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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

Ameren Exhibit No. 112-NP
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1 **SURREBUTTAL TESTIMONY**

2 **OF**

3 **RICHARD A. VOYTAS**

4 **FILE NO. EO-2015-0055**

5 **I. INTRODUCTION**

6 **Q. Please state your name and business address.**

7 A. My name is Richard A. Voytas. My business address is One Ameren Plaza,
8 1901 Chouteau Avenue, St. Louis, Missouri 63103.

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

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

15 **Q. Please describe your professional background and qualifications.**

16 A. See Schedule RAV-1.

17 **II. PURPOSE OF TESTIMONY**

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

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

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

8 III. EXECUTIVE SUMMARY

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

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

19 **IV. NATIONAL TRENDS ON UTILITY-SPONSORED**
20 **ENERGY EFFICIENCY POTENTIAL**

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

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

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

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

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

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

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

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

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

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

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

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

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

- | | |
|----|----------------|
| 20 | 1. Arizona |
| 21 | 2. Arkansas |
| 22 | 3. California |
| 23 | 4. Colorado |
| 24 | 5. Connecticut |
| 25 | 6. Hawaii |
| 26 | 7. Illinois |
| 27 | 8. Maine |

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- 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

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

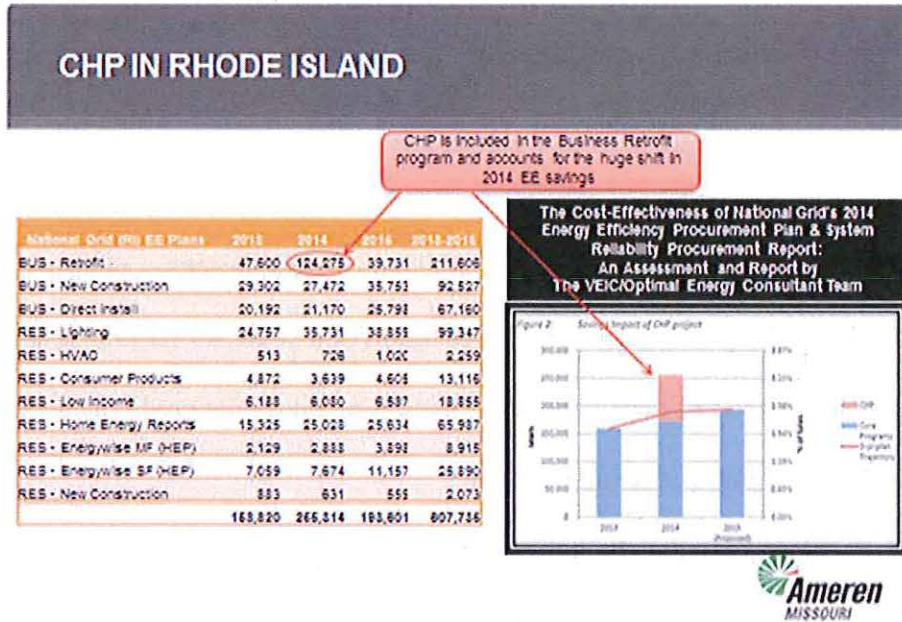
4 **V. MASSACHUSETTS AND RHODE ISLAND**

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

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

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

1 A. Rhode Island had an anomaly in 2014 in terms of reporting load reductions,
2 due to energy efficiency and due to inclusion of a very large combined heat and power
3 (“CHP”) project. The following graph¹ provides insight as to the magnitude of the anomaly:
4



The data corresponds to the Cost-Effectiveness of National Grid's 2014 EE Plan by VEIC/Optimal Energy Consultant Team

5
6
7 In June 2012, Rhode Island passed a new statute to further encourage CHP in the state.
8 The key provision of the statute is to make all CHP projects cost effective by the
9 inclusion of an ***Economic Benefit*** adder of \$2.51 of lifetime gross state product increase
10 per dollar of program investment.²

11 **Q. Please discuss the Massachusetts and Rhode Island EERS reporting**
12 **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.*

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

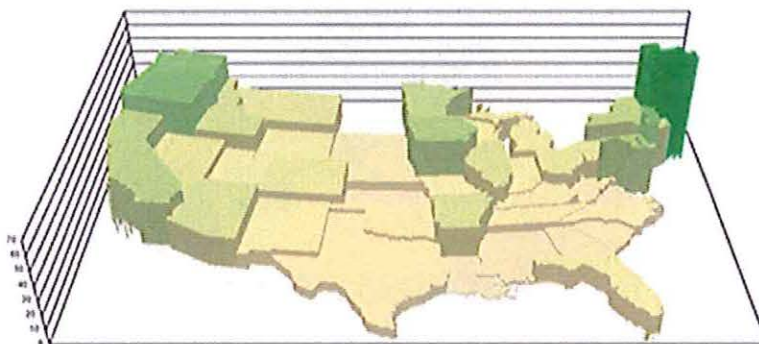
- 3 1. Credit of CHP installations;
- 4 2. Credit for compliance with existing building codes and appliance
5 efficiency standards; and
- 6 3. Credit for demand response toward energy efficiency annual load
7 reductions.

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

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

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

Annual State Energy Efficiency Spend (\$ per Capita)



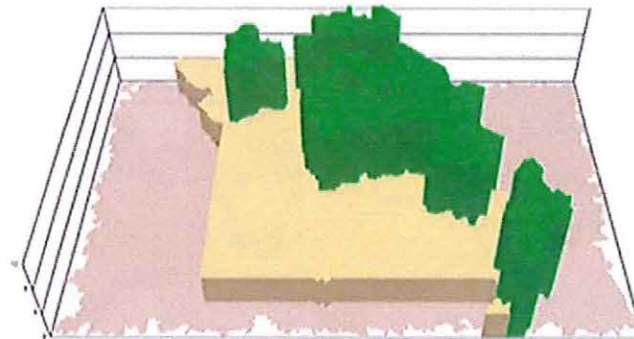
Source ACEEE 2014 Scorecard - 2013 Data - Note that higher costs are located within capacity constrained states

1

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

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

Missouri Annual Energy Efficiency Spend (\$ per Capita)



Missouri Source Data ACEEE 2014 Scorecard - 2013 Data and Ameren Missouri 2013 EE Program Data
(Ameren Missouri Energy Efficiency Spend is at \$12.37 per Capita - GREEN)
(Non-Ameren Missouri Energy Efficiency Spend within Missouri is at \$4.23 per Capita)
(Missouri Average Energy Efficiency Spend is at \$7.98 per Capita)

1

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

4 **A. Ameren Missouri's MEEIA 2016-2018 budget is \$134,461,396, which**
5 **averages to be \$44,820,465 per year. Ameren Missouri has approximately 1.1 million**
6 **customers with approximately 2.56 persons per home for a total population of 2,783,000**
7 **people. At the Massachusetts 2013 per capita spend of \$75.86, the Ameren Missouri MEEIA**
8 **2016-2018 budget would average $\$75.86 \times 2,783,000 = \$211,118,380$ per year. Therefore,**
9 **the three-year budget for MEEIA 2016-2018 would be \$633,355,140, rather than**
10 **\$134,461,396.**

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

1 A. The table below is an extract from the 2014 ACEEE state energy efficiency
2 scorecard and shows each state's annual DSM budget at the same per capita rate as
3 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

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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

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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.

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

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

8 **Q. Hypothetically speaking, could Ameren Missouri justify spending**
9 **\$633,355,140 on cost effective energy efficiency for MEEIA 2016-2018, even if the**
10 **Commission authorized it?**

11 A. No. There are simply not enough cost effective measures that could be put
12 into energy efficiency programs to justify a three-year implementation plan budget of
13 \$633,355,140.

14 **Q. How did Massachusetts develop a portfolio of energy efficiency programs**
15 **for the MassSave 2013-2015 implementation plan that resulted in a three-year budget of**
16 **\$1.5 billion?**

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

- 21 a) Demand Reduction Induced Price Effects ("DRIPE"); and
22 b) Non-Energy Benefits ("NEBs").

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

3 **Q. Please define DRIPE.**

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

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

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

17 **Q. Please define NEBs.**

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

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

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

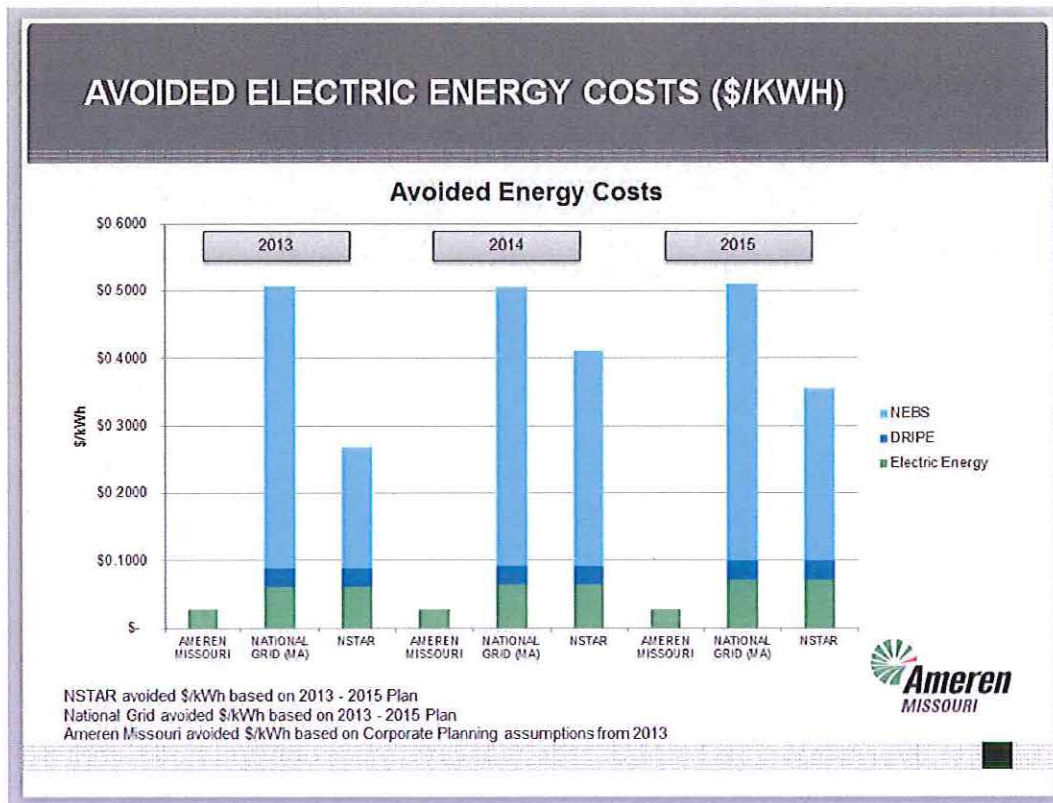
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8 **Q. Using the avoided cost components that were used in the development of**

9 **the 2013-2015 MassSave DSM implementation plan, please compare and contrast the**

10 **various avoided cost categories to those of Ameren Missouri.**

11 **A. See the slides³ below.**



12

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.

