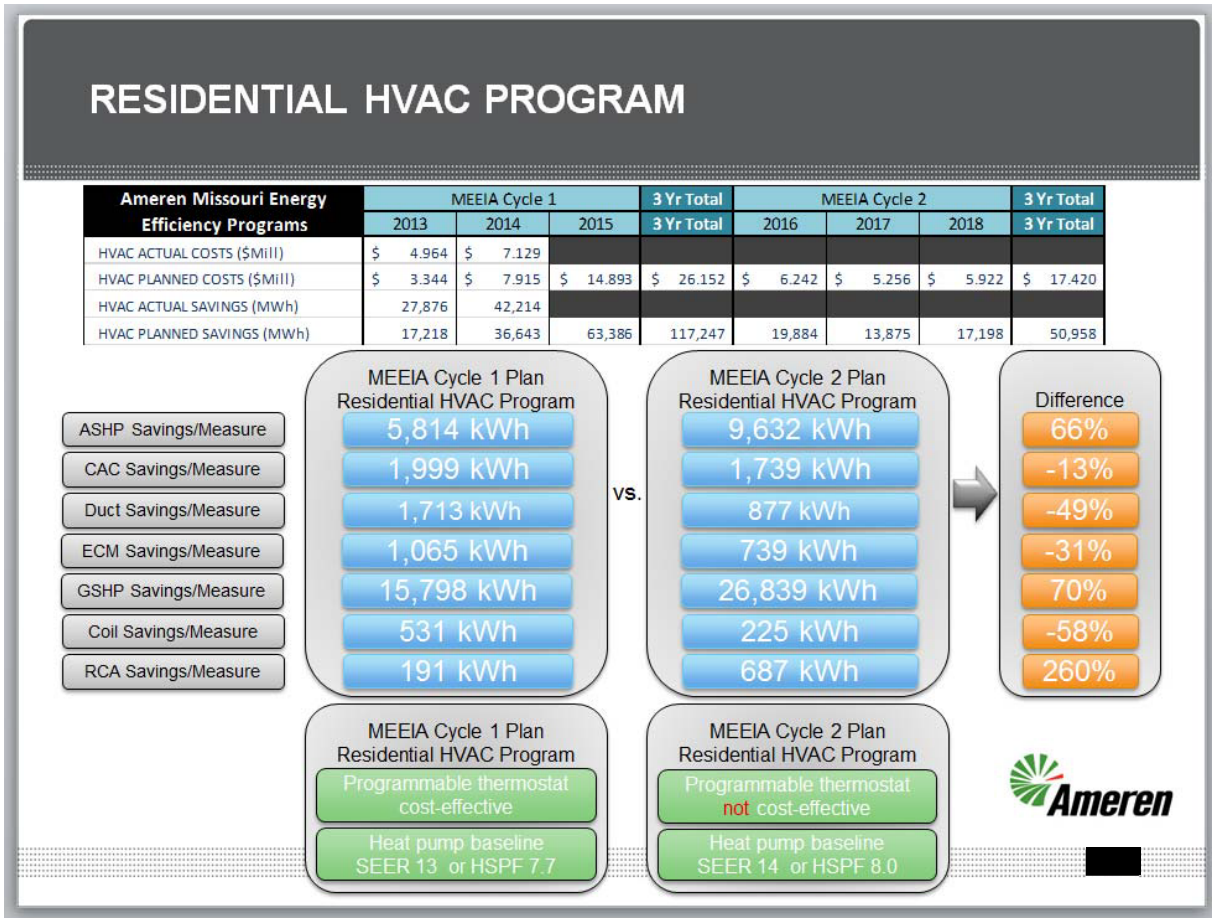
[14] Costs shown reflect the program administration and incentive costs. Portfolio costs or below-the-line costs are not included in this data. Savings reflect energy savings at the meter.



Q. Please provide a more granular, detailed analysis underlying the budget and load reduction targets for the Residential HVAC program for MEEIA 2016-2018 relative to the MEEIA 2013-2015 program.

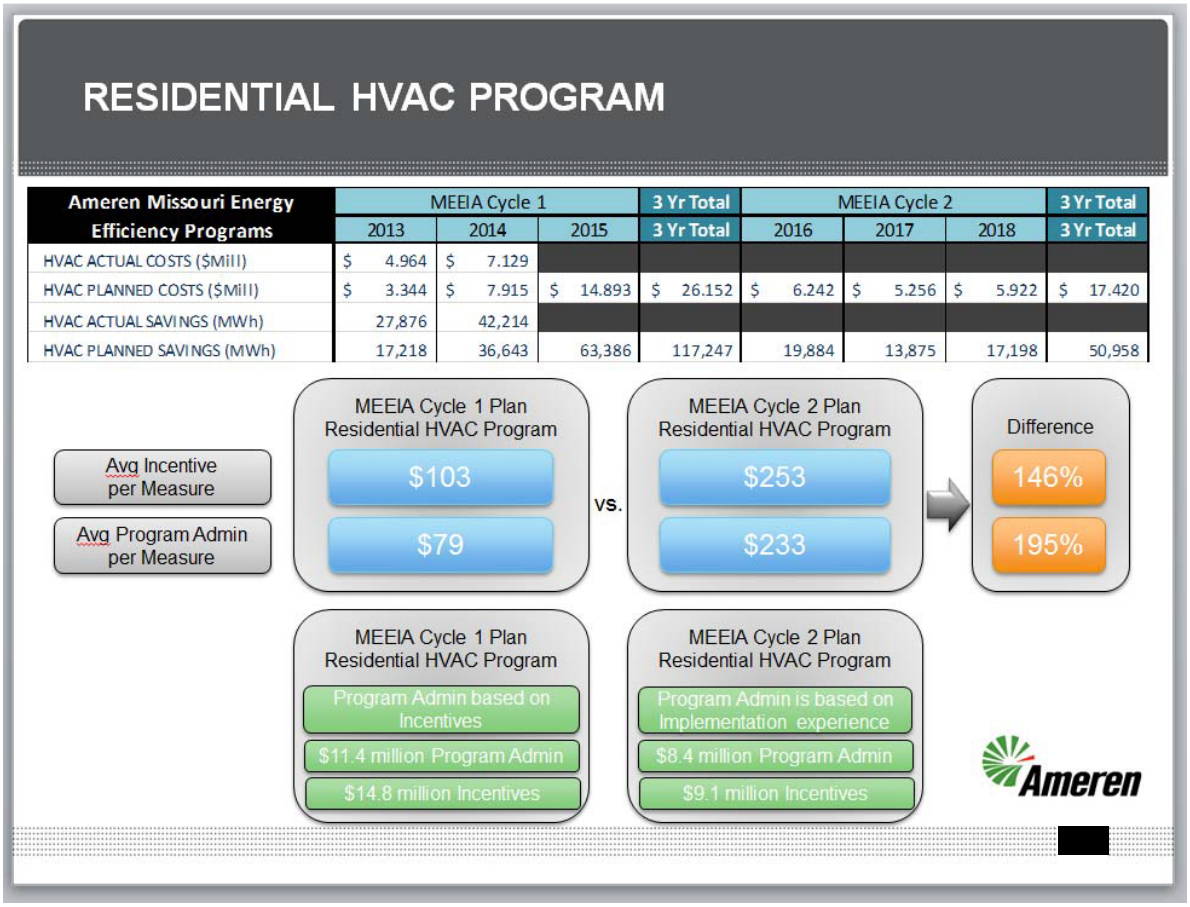
A. The following slide[15] addresses the key drivers for differences in annual load reduction goals for the Residential HVAC program for MEEIA 2016-2018.

[15] Costs shown reflect the program administration and incentive costs. Portfolio costs or below-the-line costs are not included in this data. Savings reflect energy savings at the meter.



It should be noted that while measures such as air source heat pumps ("ASHP") and ground source heat pumps ("GSHP") have significantly larger kWh incremental savings as determined by 2013 EM&V, these measures have less than 3% of the Ameren Missouri market share for central heating and air conditioning.

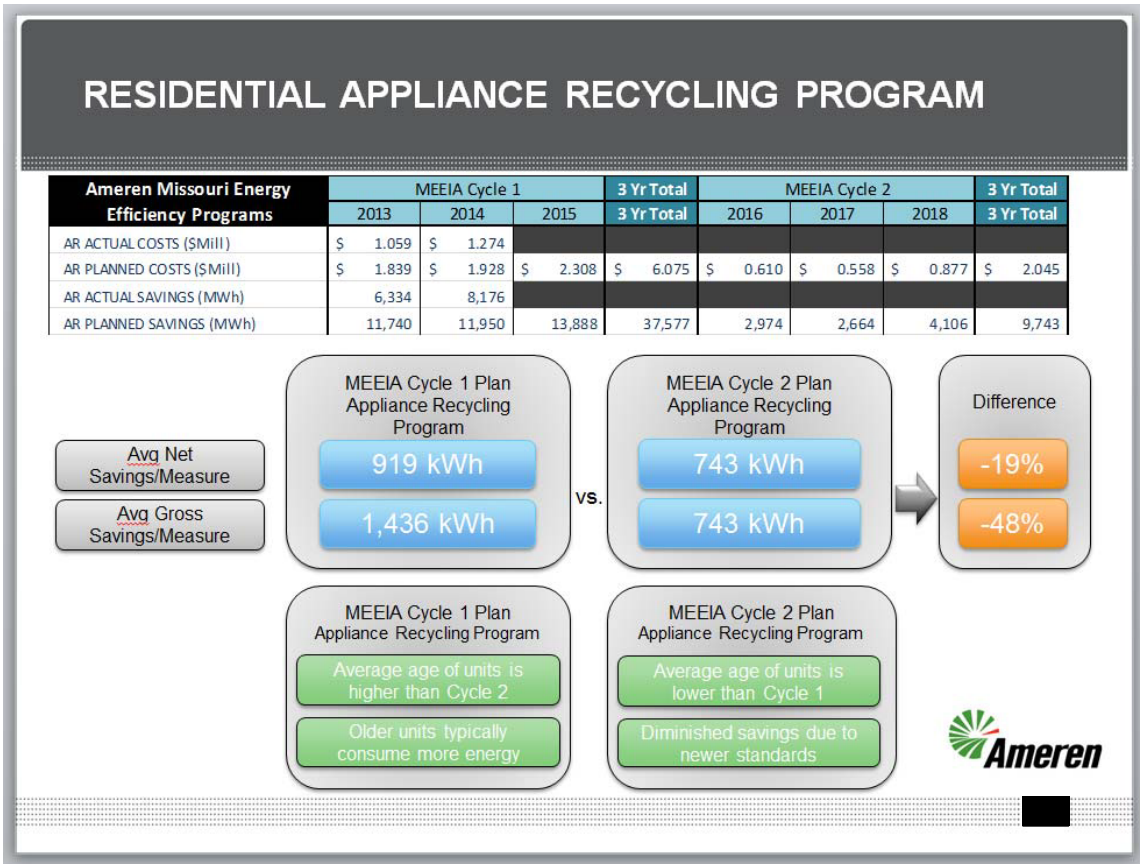
The next slide[16] includes differences in budgets:



Q. Please provide a more granular, detailed analysis underlying the budget and load reduction targets for the Residential Appliance Recycling program for MEEIA 2016-2018 relative to the MEEIA 2013-2015 program.