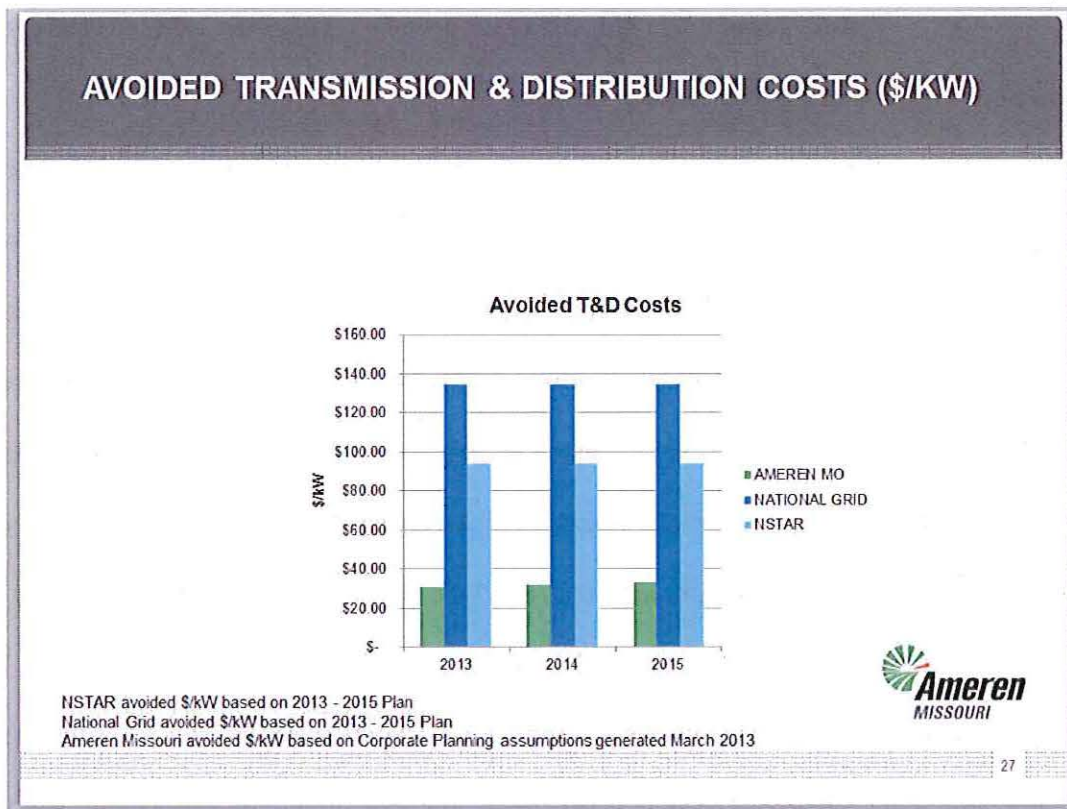
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****HC****



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

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

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

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

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

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

1 **VI. NATIONAL DSM POTENTIAL STUDIES RELATIVE**
2 **TO AMEREN MISSOURI**

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

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

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

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

20 A. The typical Ameren Missouri DSM potential study scope includes analyses of
21 energy efficiency, demand response, combined heat and power, customer-distributed
22 generation, and demand-side rate potential to achieve energy savings from Ameren Missouri
23 sponsored initiatives. A typical study takes 12-14 months to complete and costs in the
24 \$1 million range. Of the \$1 million budget, approximately 40% or more (usually more) of

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

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

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

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

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

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

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

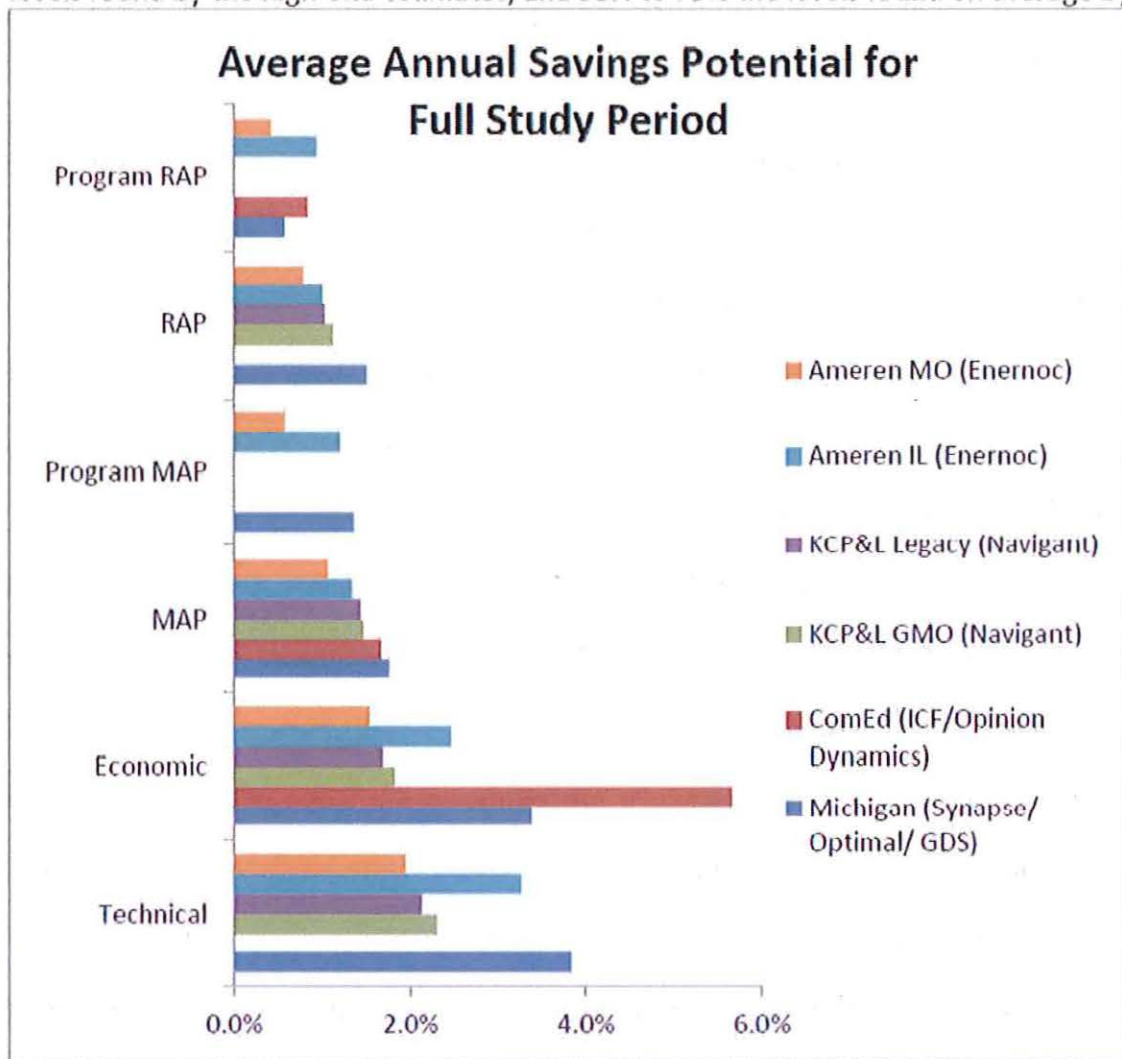
11 **Q. Approximately how many Ameren Missouri DSM Potential Study**
12 **stakeholder interactions took place during the development of the 2013 Ameren**
13 **Missouri DSM Potential Study?**

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

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

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

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



3
4 **Q. Did Mr. Mosenthal put any effort into understanding why the studies he**
5 **included contained different reported results? Put another way, did Mr. Mosenthal**
6 **attempt to do any type of gap analysis to find out why the results of the studies were**
7 **dissimilar?**

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

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

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

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

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

12 A. The most common key drivers include:

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

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

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

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

29 **VII. KANSAS CITY POWER & LIGHT COMPANY (“KCPL”)**
30 **DSM POTENTIAL STUDY**

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

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

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

- 7 • KCPL reported gross rather than net potential thereby yielding higher
8 estimates of potential;
- 9 • KCPL included opt-out customers thereby yielding higher estimates of
10 potential;
- 11 • KCPL included natural gas benefits in their cost effectiveness screening of
12 measures thereby yielding higher estimates of potential;
- 13 • KCPL did not adjust estimates of potential from TRM derived estimates to
14 actual EM&V results;
- 15 • KCPL reported measure level rather than program level potential thereby
16 yielding higher estimates of potential;
- 17 • KCPL assumed a 1.0% sales forecast rate compared to Ameren Missouri's
18 0.6% thereby yielding higher estimates of potential; and
- 19 • KCPL assumed customers would revert back to buying inefficient equipment
20 when efficient equipment reached the end of its useful life thereby yielding
21 higher estimates of potential.

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

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

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

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

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

32
33 KCPL states, “Each of the above input assumptions would result in the potential savings to
34 be overestimated, however, the effects of these assumptions have not be quantified
35 individually or in total.”⁴

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

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

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

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

9 **A. KCPL quantified this in Volume 5 in Table 48 on page 129 of their IRP filing.**
10 **A replication of the table is shown below. Option C, which represents the KCPL IRP**
11 **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

1 **VIII. MICHIGAN STATEWIDE DSM POTENTIAL STUDY**

2 **Q. Please discuss the Michigan statewide DSM Potential Study cited by**
3 **Mr. Mosenthal as having higher DSM potential than Ameren Missouri’s Potential**
4 **Study.**

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

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

11 **Q. In Mr. Mosenthal’s bar chart, he states the contractor for the Michigan**
12 **study was Synapse/Optimal/GDS. What were the results of the Michigan study for the**
13 **5-year period from January 1, 2014 through December 31, 2018?**

14 **A. I located the study that identified GDS as the contractor and reviewed the**
15 **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%

16
17 If the Total Resource Cost (“TRC”) potential is 8.6% over a 5-year period, that would equate
18 to a simple average of $8.6\%/5 = 1.72\%$ per year.

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

3 **A. The results are shown in Table 1-2, page 6 of the study. Table 1-2 is shown**
4 **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%

5
6 If the TRC potential is 13.5% over a 10-year period that would equate to a simple average of
7 $13.5\%/10 = 1.35\%$ per year.