A. The following slide[17] addresses the key drivers for differences in annual load reduction goals for the Residential Appliance Recycling program for MEEIA 2016-2018.

[16] Costs shown reflect the program administration and incentive costs. Portfolio costs or below-the-line costs are not included in this data. Savings reflect energy savings at the meter.
[17] Costs shown reflect the program administration and incentive costs. Portfolio costs or below-the-line costs are not included in this data. Savings reflect energy savings at the meter.


RESIDENTIAL APPLIANCE RECYCLING PROGRAM
Ameren Missouri Energy Efficiency Programs
MEEIA Cycle 1
3 Yr Total
MEEIA Cycle 2
3 Yr Total
2013
2014
2015
3 Yr Total
2016
2017
2018
3 Yr Total
AR ACTUAL COSTS ($Mill) $ 1.059 $ 1.274
AR PLANNED COSTS ($Mill) $ 1.839 $ 1.928 $ 2.308 $ 6.075 $ 0.610 $ 0.558 $ 0.877 $ 2.045
AR ACTUAL SAVINGS (MWh) 6,334 8,176
AR PLANNED SAVINGS (MWh) 11,740 11,950 13,888 37,577 2,974 2,664 4,106 9,743
Avg Net Savings/Measure
Avg Gross Savings/Measure
MEEIA Cycle 1 Plan Appliance Recycling Program
919 kWh
1,436 kWh
vs.
MEEIA Cycle 2 Plan Appliance Recycling Program
743 kWh
743 kWh
Difference
-19%
-48%
MEEIA Cycle 1 Plan Appliance Recycling Program
Average age of units is higher than Cycle 2
Older units typically consume more energy
MEEIA Cycle 2 Plan Appliance Recycling Program
Average age of units is lower than Cycle 1
Diminished savings due to newer standards
Ameren

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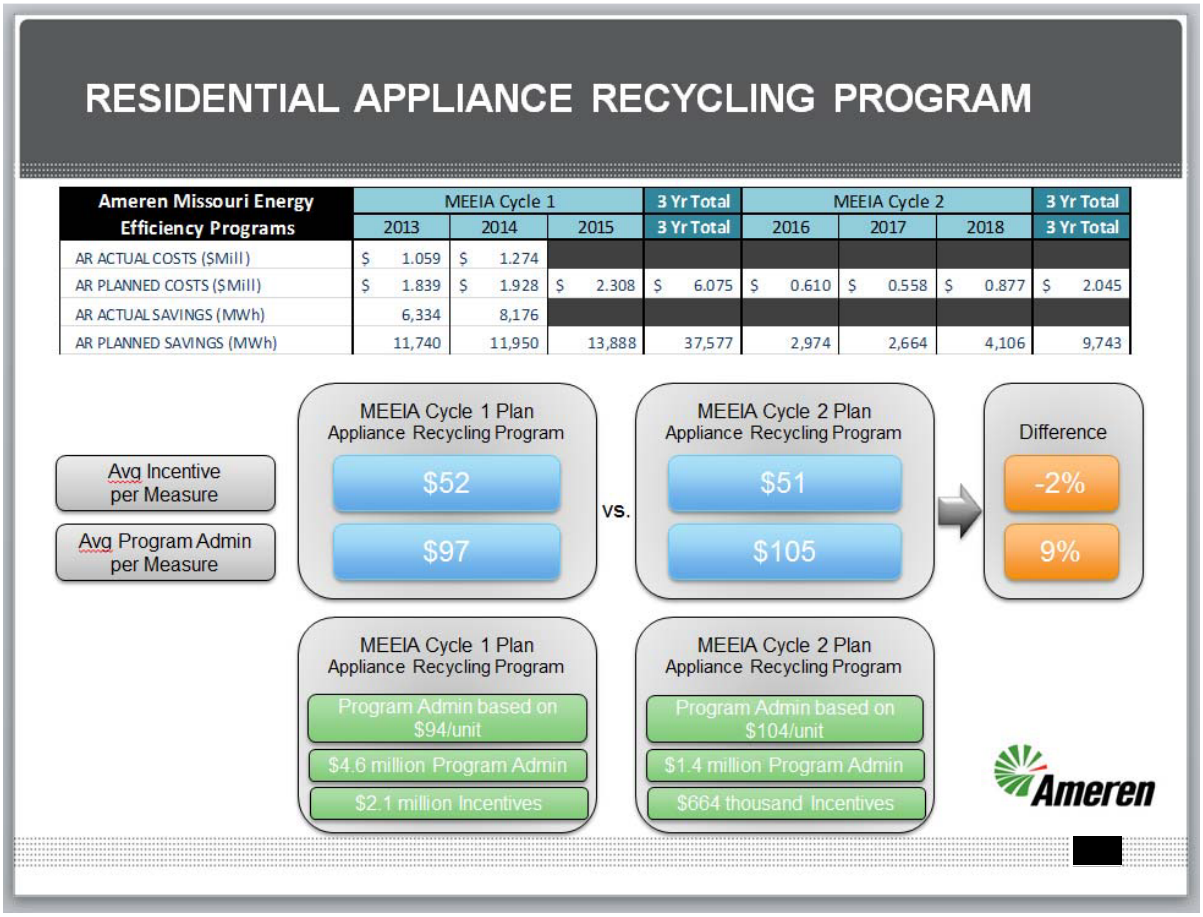
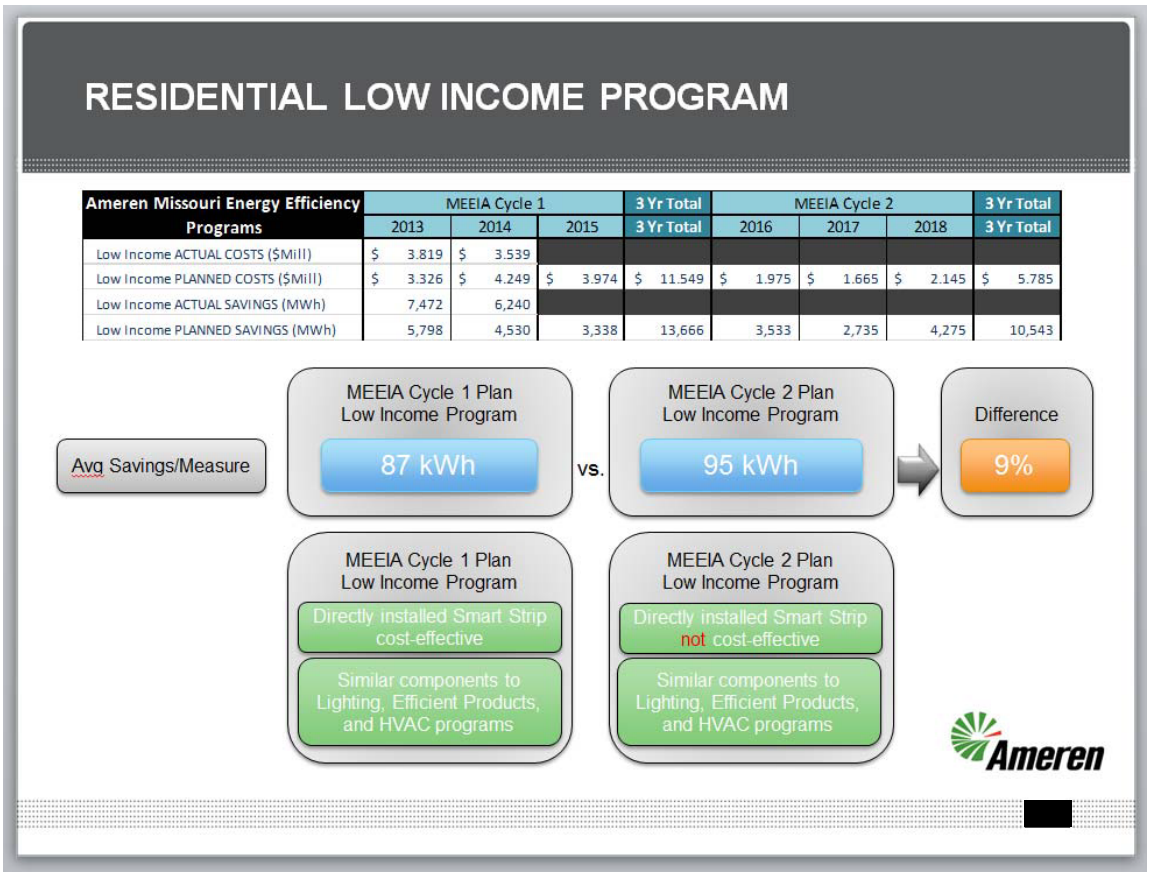
The next slide[18] shows differences in budgets:



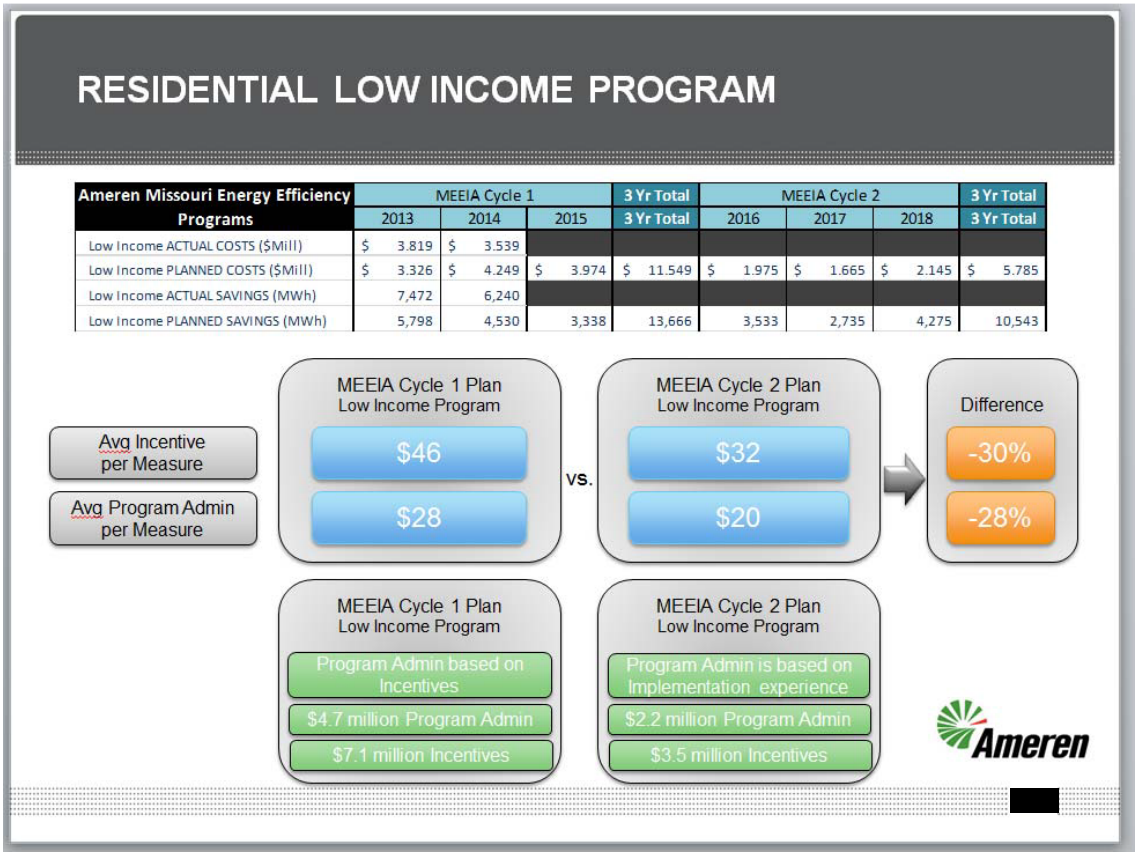
Q. Please provide a more granular, detailed analysis underlying the budget and load reduction targets for the Residential Low income program for MEEIA 2016-2018 relative to the MEEIA 2013-2015 program.

A. The following slide[19] addresses the key drivers for differences in annual load reduction goals for the Residential Low Income program for MEEIA 2016-2018.

[18] Costs shown reflect the program administration and incentive costs. Portfolio costs or below-the-line costs are not included in this data. Savings reflect energy savings at the meter.
[19] Costs shown reflect the program administration and incentive costs. Portfolio costs or below-the-line costs are not included in this data. Savings reflect energy savings at the meter.


RESIDENTIAL LOW INCOME PROGRAM
Ameren Missouri Energy Efficiency Programs
MEEIA Cycle 1
2013
2014
2015
3 Yr Total
3 Yr Total
MEEIA Cycle 2
2016
2017
2018
3 Yr Total
3 Yr Total
Low Income ACTUAL COSTS ($Mill) $ 3.819 $ 3.539
Low Income PLANNED COSTS ($Mill) $ 3.326 $ 4.249 $ 3.974 $ 11.549 $ 1.975 $ 1.665 $ 2.145 $ 5.785
Low Income ACTUAL SAVINGS (MWh) 7,472 6,240
Low Income PLANNED SAVINGS (MWh) 5,798 4,530 3,338 13,666 3,533 2,735 4,275 10,543
Avg Savings/Measure
MEEIA Cycle 1 Plan Low Income Program
87 kWh
vs.
MEEIA Cycle 2 Plan Low Income Program
95 kWh
Difference
9%
MEEIA Cycle 1 Plan Low Income Program
Directly installed Smart Strip cost-effective
Similar components to Lighting, Efficient Products, and HVAC programs
MEEIA Cycle 2 Plan Low Income Program
Directly installed Smart Strip not cost-effective
Similar components to Lighting, Efficient Products, and HVAC programs
Ameren

The next slide[20] shows differences in budgets:



Q. Please provide a more granular, detailed analysis underlying the budget and load reduction targets for the Residential Efficient Products program for MEEIA 2016-2018 relative to the MEEIA 2013-2015 program.

A. The following slide[21] addresses the key drivers for differences in annual load reduction goals for the Residential Efficient Products program for MEEIA 2016-2018.

[20] Costs shown reflect the program administration and incentive costs. Portfolio costs or below-the-line costs are not included in this data. Savings reflect energy savings at the meter.
[21] Costs shown reflect the program administration and incentive costs. Portfolio costs or below-the-line costs are not included in this data. Savings reflect energy savings at the meter.

RESIDENTIAL EFFICIENT PRODUCTS PROGRAM

Ameren Missouri Energy Efficiency Programs	MEEIA Cycle 1			3 Yr Total	MEEIA Cycle 2			3 Yr Total
	2013	2014	2015	3 Yr Total	2016	2017	2018	3 Yr Total
EP ACTUAL COSTS ($Mill)	$ 1.393	$ 1.727						
EP PLANNED COSTS ($Millions)	$ 0.958	$ 2.063	$ 3.841	$ 6.863	$ 1.610	$ 0.926	$ 1.683	$ 4.219
EP ACTUAL SAVINGS (MWh)	21,473	11,741						
EP PLANNED SAVINGS (MWh)	7,513	15,768	25,087	48,367	5,686	1,857	6,737	14,280

Avg Savings/Measure

MEEIA Cycle 1 Plan Efficient Products Program: 389 kWh

vs.