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

10 **A. The most obvious key driver difference is the study period. The Michigan**
11 **5-year study period starts two years prior to the Ameren Missouri study and ends seventeen**
12 **years prior to the Ameren Missouri study. The Michigan 10-year study also starts two years**
13 **prior to the Ameren Missouri study but ends twelve years prior to the Ameren Missouri**
14 **study. Consequently, the impact of lower incremental energy savings due to the proliferation**
15 **of building energy codes and appliance energy efficiency standards is minimized in the**
16 **Michigan study relative to the Ameren Missouri study.**

17 Other key driver differences include the following:

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

- 1 MEMD is based on a secondary data source called the Morgan Measure
2 Library ("MML"). Many of the measures in the first Ameren Missouri TRM
3 were derived from MML. The MML measures were generally adjusted
4 downward when actual Ameren Missouri primary EM&V results were
5 compared to MML results.
- 6 2) With respect to non-energy benefits of energy efficiency programs, GDS
7 included an adder of \$9.25 per ton of carbon for reduced emissions of CO₂.
8 Ameren Missouri had no such adder.
- 9 3) GDS included natural gas and water benefits in the determination of the cost
10 effectiveness of electric measures. Ameren Missouri did not.
- 11 4) GDS reported measure level potential. Ameren Missouri reported program
12 level potential.
- 13 5) Michigan did not make an adjustment to reflect loss of any opt-out customers
14 from DSM potential.
- 15 6) Residential DSM Potential in Michigan includes significant components
16 related to consumer electronics, i.e., LED TVs, PCs, and consumer
17 appliances. Neither consumer electronics nor most appliances are cost
18 effective for Ameren Missouri. Even if consumer electronics were cost
19 effective, the value of using customer funds to encourage customers to
20 purchase Energy Star branded TVs and PCs is questionable. The latest
21 Energy Star brand awareness shows that in excess of 87% of all consumers
22 recognize and value this brand absent any utility DSM program. In addition,
23 many Energy Star branded consumer electronics have lower costs than non-
24 Energy Star branded consumer electronics. It is also true that some Energy
25 Star brands have negative incremental energy savings due to other features
26 that consumers value. Finally, it is difficult to justify the use of customer
27 funds to support the purchase of highly discretionary consumer electronics
28 products that are often out of date within five years.

29
30 To illustrate the reliance of consumer electronics on the Michigan DSM residential
31 customer potential, Table 6-10 on page 64 of the Michigan study states the various types and
32 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%
<i>% of Annual Sales Forecast</i>		<i>10.5%</i>		<i>14.3%</i>

1

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

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

6 **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%
Cooling	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%
<i>% of Annual Sales Forecast</i>		<i>10.5%</i>		<i>17.6%</i>

1

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

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

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

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

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

6 A. Michigan cumulative residential potential in 2018 is 3,549,596 MWh.
7 Removal of the appliances, electronics, HVAC building envelope, and behavior programs
8 would reduce the potential to 1,998,926 MWh. Michigan cumulative business potential in
9 2018 is 4,004,548 MWh. Removal of the office equipment and 50% of the refrigeration
10 potential would reduce the potential to 3,206,050 MWh. The revised potential would be
11 $1,996,926 + 3,206,050 = 5,202,976$ MWh or 69% of the total. Consequently, if the Michigan
12 average annual DSM potential through 2018 was estimated to be 1.72% per year, the
13 normalized value to Ameren Missouri would be $1.72\% \times 0.69 = 1.19\%$.

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

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

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

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

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

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

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

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

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

16 **A.** The results are shown on page iii, Figure ES-1 in the COMED study. Figure
17 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

1

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

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

8 **A.** Similar to the Michigan state DSM Potential Study, the most obvious
9 difference is the study period of the COMED study from 2013-2018 as compared to the
10 Ameren Missouri study period from 2016-2033. The start date of 2013 for the COMED
11 study is a particularly meaningful difference as it allows for substantial savings from CFLs
12 using an incandescent light bulb as the baseline for determining incremental energy savings.
13 There are no cost effective CFLs in the Ameren Missouri 2016-2033 DSM Potential Study.
14 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 be 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

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

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

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

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

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

3 Without COMED program specific details for the COMED study period from 2013 to
4 2018, it is relatively certain that due to the significant differences in key driver assumptions
5 between the COMED and Ameren Missouri DSM Potential Studies that the COMED study
6 would yield similar results to those of Ameren Missouri if the study key drivers were
7 normalized to each other.

8 **X. AMEREN ILLINOIS DSM POTENTIAL STUDY**

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

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

15 **Q. Why not?**

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

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

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

5 **Table 1 Summary of Cumulative, Net, Program-Level Electric Energy**
6 **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

7
8 These actual program level results appear to be meaningfully less than the results that Mr.
9 Mosenthal has put in his bar graph in his testimony.

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

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

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

4 **XI. NEW YORK STATE DSM POTENTIAL STUDY**

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

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

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

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

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

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

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

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

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

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

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

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

14 A. The results are shown on page 16 in Table 2 of the NYSERDA report.
15 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
<i>% of Forecast</i>	36%	45%
Achievable Potential (GWh)	21,748	36,328
<i>% of Forecast</i>	12%	18%
Savings from EEPS (GWh)	11,230	17,013
<i>% of Forecast</i>	6%	8%

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

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

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

9 **Q. Given that you think Ameren's savings targets in the**
10 **2016-2018 MEEIA plan are too low, what would be reasonable**
11 **targets?**

12 A. The minimum savings targets in the MEEIA rules provide a
13 reasonable ramp rate for Ameren's DSM programs. These rules
14 require 0.5% annual savings as a percent of load in 2013, with a
15 ramp up of an additional 0.2% per year until reaching 1.9%
16 savings in 2020. MEEIA rules state that "[t]he commission shall
17 use the greater of the annual realistic achievable energy savings
18 and demand savings as determined through the utility's market
19 potential study or the following incremental annual demand-side
20 savings goals." Since the savings goals in the MEEIA rules are
21 greater than the potential determined through Ameren's market
22 potential study, which I have shown to be unreasonably low, these
23 rules clearly provide that the savings targets should be viewed as a

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

3 Following Mr. Mosenthal's testimony, his opinion is that Ameren Missouri should be
4 required to achieve the MEEIA aspirational load reduction goals of 1.1% in 2016, 1.3% in
5 2017, and 1.5% in 2018.

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

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

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

17 A. Both studies reported DSM potential in terms of program potential. Yet
18 Mr. Mosenthal questioned the appropriateness of the Ameren Missouri DSM Potential Study
19 reporting program potential. His rebuttal testimony in the Ameren Missouri MEEIA 2016-
20 2018 filing states the following on page 4, lines 13-14:

21 "...the potential study then inappropriately and significantly lowers
22 the measure-level potential study to estimate a "program potential,"..."

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

1 level to program-level potential for NYSERDA. The following excerpt can be found on page
2 5 of the NYSERDA study report:

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

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

17 A. Mr. Mosenthal did not address the issues of free ridership, spillover and
18 market effects for the Ameren Missouri MEEIA 2016-2018 implementation plan in his
19 Ameren Missouri MEEIA 2016-2018 rebuttal testimony. However, he has explicitly stated
20 his thoughts about the issues of free ridership, spillover and market effects in the NYSERDA
21 study. Mr. Mosenthal's thoughts are on page 10 and 11 of the NYSERDA study. The
22 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}

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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.

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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.

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Q. Is Ameren Missouri in alignment with Mr. Mosenthal in the Ameren

8

Missouri MEEIA 2016-2018 filing in terms of deeming net = gross?

1 A. Yes. Section 4.3 beginning on page 64 of the Ameren Missouri MEEIA
2 2016-2018 filing describes the Ameren Missouri rationale, analysis and recommendation to
3 deem net equal to gross for the MEEIA 2016-2018 implementation period.

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

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

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

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

15 **Q. What specific factors do you think caused EnerNOC to**
16 **underestimate the available potential?**

17 A. One significant contributor to EnerNOC's low potential
18 estimate is its approach for estimating take rates. Take rates are
19 the maximum rates at which cost-effective efficiency measures
20 will be adopted by the public. In the potential study, EnerNOC
21 estimated that take rates for the RAP scenario are between 29%
22 and 39% for the residential sector and 38% and 49% for the
23 commercial sector. These numbers are well below documented

1 program participation rates in a recent ACEEE study that
2 examined take rates throughout the country. The study found that
3 efficiency programs have increased the market share of Energy
4 Star products to nearly 90%, participation rates in the absence of
5 budget caps for small business direct install programs to between
6 60-80%, and participation rates for commercial custom programs
7 targeting larger customers to nearly 90% over 3-4 years. These
8 numbers are significantly higher than the rates used for the
9 potential study and are one of the primary reasons the EnerNOC
10 potential is lower than the savings estimated in other studies and
11 that are already being achieved by Ameren.

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

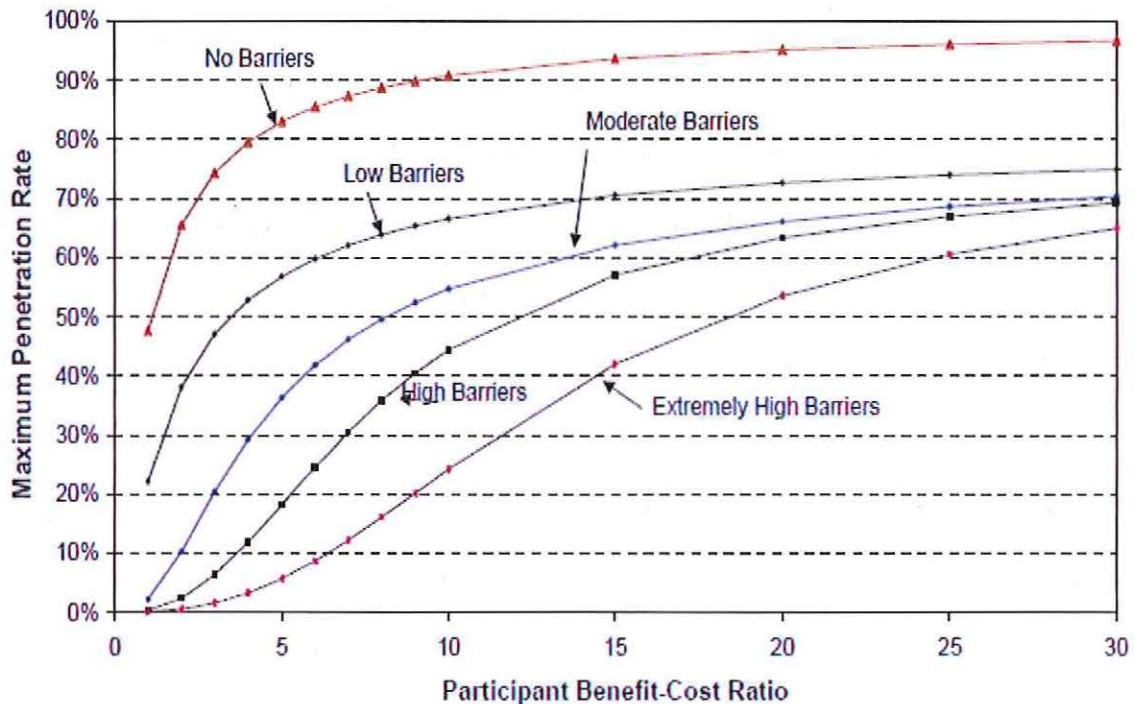
14 A. There are three core elements in any DSM potential study. The three core
15 elements are: (1) the calculation of technical potential; (2) the calculation of economic
16 potential; and (3) the calculation of achievable potential. Technical potential is the
17 quantification of all energy efficiency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