MEEIA Cycle 2 Plan Efficient Products Program: 166 kWh

Difference: -57%

MEEIA Cycle 1 Plan Efficient Products Program
- Programmable thermostat cost-effective
- Water heater baseline EF 0.90

MEEIA Cycle 2 Plan Efficient Products Program
- Programmable thermostat not cost-effective
- Water heater baseline EF 0.95 or Heat Pump Water Heater
- Pool/spa cover is industry standard inclusion

Ameren

[redacted]

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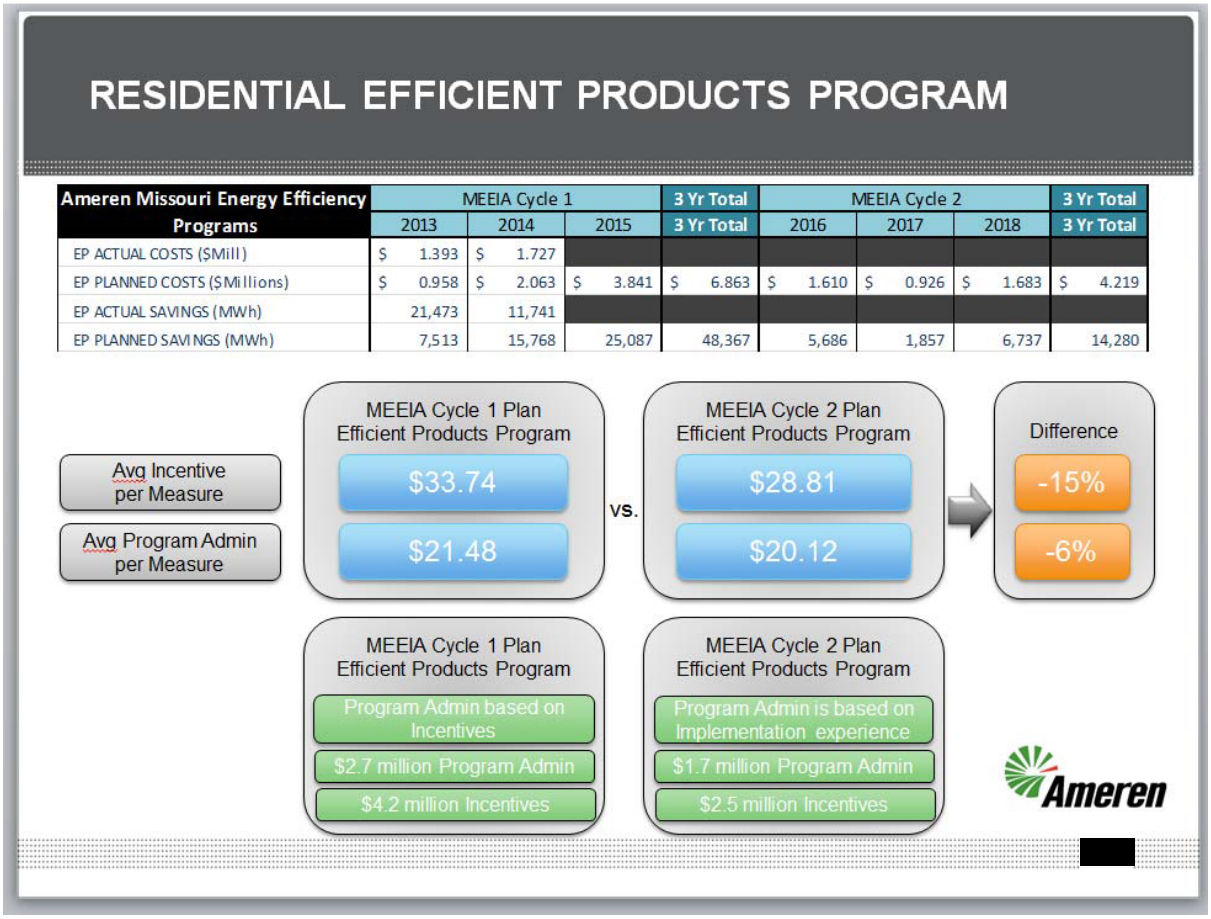
The next slide[22] shows differences in budgets:



Q. Please discuss the key drivers for changes in the MEEIA 2016-2018 Business portfolio changes relative to MEEIA 2013-2015.

A. There are two important considerations to keep in mind. First, the Business portfolio does not have the CFL issue. Second, the Business portfolio is expected to produce the majority of the annual load reductions for MEEIA 2016-2018. An overview of the

[22] Costs shown reflect the program administration and incentive costs. Portfolio costs or below-the-line costs are not included in this data. Savings reflect energy savings at the meter.

MEEIA 2013-2015 Business Plan relative to the MEEIA 2016-2018 Business Plan is shown in the table below:[23]

Ameren Missouri Energy Efficiency Programs	MEEIA Cycle 1 2013	2014	2015	3 Yr Total 3 Yr Total	MEEIA Cycle 2 2016	2017	2018	3 Yr Total 3 Yr Total	
Business ACTUAL COSTS ($Millions)	$ 9.591	$ 14.776							
Business PLANNED COSTS ($Millions)	$ 12.485	$ 15 000	$ 23 301	$ 52.785	$ 20.364	$ 23.079	$ 24.437	$ 67 881	29%
Variance Amount	$ (2.894)	$ (0 224)							
Percent Variance	-23 2%	-1.5%							
Business ACTUAL SAVINGS (MWh)	74,616	144,510							
Business PLANNED SAVINGS (MWh)	85,517	95,067	135,766	316,353	78,215	88,643	93,857	260,716	-18%
Variance Amount	(10,901)	49,443							
Percent Variance	-12.7%	52.0%							
kWh per $ for ACTUAL	7.78	9.78							
kWh per $ for PLANNED	6 85	6.34	5.83	5.99	3 84	3 84	3.84	3.84	-36%
$ per kWh for ACTUAL	$ 0.13	$ 0.10							
$ per kWh for PLANNED	$ 0.15	$ 0.16	$ 0.17	$ 0.17	$ 0 26	$ 0 26	$ 0.26	$ 0.26	56%

There is one metric, first year dollars per kWh cost, that appears to be fluctuating significantly between the two plans. The MEEIA 2013-2015 plan budget had a three-year value of $0.17/kWh. The MEEIA 2016-2018 plan has a three-year value of $0.26/kWh. This represents a 56% increase in cost per kWh absent a significant event such as the removal of CFLs. Even more notable is the actual 2014 performance of $0.10/kWh relative to the $0.26/kWh three-year average for MEEIA 2016-2018.

Q. Please explain the relative difference.

A. There are three reasons that explain the difference. The first point to note is that the Business incentive budget on a $/kWh basis has almost doubled from a range of $0.07/kWh to $0.10/kWh to $0.18/kWh for MEEIA 2016-2018. This is for several reasons. The first is the fact that after implementing Business programs since 2008, the Business

[23] Savings and Costs for MEEIA Cycle 1 as indicated in the DSM Advisory Group Annual Report. Planned Savings for MEEIA Cycle 1 as indicated in the revised MEEIA goals per 2013-2015 Ameren Missouri Energy Efficiency MWh Goal Adjustment for Opt-Out Customers dated January 2015. Savings and Costs for MEEIA Cycle 2 as indicated in the 2016-18 Energy Efficiency Plan dated December 22, 2014. Costs shown reflect the program administration and incentive costs. Portfolio costs or below-the-line costs are not included in this data. Savings reflect energy savings at the meter.

implementation team will be pursuing harder to reach customers in the MEEIA 2016-2018 implementation period; thereby requiring higher financial incentives.

The second point is that the Business implementation team expects most Business opportunities in MEEIA 2016-2018 will be in the form of replace on failure rather than early replacement opportunities, as was experienced in MEEIA 2013-2015. This means that first year kWh savings for replace on failure opportunities may provide smaller values because the baseline is the existing federal standard for the equipment under review. If the opportunity was early replacement, this means that the first year kWh savings are based on whatever vintage of equipment is currently in place versus the more efficient option. This means that first year kWh savings may be higher than for replace on failure situations. These nuances boil down to the fact customers require a certain fixed dollar incentive to pursue an investment in an efficient piece of equipment or service. If there are less first year kWh savings to be had (i.e., replace on failure) then a higher incentive rate is needed to produce the same total dollar savings as in the case where the $/kWh incentive rate may be lower but the first year energy savings were higher (i.e., early replacement).

The third point is that federal and state office buildings and schools have been considered 100% freeriders for MEEIA 2016-2018 as a result of federal and Missouri mandates on building energy efficiency requirements. These mandates were either not in effect or not explicitly defined in prior Ameren Missouri DSM Potential studies. Yet, federal and state office buildings and schools may participate in Ameren Missouri MEEIA 2016-2018 business programs. This means that Ameren Missouri must budget for providing financial incentives for federal and state office buildings and schools to participate in Ameren Missouri programs but may not claim energy savings associated with those budgets.

Again, this is based on the explicit federal and Missouri directives I discussed at length previously in my testimony. The net effect is that approximately 25,000 MWh of Business load reduction potential spread across MEEIA 2016-2018 has been removed from the MEEIA 2016-2018 plan but an incentive budget of approximately $0.18 x 25,000,000 kWh = $4,500,000 has been added to the MEEIA 2016-2018 budget to account for the fact that federal and state office buildings and schools may participate in the Ameren Missouri MEEIA 2016-2018 energy efficiency programs.

Q. How then did the three factors you discuss above ultimately end up producing a MEEIA 2016-2018 Business budget that resulted in a $0.26/kWh first cost?

A. The incentive budget, as discussed, accounts for $0.18/kWh of the $0.26/kWh budget. That is an additional $4,500,000 in incentives for federal and state office buildings and schools for which there are no commensurate energy savings due to the assumption of 100% free ridership. An additional $4,500,000 spread over a total MEEIA 2016-2018 Business cumulative portfolio of 260,716 MWh equates to an additional $0.017/kWh incentive adder. The total incentive component becomes $0.18/kWh + $0.017/kWh = $0.197/kWh. The differential with $0.26/kWh is $0.26/kWh - $0.197/kWh = $0.063/kWh for program administration costs.

Q. What are your final thoughts about the reconciliation of the MEEIA 2013-2015 plan and actual load reductions and budgets to the same for MEEIA 2016-2018?