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

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

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

Primary Measure Implementation Curves Used in Adoption Model

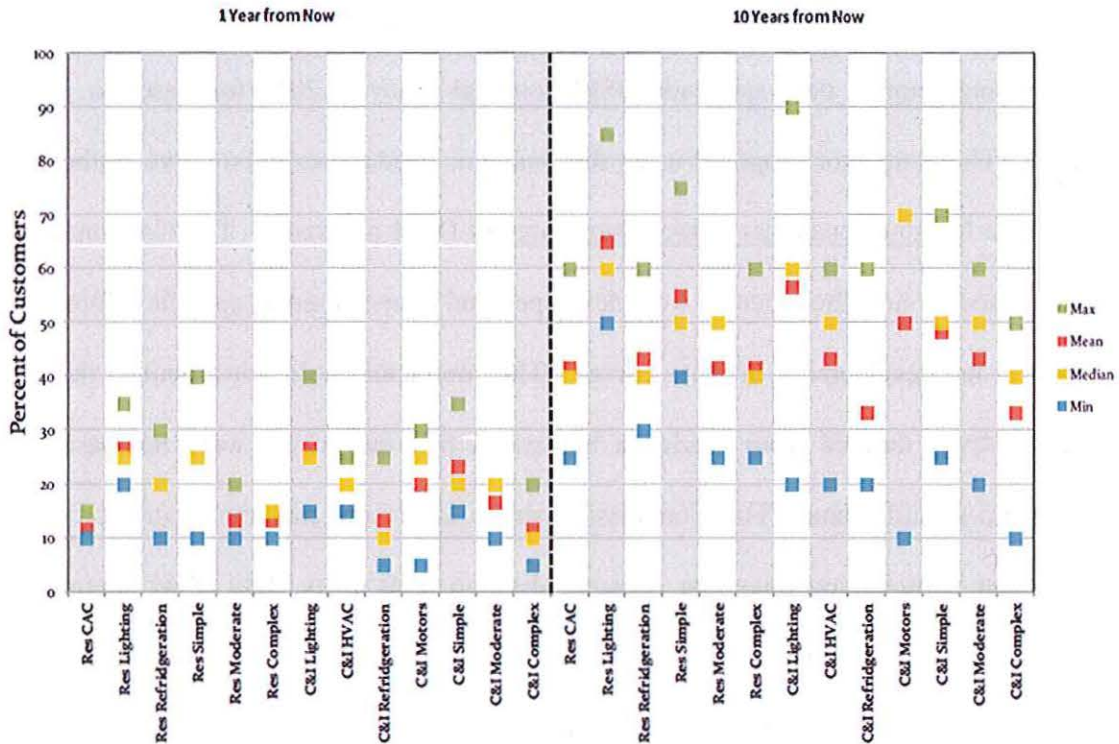


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1 It is worth noting that the Missouri Public Service Commission hired a DSM potential
2 study contractor to do a statewide DSM Potential Study in 2011 for Case No. EW-2011-
3 0136. The contractor proposed using the academic product adoption curve methodology to
4 estimate Missouri customer participation rates in DSM programs. The Commission asked
5 the contractor how these curves were developed and if any Missouri-specific information was
6 used in the development of these curves. The contractor could not articulate the basis for
7 these curves derived from academia but stated that the curves were not based on any
8 Missouri-specific data. The Commission subsequently directed the contractor to use the
9 customer participation rates that Ameren Missouri used in its 2009 DSM Potential Study.
10 These customer participation rates were based on Ameren Missouri customer primary market
11 research that asked customers how willing they would be to participate based on the
12 timeliness of the payback of the customer investment in incremental energy efficiency
13 savings.

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

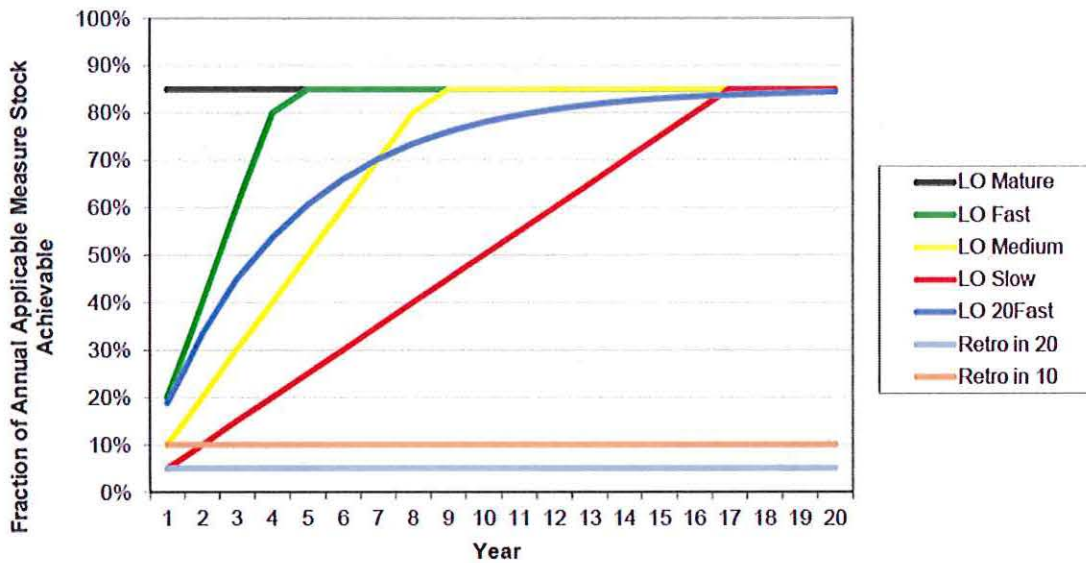
Surrebuttal Testimony of
Richard A. Voytas



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

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



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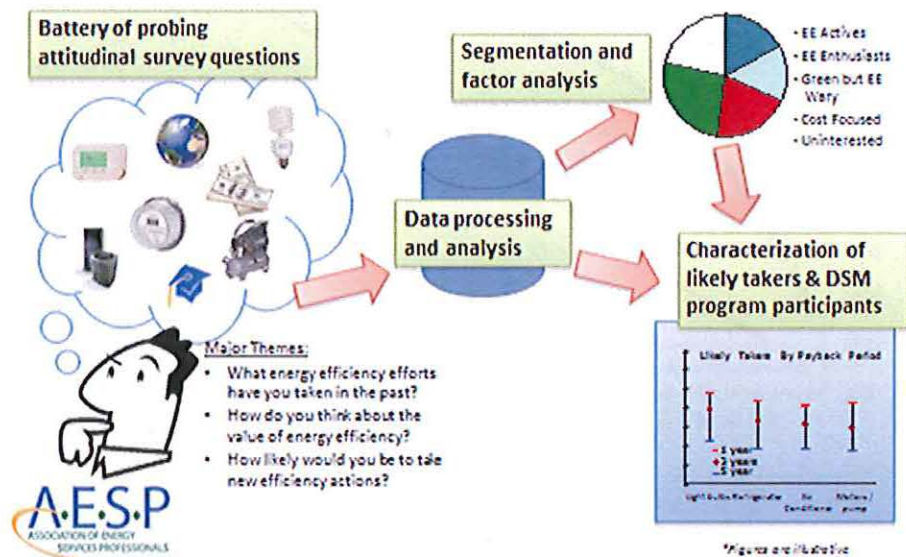
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The distinguishing feature of the "hope and pray" methodology to estimate customer participation rates is the assumption of 80+% customer participation in utility energy efficiency programs in as little as year four of program life to year seventeen 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:

4. Estimating Customer Take Rates



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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.

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

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

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

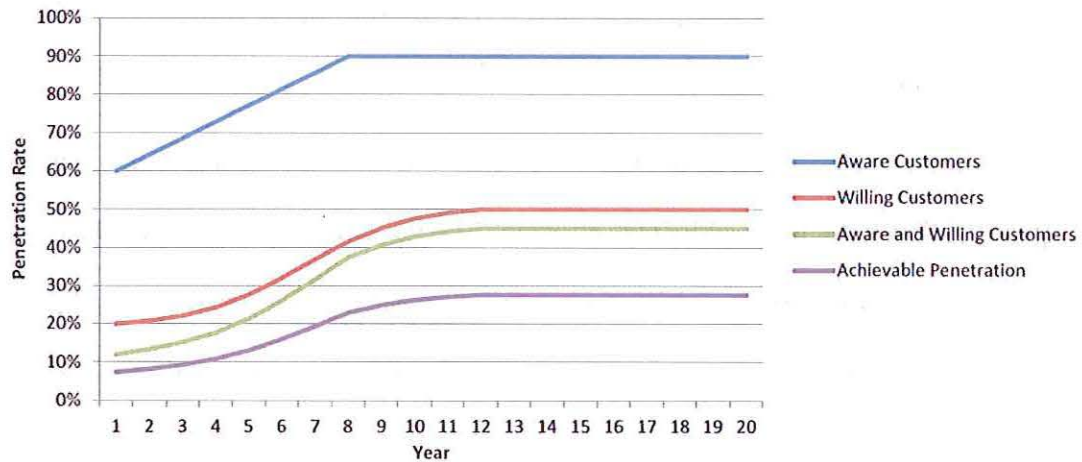
15 Mr. Mosenthal did not employ primary market research in the estimation of the magnitude of
16 the four market barriers. All assessments were based on subjective judgments.

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

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

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Figure 1. Example of Estimating Measure Penetration Rates



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

6 **A. No.**

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

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

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

1 A. Table 12 on page 33 of the NYSERDA report describes the 2030 residential
2 measure mix of programs and associated cumulative energy savings. The table is shown
3 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%

4
5 Electronics and other appliances make up 20% of the cumulative 2030 residential energy
6 efficiency potential for NYSERDA. Neither of these categories of programs is close to being
7 cost effective for Ameren Missouri. If they were cost effective, Ameren Missouri
8 stakeholders and the Commission would have to consider if offering such programs would be
9 in the best interest of all customers and would actually contribute toward the building of the
10 equivalent of a supply-side generation resource.

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

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

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

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

11 **A.** Table 22 on page 49 describes the NYSERDA commercial potential. Similar
12 to consumer electronics for the residential class, there is a significant commercial program
13 for commercial office equipment. Office equipment accounts for 8% of all achievable
14 business potential by 2030 for NYSERDA. Office equipment may not be a suitable program
15 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%

16

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

3 A. Table 34 on page 62 of the NYSERDA report provides the industrial results as
4 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%

5
6 Unlike Missouri, NYSERDA industrial electric load is small relative to residential and
7 especially commercial load. NYSERDA industrial energy efficiency achievable potential
8 represents less than commercial office equipment achievable potential.

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

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

- 15 1. Gross Potential: We know the NYSERDA study is reported in terms of gross
16 potential. Ameren Missouri reports on net potential. At a minimum, there is
17 about a 20% difference between the two. Consequently, the average annual
18 load reduction of 1.06% for NYSERDA would decline to 0.85% if reported on
19 a net basis.
20
21 2. Electronics: We know NYSERDA has substantial contributions to annual
22 load reductions from consumer electronics, appliances, and office equipment

1 – none of which are cost effective in Missouri. We can assume approximately
2 a 10% decrease in NYSERDA potential to account for this discrepancy.
3 Consequently, the average annual load reduction would decline from 0.85% to
4 0.76%.