A. If I had to state one reason for the significant differences in first year $/kWh costs it would be the domination of CFLs for MEEIA 2013-2015 as compared to the absence of CFLs for MEEIA 2016-2018. Consider that the 2013 Residential Lighting program first

year actual cost came in at a metric of $0.03/kWh when the program was dominated by CFLs, took advantage of incandescent light baselines, and had an average hours of use per day metric of 2.9. The MEEIA 2016-2018 Residential Lighting program is dominated by LED technology and has minimal CFLs. Baselines have increased to the EISA legislation standards and HOU is expected to decline to 1.8. The MEEIA 2016-2018 Residential Lighting program first year cost should come in at a metric of $0.21/kWh. That represents an increase of a multiple of seven times for the one program that dominated the Ameren Missouri MEEIA 2013-2015 portfolio.

XX. CONCLUSIONS

Q. What have you learned from your review and analyses of the rebuttal testimonies on the Ameren Missouri MEEIA 2016-2018 filing?

A. My perspective associated with the risk and uncertainty associated with the MEEIA 2016-2018 filing has changed. I now assign a higher risk associated with achieving the results in the filing – especially if some of the policy recommendations offered by witnesses are made. For the Company, there appears to be high expectation for performance from the parties, and the process going forward seems more undefined at this point than before. This creates certain risks for Ameren Missouri considering energy efficiency programs under the MEEIA regulations.

Q. Please enumerate and briefly discuss some of the risks and uncertainty for which your thinking has changed or is changing.

A. The first risk that relates to portfolio risk is the unsubstantiated opinions of witnesses who claim that the MEEIA 2016-2018 filing should have cumulative load reductions and budgets that resemble those achieved in MEEIA 2013-2015 – they believe

there is an unlimited amount of cost effective energy efficiency. That simply is not true for multiple reasons but the overwhelming reason is that CFLs are no longer a cost effective option for Ameren Missouri MEEIA 2016-2018 programs. Equally concerning is the lack of recognition of the law of diminishing returns for energy efficiency equipment savings brought about by aggressive and ubiquitous new codes and standards.

The second risk that also relates to portfolio risk is that Missouri should be compared to Massachusetts or that Massachusetts should be an energy efficiency implementation model for Missouri. The idea that Ameren Missouri should reconstruct the magnitude of its avoided costs so as to be in a position to make more energy efficiency measures cost effective so as to increase costs to Ameren Missouri customers by an order of magnitude or a multiple of ten for energy efficiency programs is fraught with far more than concern over customer financial consequences. The resources to track and record data, evaluate, verify and measure impacts as well as the additional resources within Ameren Missouri and also with outside Ameren Missouri contractors are daunting.

The third risk that relates to energy efficiency program planning is the effectiveness or the lack of effectiveness of the Ameren Missouri DSM Regulatory Stakeholder Advisory meetings. These meetings cover the gamut from the development of DSM Potential studies, to implementation status of DSM programs, to evaluation of DSM programs. Reading intervenor testimonies, it almost appears as if these meetings never occurred. From my perspective, it appears, based on intervenors' rebuttal testimonies, that stakeholders choose to remain silent during the collaborative meetings, teleconferences, WebEx™ conferences, and other stakeholder collaborative correspondence channels. In the absence of comments, Ameren Missouri believed that there is alignment on studies and analyses' inputs,

assumptions and methodologies. However, when the results of the same studies and analyses do not align with the perceptions of stakeholders, stakeholders or their representatives then submit testimonies on the studies and analyses as if no stakeholder collaboration ever even occurred. Significant resources are spent by all parties and their clients and/or customers in the conduct of the Ameren Missouri DSM Regulatory Stakeholder Advisory meetings. It is important that the collaborative process be honored otherwise resources expended in furtherance of these efforts are wasted. The fourth and last risk relates to the accountability that the Ameren Missouri energy efficiency team has to implement and deliver results on robust energy efficiency programs. We issued numerous data requests to better understand the analyses they did of the Ameren Missouri workpapers for the MEEIA 2016-2018 filings. Either no analyses were done or a small portion of Ameren Missouri's workpapers may have been cited. We issued numerous data requests to understand the analyses, documentation and workpapers that accompanied policy recommendations regarding how Ameren Missouri should run its energy efficiency programs going forward. In the vast majority of responses, witnesses stated that no analyses were performed. Rather, witnesses relied on their past experience when making policy recommendations on the Ameren Missouri MEEIA 2016-2018 filing.

Q. Does this conclude your surrebuttal testimony?

A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Union Electric Company d/b/a Ameren Missouri's 2nd Filing to Implement Regulatory Changes in Furtherance of Energy Efficiency as Allowed by MEEIA.	))))	File No. EO-2015-0055

AFFIDAVIT OF RICHARD A. VOYTAS

STATE OF MISSOURI)
) **ss**
CITY OF ST. LOUIS)

Richard A. Voytas, being first duly sworn on his oath, states:

1. My name is Richard A. Voytas. I work in the City of St. Louis, Missouri, and I am employed by Ameren Services Company as Director of Energy Efficiency/Demand Response.

2. Attached hereto and made a part hereof for all purposes is my Surrebuttal Testimony on behalf of Union Electric Company d/b/a Ameren Missouri consisting of 159 pages and Schedule(s) RAV-1 thru RAV-3, all of which have been prepared in written form for introduction into evidence in the above-referenced docket.

3. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct.

Richard A. Voytas

Subscribed and sworn to before me this 24th day of April, 2015.

Julie Irby
Notary Public

My commission expires:

Julie Irby - Notary Public
Notary Seal, State of
Missouri - St. Louis County
Commission #13753418
My Commission Expires 1/15/2017