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

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

16 **XII. AMEREN MISSOURI DSM POTENTIAL STUDY DATED JANUARY 2014**

17 **Q. When did Ameren Missouri begin the process that culminated in the**
18 **completion of the Ameren Missouri DSM Potential Study used to support its MEEIA**
19 **2016-2018 filing?**

20 A. The process began in June 2012 with the development of a Request For
21 Proposal (“RFP”) for a contractor to perform the study. The RFP was vetted with the entire
22 Ameren Missouri DSM regulatory stakeholder advisory group. Shown below is the exact
23 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.

1 Sincerely,

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

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

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

10 **Q. When did all Ameren Missouri stakeholders reach consensus to award
11 the DSM potential study to EnerNOC Energy Solutions (“EnerNOC”)?**

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

1 **Q. Who is EnerNOC?**

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

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

12 **Q. What was the cost of the study?**

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

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

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

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

1 A. Ultimately, approximately 3,200 surveys were administered to customers plus
2 100 site visits to the largest industrial customers. The majority of surveys were administered
3 online rather than via telephone or U.S. mail.

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

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

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

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

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

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

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

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

23 A. The key “takeaway” is that when it comes to DSM program design, the Pareto
24 principle is usually in force. The Pareto principle (also known as the 80–20 rule, the law of
25 the vital few, and the principle of factor sparsity) states that, for many events, roughly 80%
26 of the effects come from 20% of the causes. For DSM program design, this means that about
27 20% of the possible cost effective energy efficiency measures account for about 80% of the
28 energy savings in the MEEIA 2016-2018 implementation plan. In fact, AEG illustrates this
29 fact in the Ameren Missouri DSM Potential Study, Volume 3: Energy Efficiency on
30 page 5-5, Table 5-5 as follows:

1

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%

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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

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

4 **Q. Is Mr. Mosenthal's assertion, in his rebuttal testimony on page 22, lines**
5 **18-23, that "neither the EnerNOC potential nor Ameren's MEEIA plan goals took into**
6 **account the precipitous decline in LED cost" correct?**

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

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

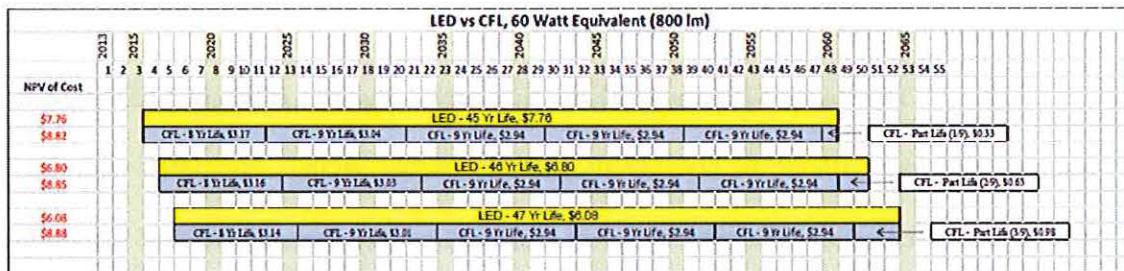
12 A. Yes. When reviewing the Ameren Missouri Analysis workbook for the
13 Residential Lighting Program, it is clear that Ameren Missouri actually considers the cost of
14 LED lights to be lower than the cost of alternative technologies, such as CFLs and Halogen
15 lighting.

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

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

1 **Q. Is this something that you can illustrate?**

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



7

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

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

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

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

1 this value is approximately 1,000 hours (which equates to approximately one year for bulbs
2 that are used approximately three hours per day). Some more expensive versions of the bulbs
3 will even indicate a life of up to 2,000 hours. CFL lighting is typically indicated as having a
4 life of approximately 9,000 hours. LED lighting typically has between 25,000 hours to
5 50,000 hours. The life of the equipment is increasing as the technologies are maturing.

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

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

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

14 A. When evaluating the program cost effectiveness of energy efficient
15 technologies, Ameren Missouri contrasts both the program benefits from measures to the
16 measure incremental costs and program delivery costs. For the TRC, the cost of incentives
17 that are less than or equal to the incremental measure costs are not included as these are used
18 to offset the incremental costs of the measures. A negative value in the denominator of the
19 equation will result in a negative, nonsensical TRC result. Therefore, to correct for this, the
20 negative value is replaced with a very small value which indicates an incremental cost that is
21 very low, although not less than or equal to zero. Ameren Missouri has chosen the value of
22 \$0.000001 as this very low value. This value prevents the generation of a negative TRC
23 result.

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

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

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

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

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

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

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

3 A. Mr. Woolf is 50% correct. AEG did make an adjustment to account for
4 customer “say/do” survey response bias. AEG did not make an adjustment to account for
5 “psychographic questions.” This point has been made at stakeholder meetings, in response to
6 data requests, and in AEG documentation on its take rate methodology. In addition,
7 Volume 3 of the final DSM Potential Study report makes this point explicitly on pages 2-12,
8 20 and E-1.

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

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

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

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

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

4 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%

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

6 The ACEEE study reaches the following conclusion:

Overall Conclusions and Recommendations

7 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.

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

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

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

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

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

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

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

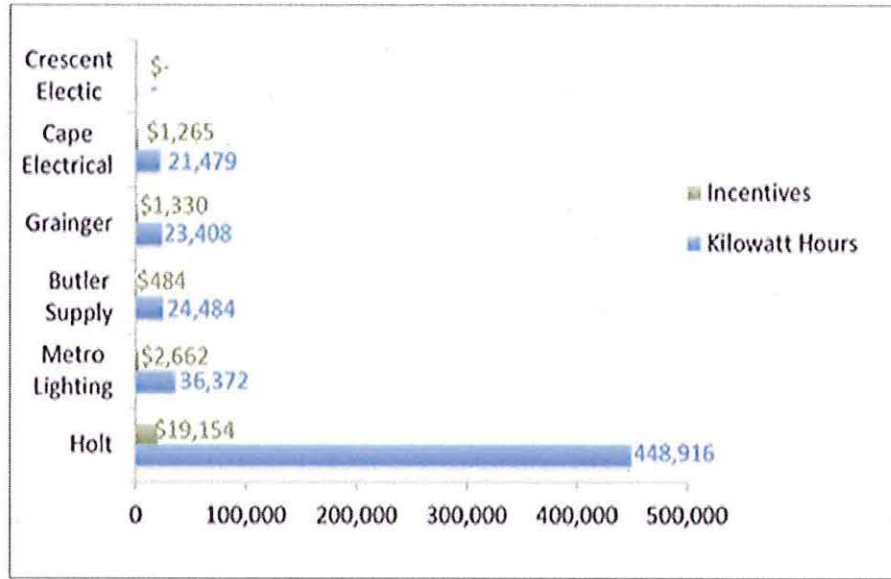
3 In 2014, the Ameren Missouri HVAC implementation account managers prepared
4 reports to discuss with HVAC distributors on the number of units sold through Ameren
5 Missouri programs via their participating contractors. This prompted many contractors to
6 step up their high-efficiency sales as a result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

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

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

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

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



1

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

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

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

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

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

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

18 **Q. Please explain.**

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

21 ***Program Activity***

22 *In PY14, 15,838 participants received a total of 25,869 measures through the HVAC*
23 *Program (many program participants received multiple rebates). This represented a*
24 *28% increase in rebates from PY13. Table 2 summarizes results from the three*
25 *primary measure types.*

1

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%

2

*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.

3

4

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:

6

7

Program Marketing

8

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:

9

10

11

12

- E-mails to customers

13

- Website banners and Ameren's website

14

- Gas pump toppers

15

- Newspaper advertisements

16

- Utility bill inserts, including personal energy reports

17

- Newspaper advertisements

18

- Radio advertisements

19

- Internet radio ads (e.g., Pandora)

20

- Television commercials

21

- Shelf marketing campaign

22

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

23

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

24

25

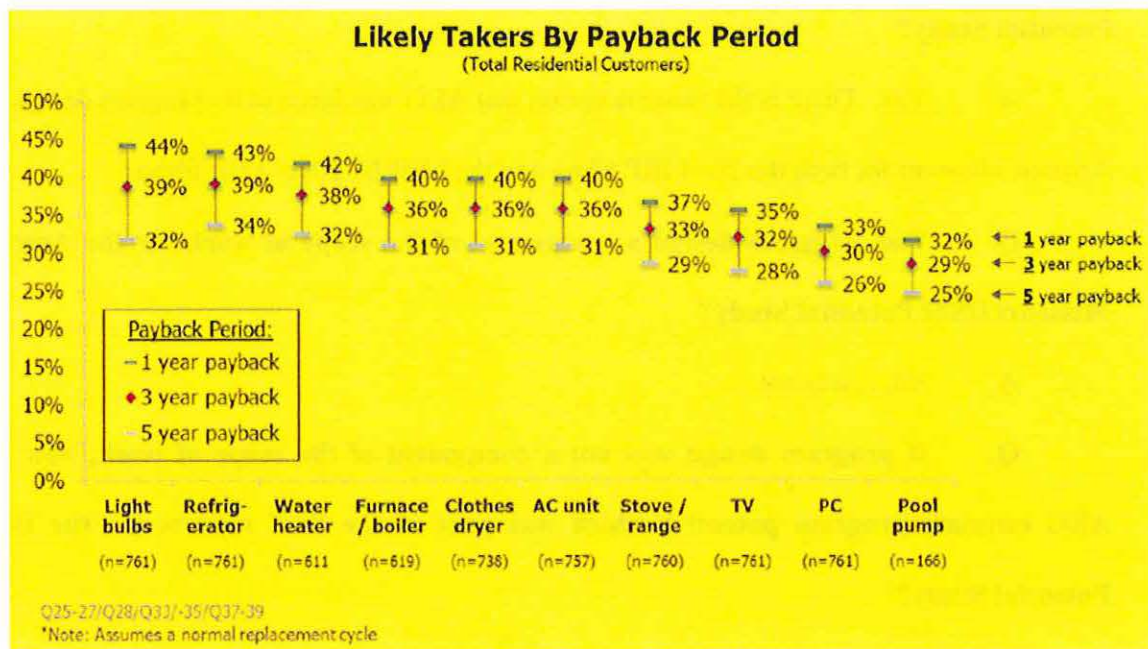
To get an idea of the size of the potential market for efficient HVAC in 2014, the first metric is to have an understanding of the average EUL of HVAC equipment. The EUL for HVAC equipment, as stated in the Ameren Missouri TRM, is 18 years. This means that, on

26

27

Surrebuttal Testimony of
Richard A. Voytas

1 average, 1/18 of Ameren Missouri residential air conditioners are replaced every year. For a
2 residential population of approximately one million customers, this means that 1/18 x
3 1,000,000 ~ 56,000 HVAC units are replaced each year. The 2014 Ameren Missouri
4 residential HVAC program had 15,838 customer participants. Therefore, the approximate
5 customer participation rate for the 2014 residential HVAC program was 15,838/56,000 =
6 28%.



7
8 As is shown in the column above the heading “AC unit,” the realistic achievable potential
9 take rate is 36%.

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

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

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

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

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

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

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

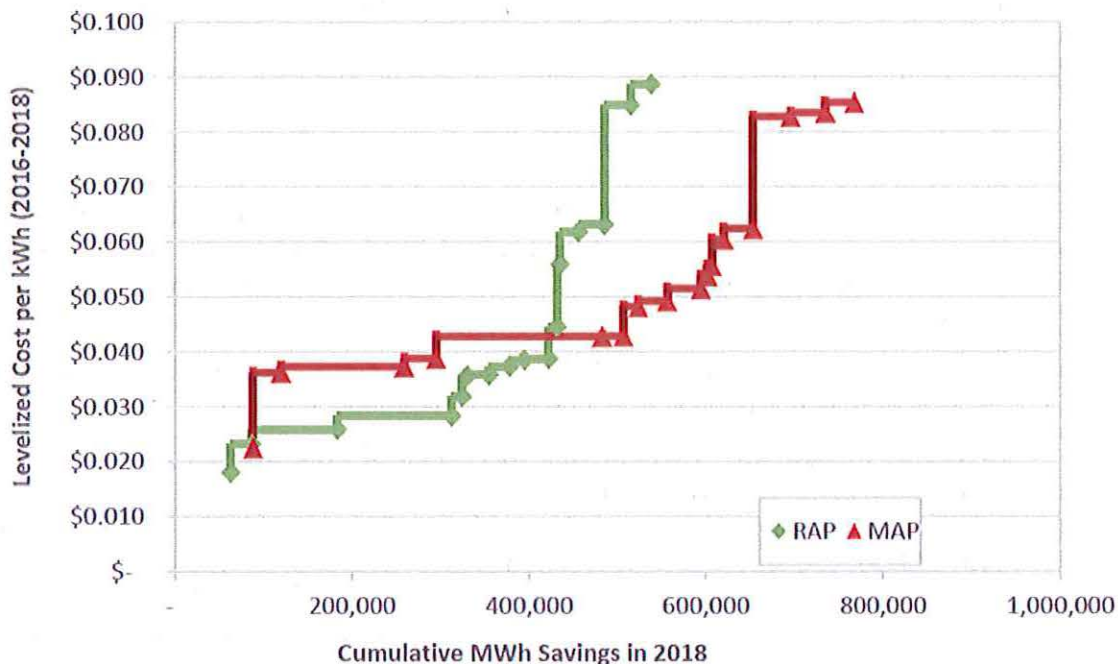
12 A. No, it was not.

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

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

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

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



4
5 **Q. Beginning on page 40 of his rebuttal testimony, Mr. Woolf cites several**
6 **programs that were generically modeled in the Ameren Missouri DSM Potential Study**
7 **but are not included in the Ameren Missouri MEEIA 2016-2018 filing. Please discuss.**

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

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

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

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

6 Residential New Construction: The benefit to cost ratio for the program was 0.28 for
7 the TRC and 0.36 for the Utility Cost Test ("UCT"). With MEEIA 2016-2018
8 avoided costs being approximately 50% of the level of MEEIA 2013-2015 the benefit
9 to cost ratio for this program for MEEIA 2016-2018 is 0.14 for the TRC and 0.18 for
10 the UCT. This program was excluded from MEEIA 2016-2018 on the basis of not
11 being cost effective.

12 Home Energy Performance (HEP): This program was excluded from MEEIA 2016-
13 2018 on the basis of not being cost effective. The TRC was 0.42.

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

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

27 Multi-Family Direct Install: The MEEIA 2016-2018 Low Income and Energy
28 Efficiency Kits programs include reaching multi-family customers with direct
29 installed measures. Mr. Woolf may have missed reading Appendix A of the MEEIA
30 2016-2018 filing.

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

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

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

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

5 **Q. Is Mr. Mosenthal correct?**

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

10 **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%

11
12 As Table 4-3 shows, CHP is not cost effective for MEEIA 2016-2018. Relatively minor
13 amounts of potential become cost effective in 2025.

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

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

5 In the 2014 ACEEE State Scorecard, ACEEE includes Table 28 - Installed CHP
6 capacity and fuel prices by state, 2012-13. Table 28 includes the industrial average electric
7 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*

8
9
10 The Massachusetts average industrial electric price is \$0.1309/kWh and the Missouri
11 average industrial electric price is \$0.0614/kWh. Therefore, Massachusetts industrial
12 customers pay more than twice the electric rate as Missouri industrial customers.

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

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

9 **Q. Please comment.**

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

14 Mr. Mosenthal may be unaware that Ameren Missouri conducted an LED street light
15 technology pilot in conjunction with the Electric Power Research Institute on a St. Louis
16 County suburban road from 2009 through 2012. Furthermore, in an order in File No.
17 ER-2011-0028, the Commission required that Ameren Missouri further study the economics
18 for a potential LED street light conversion. The Company filed its first LED street lighting
19 report with the Commission in July of 2013. The Company updated the LED street lighting
20 report in December of 2014. The report acknowledges that approximately 70% of the
21 Company owned street lights have a cost effective LED alternative. Potential energy savings
22 associated with the 70% of street lights converting to LED technology is approximately
23 59,000 MWh.

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

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

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

1 **Q. What is Mr. Mosenthal’s testimony on customer behavior programs?**

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

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

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

10 **Q. Was OPower cost effective?**

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

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

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

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

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

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

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

20 Attached is an excerpt from the Colorado Xcel Energy DSM Potential Study used by
21 the EPA in the determination of an average annual 1.5% load reduction for the EPA CPP
22 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	<i>Shown above under GWh</i>		
	Demand Response	43.5	43.5	27.3	\$48.6	\$48.6	\$31.2
	Conservation	3.9	2.4	1.0	<i>Shown above under GWh</i>		
	Total	156.3	94.8	58.1	<i>Equals GWh total plus DR costs</i>		
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	<i>Shown above under GWh</i>		

Also, see notes for Table 1-1.

1

2 The 100% incentive column represents MAP. The 50% incentive column represents RAP.

3 According to Xcel, the electric budget for MAP is \$253.9 million and \$43.9 million for RAP.

4 The MAP budget is almost six times greater than the budget for RAP. MAP incremental

5 energy savings are 444.8. RAP incremental energy savings are 163.8 gigawatt-hours

6 (“GWh”). MAP incremental energy savings are almost three greater than RAP savings.

7 Xcel also has quite a bit to say about the risk and uncertainty associated with MAP

8 relative to RAP. Again, quoting from the Xcel study⁵:

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.

1

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

3 A. RAP risks are associated with a more likely scenario than achieving MAP
4 results. RAP represents a forecast of likely customer behavior under realistic program design
5 and implementation. It takes into account existing market, financial, political, and regulatory
6 barriers that are likely to limit the amount of savings that might be achieved through energy
7 efficiency programs. RAP considers more realistic incentives (i.e., less than 100% of
8 incremental cost), defined marketing campaigns, and internal budget constraints. MAP
9 establishes a maximum target for the savings and involves incentives that represent up to
10 100% of the incremental cost of energy efficient measures above baseline measures,
11 combined with high administrative and marketing costs. MAP also considers a maximum
12 participation rate by customers, which is one of the reasons for the larger downside risk
13 relative to RAP.

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

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

5 **Q. How was the uncertainty risk determined for RAP?**

6 A. Scalars were determined for the upper and lower limits of risk associated with
7 the RAP portfolio. The scalars were based on a formulaic approach where the PY2013
8 EM&V realization rates for the top measures were applied to the pre-EM&V 2018 GWh
9 savings per the EnerNOC/2013 DSM Potential Study. The top residential measures
10 represented 91% of the savings associated with the 2018 RAP residential portfolio prior to
11 applying the 2013 EM&V results. After the 2013 EM&V results were applied, those
12 measures only represented 73% of the savings associated with the 2018 RAP residential
13 portfolio. Similarly, the top commercial and industrial measures represented 77% of the
14 savings prior to applying the 2013 EM&V results. After the 2013 EM&V results were
15 applied, those measures represented 100% and 94% for commercial and industrial savings
16 respectively. Comparison of the total portfolios of measure savings associated with the 2018
17 RAP for pre-EM&V and post-EM&V applications resulted in a 91.2% ratio. The remaining
18 8.8% was used as the basis for the RAP risk scalar. Since RAP is modeled as the probable
19 portfolio, the scalars were evenly applied for the upper and lower limits. The table below
20 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	$C = A \times B$	$D = C / A$	$= 1 - D$
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%

1

2 **Q. How was the uncertainty risk determined for MAP?**

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

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

10 A. They are consistent with what we are seeing in other studies. For example,
11 the 2010 Colorado Xcel DSM Potential Study, one of the ten DSM potential studies used by
12 the EPA in the development of its CPP plan, states the following about MAP risk and
13 uncertainty on page 1-20 of the report⁶:

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.

1

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

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

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

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

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

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

- 7 1. Update the DSM potential study as required. The DSM potential
8 ptudy used to do program design for the MEEIA 2016-2018
9 implementation period started in 2012. Consequently, there is up to a
10 6-year gap between the start of the study and the end of the program
11 implementation period. Major program drivers can change during
12 such a 6-year period.
- 13 2. Develop revised annual load reduction goals as a result of updates to
14 the DSM potential study.
- 15 3. Work with Ameren Missouri implementation teams and EM&V teams
16 to address inconsistencies between components of proposed annual
17 load reductions goals to actual implementation experience in the
18 marketplace.
- 19 4. Work with Ameren Missouri implementation teams to refine
20 individual program administration and incentive costs based on actual
21 program experience and projected changes in key drivers for costs.
- 22 5. Work with stakeholders to keep all apprised of program design status.
23 Seek input on new program design concepts.
- 24 6. Finalize program design.

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

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

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

1 • New program designs are introduced

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

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

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

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

12 **Q. Please respond.**

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

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

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

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

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

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

15 A. We issued a data request to Mr. Mosenthal to request the documentation he
16 relied upon to make this statement. Mr. Mosenthal has none. Federal requirements include
17 [Executive Order \(EO\) 13514](#), the [Energy Independence and Security Act of 2007 \(EISA\)](#), the
18 2009 Omnibus Appropriations Act which codified EISA into law, and [EO 13423](#). The EISA
19 requirements exemplify how significant the federal building energy efficiency mandates are
20 listed below:

- 21 • **Energy Efficiency:** EISA requires federal agencies to reduce energy intensity
22 by 3 percent per year, or 30 percent by FY 2015 (compared to an FY 2003
23 baseline):
24 9 percent by FY 2008**
25 12 percent by FY 2009
26 15 percent by FY 2010

1 18 percent by FY 2011
2 21 percent by FY 2012
3 24 percent by FY 2013
4 27 percent by FY 2014
5 30 percent by FY 2015
6

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

9 *Executive Order 09-18*

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

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

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

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

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

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

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

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

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

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

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

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

⁷ <https://governor.mo.gov/news/executive-orders/executive-order-09-18>

1 *“Missouri state agencies have reduced energy use by more than 22 percent since*
2 *a 2009 executive order directing agencies to reduce their energy use by two*
3 *percent each year.”⁸*

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

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

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

19 A. Yes, that is correct. However, it does depend on EM&V – specifically on the
20 type of questions asked to determine free ridership in customer self-reporting surveys and the
21 person answering the survey. Energy savings from those specific categories of buildings are
22 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.

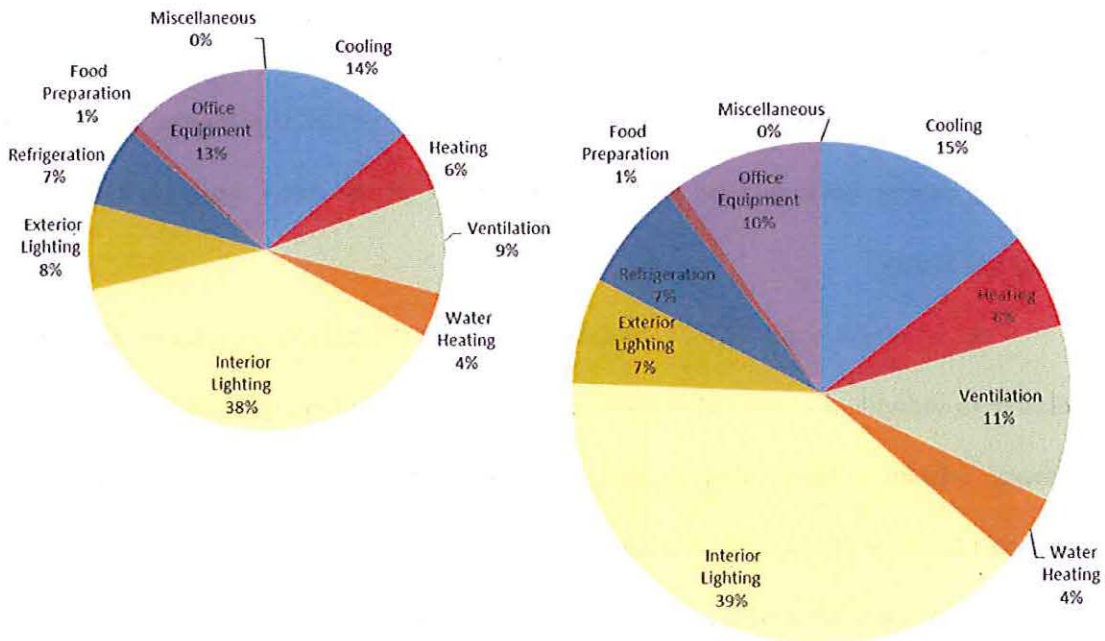
1 as part of the Ameren Missouri energy efficiency program would result in a double counting
2 of energy savings – in terms of building the equivalent of a demand-side resource.

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

5 A. In 2014, the Department of Energy issued proposed new rules for commercial
6 building rooftop air conditioners that are expected to go into effect during MEEIA 2016-
7 2018. The new standards would slash commercial rooftop air conditioner energy use by
8 about 30%. The proposed standards would achieve the largest national energy savings of any
9 standard ever issued by the U.S. Department of Energy.

10 The bad news is that the new baselines would eliminate rooftop air conditioners as a
11 cost effective business energy efficiency measure for Ameren Missouri for MEEIA 2016-
12 2018. Since this federal rule was not on the books at the time of the Ameren Missouri DSM
13 Potential Study, business program potential is overstated for MEEIA 2016-2018. To provide
14 an idea of the magnitude of removing this measure from potential, Volume 3 of the Ameren
15 Missouri DSM Potential Study, page 5-11, Figure 5-7, shows the measure-level potential for
16 commercial building end uses. Figure 5-7 is reproduced below:

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



2

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

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

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**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%

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

4 **Q. Please address the importance of some of the EM&V results in the**
5 **preceding table and how they impact program annual load reduction goals for MEEIA**
6 **2016-2018 relative to MEEIA 2013-2015.**

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

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

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

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

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

19 **XV. CFL COST EFFECTIVENESS FOR MEEIA 2016-2018**

20 **Q. Even though the downward adjustments to MEEIA 2016-2018 for the**
21 **examples presented above are meaningful, doesn’t residential lighting in the form of**
22 **CFLs account for the majority of annual load reductions – similar to MEEIA 2013-**
23 **2015?**

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

10 **Q. What are HOU and how are they measured?**

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

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

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

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

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

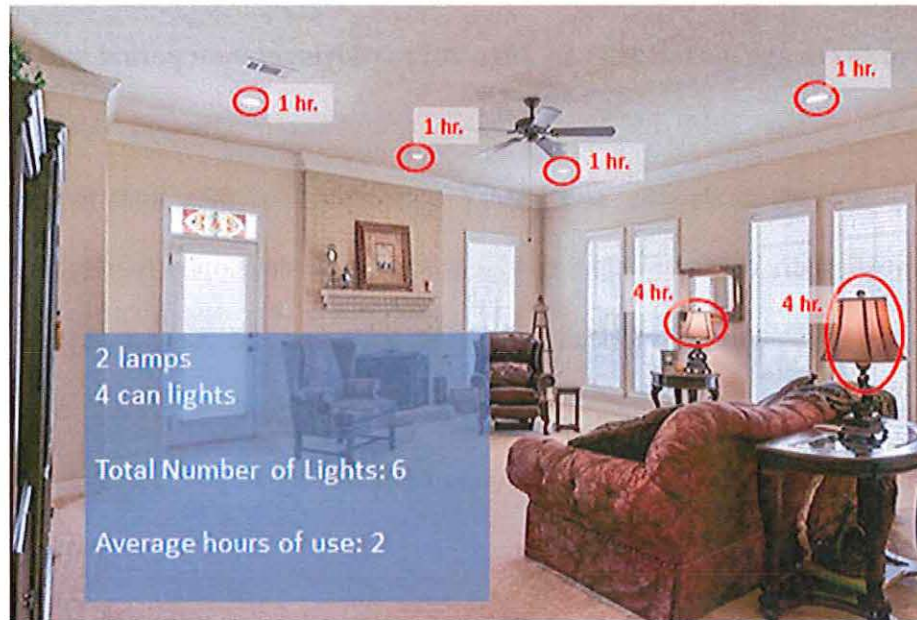
HOU's by Program and Year		
	Lighting	
Room Type	2010	2014
Basement	4.6	1.9
Bathroom	1.9	1.2
Bedroom	1.6	1.2
Closet	0.9	0.4
Dining Room	1.4	1.6
Garage	1.2	1.4
Hallway	1.3	1.1
Kitchen	5.3	3.2
Living Room	4.4	2.4
Office	2.6	1.5
Exterior	2.9	2.5
Overall (Weighted)	2.91	2.2

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

3 **A.** The decline in HOU is directly attributable to large volume of CFLs that
4 Ameren Missouri customers purchased from the Residential Lighting program from 2010 to
5 2014. Approximately 10 million CFLs were purchased by Ameren Missouri customers from
6 the program between 2010 and 2014. From in-home inventories conducted by EM&V
7 auditors, we know that the average Ameren Missouri home has a total of 56 light sockets that
8 are suitable for CFLs. Therefore, moving 10 million CFLs is equivalent to increasing the
9 saturation of CFLs in the average home by $10/56 = 18\%$.

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

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



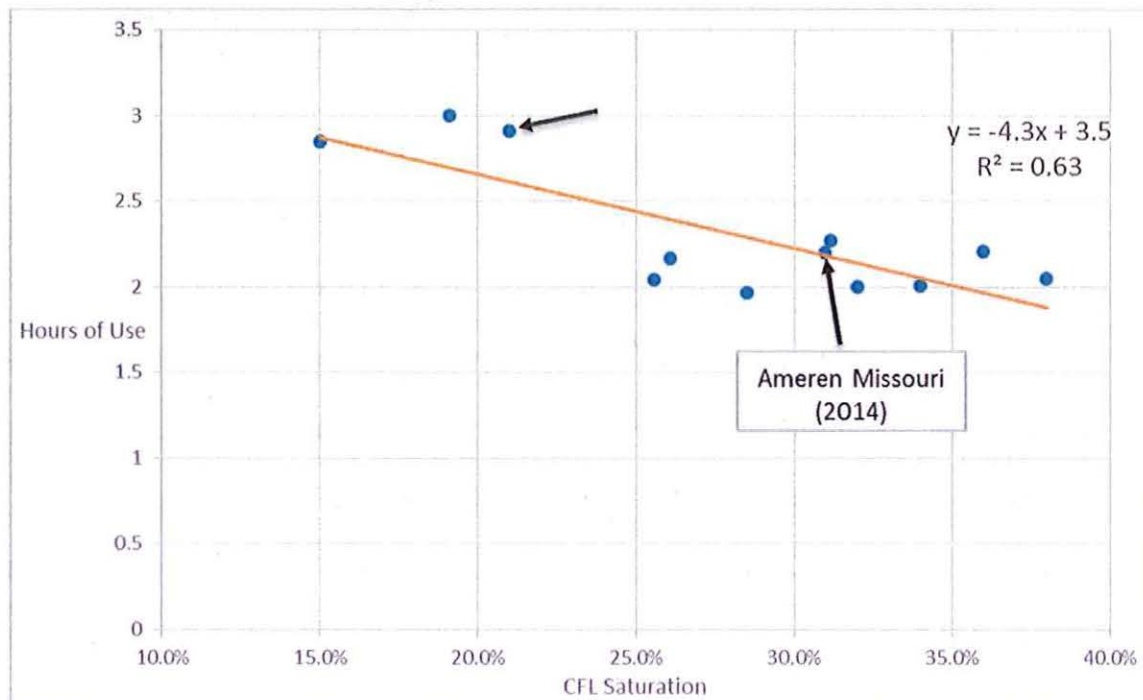
- 3
4 In this illustrative example, assume the customer installed CFLs in the reading lamps in this
5 room in 2010 because that is where the customer usually turns on the lights – hence the
6 largest bill savings from the installation of CFLs. If so, in 2010 the average HOU for the
7 CFLs installed would have been four hours per day. Next assume that in 2014, as a result of
8 the marketing and financial incentives provided by the Ameren Missouri Residential
9 Lighting program that the customer proceeded to install CFLs in the ceiling can lights that
10 the customer uses less frequently at the rate of one hour per day. If so, the new average HOU
11 for CFLs for the entire room, reading lamps and ceiling can lights, becomes two hours per
12 day – a significant drop from the four hours per day calculated in 2010. Repeat this same
13 occurrence in the other rooms of a home and it becomes clear how the HOU for CFLs or

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

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

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

11 **Figure 1. Hours of Use by CFL Saturation**



12
13 **Q. Please interpret Figure 5 as it pertains to residential lighting program**
14 **design for MEEIA 2016-2018.**

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

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

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

1 **Q. Is it common for utility Residential Lighting programs to experience an**
2 **unexplained “ceiling” for the saturation of efficient lighting technologies?**

3 A. Yes, the situation is very common. I will provide two examples. First, in the
4 EM&V impact report on the 2012 Ameren Missouri Residential Lighting program, the
5 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

6 The Cadmus Group, Inc. / Energy Services Division 8

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

9 Second, Massachusetts is a state that had been running Residential Lighting programs
10 offering CFLs for longer than Ameren Missouri. In 2012, the Massachusetts Residential
11 Lighting EM&V contractor issued a report on the “*Results of the Massachusetts*
12 *Onsite Compact Fluorescent Lamp Surveys.*” Page IV of the Massachusetts report states the
13 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

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

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

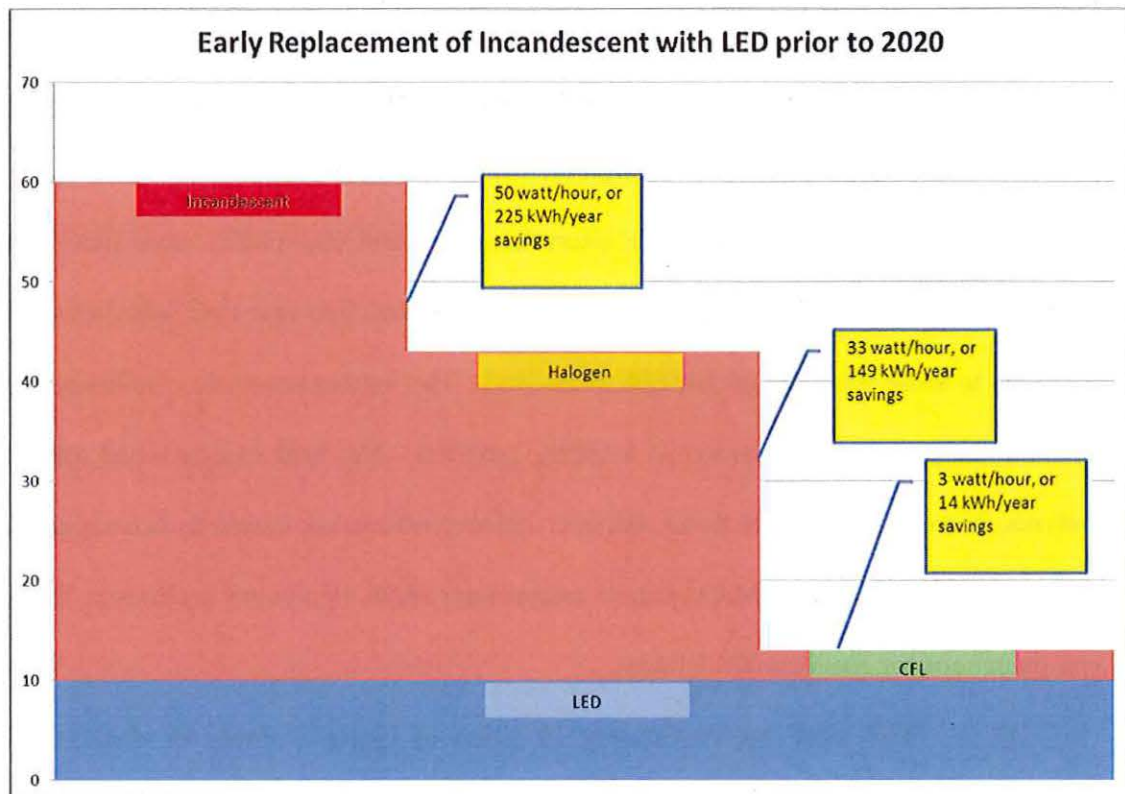
7 A. It is important because intervenors' rebuttal testimonies state that MEEIA
8 2016-2018 Residential Lighting program designs and annual first year load reductions should
9 be similar to those achieved for MEEIA 2013-2015. The implication is that the future should
10 resemble the past for the Residential Lighting program. The hard evidence and associated
11 analyses, however, show that more stringent lighting efficiency standards accompanied by
12 Ameren Missouri specific EM&V impact assessments show significant declines in first year
13 load reductions for Residential Lighting.

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

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

1 **Q. Please explain.**

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



4
5 The column under the word "incandescent" shows a highlighted area with the energy savings
6 in going from a 60-watt incandescent light bulb to a CFL is approximately 47 watts. Hence,
7 this is the reason why CFLs were the foundation on which all electric utility energy
8 efficiency programs were developed.

9 EISA, however, mandated the phase out of most standard incandescent lighting
10 technology as of January 1, 2014. This should not be interpreted to imply that CFLs are the
11 only lighting technology that complies with EISA between 2014 and 2020. There is a
12 window of opportunity to consider the continued promotion of cost effective CFLs between
13 2014 and 2020 due to the fact that EISA-compliant halogen light bulbs are an option for

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

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

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

11 **...If the final rule does not produce savings that are greater than or equal to**
12 **the savings from a minimum efficacy standard of 45 lumens per watt,**
13 **effective beginning January 1, 2020, the secretary shall prohibit the sale of**
14 **any general service lamp that does not meet a minimum efficacy standard of**
15 **45 lumens per watt.⁹**

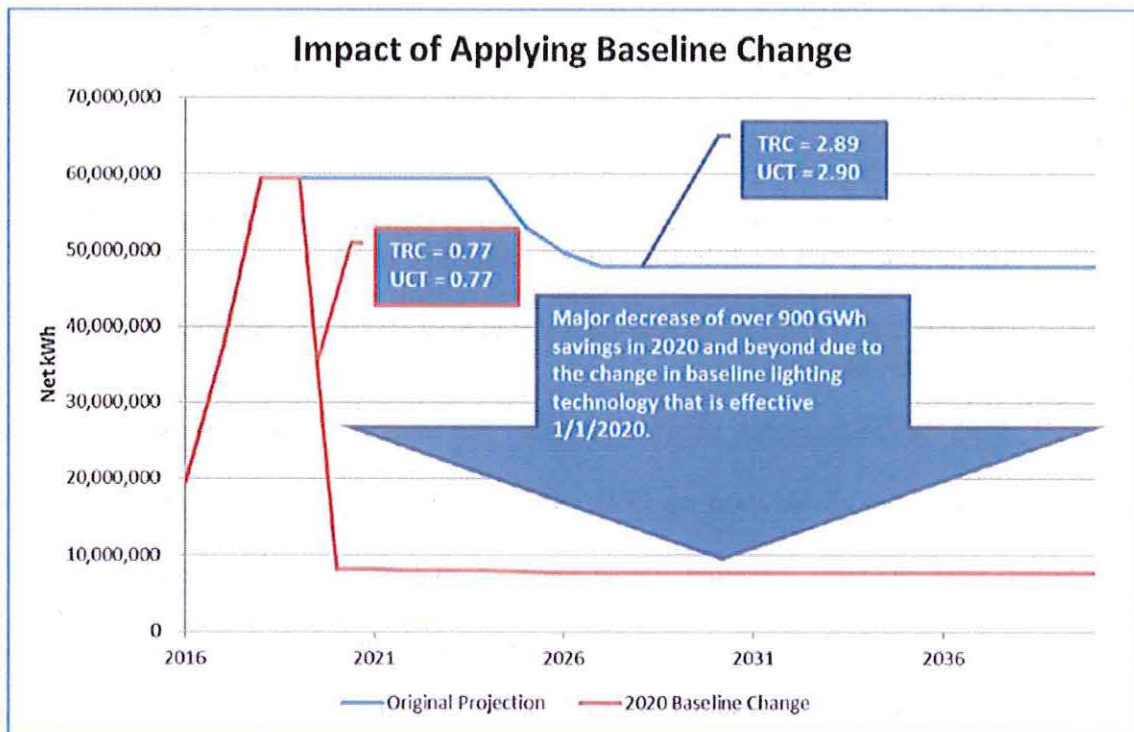
16 With this background, the column under the word “CFL” represents the incremental
17 energy savings associated with an LED with a CFL rather than a halogen baseline. The
18 savings with a CFL baseline rather than a halogen baseline represent 3 watts.
19 Compare/contrast 2020 Residential Lighting program average light savings of 3 watts to
20 2013 Ameren Missouri Residential Lighting average watt savings of 47 watts. It becomes
21 readily apparent why Residential Lighting program savings are declining rapidly due solely
22 to EISA lighting mandates.

23 **Q. Is Mr. Mosenthal's claims (his rebuttal testimony on page 23, lines 18-19),**
24 **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>

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

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

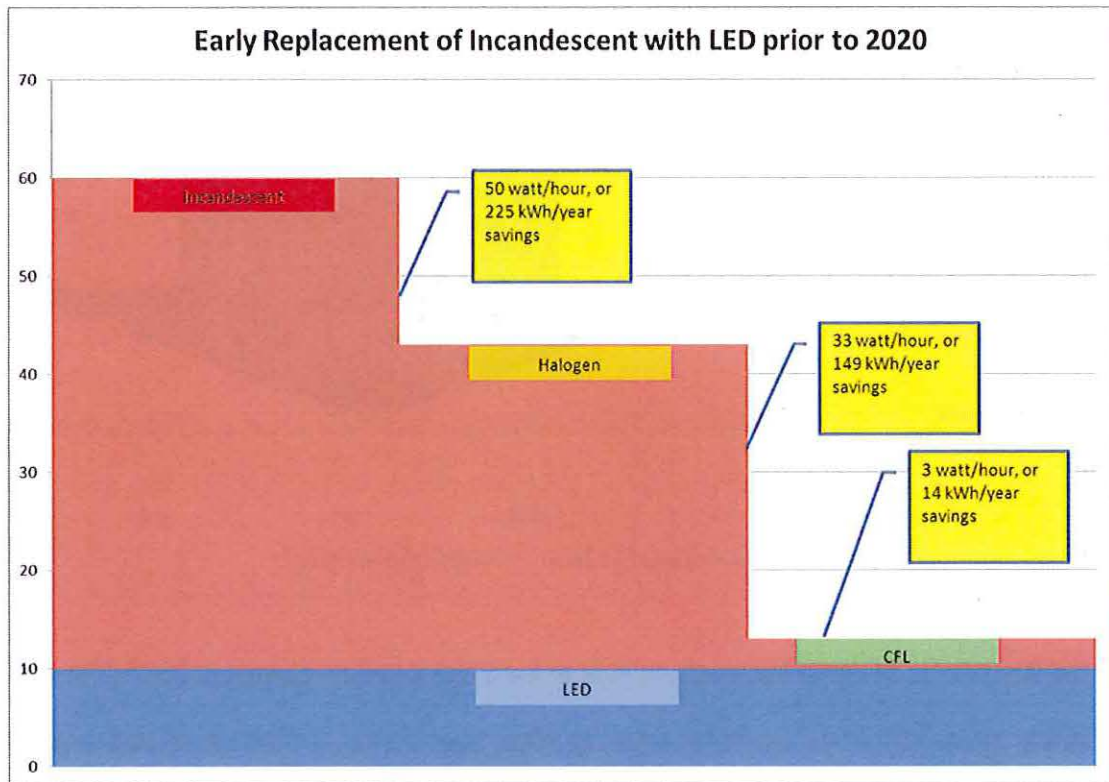


8

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

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

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

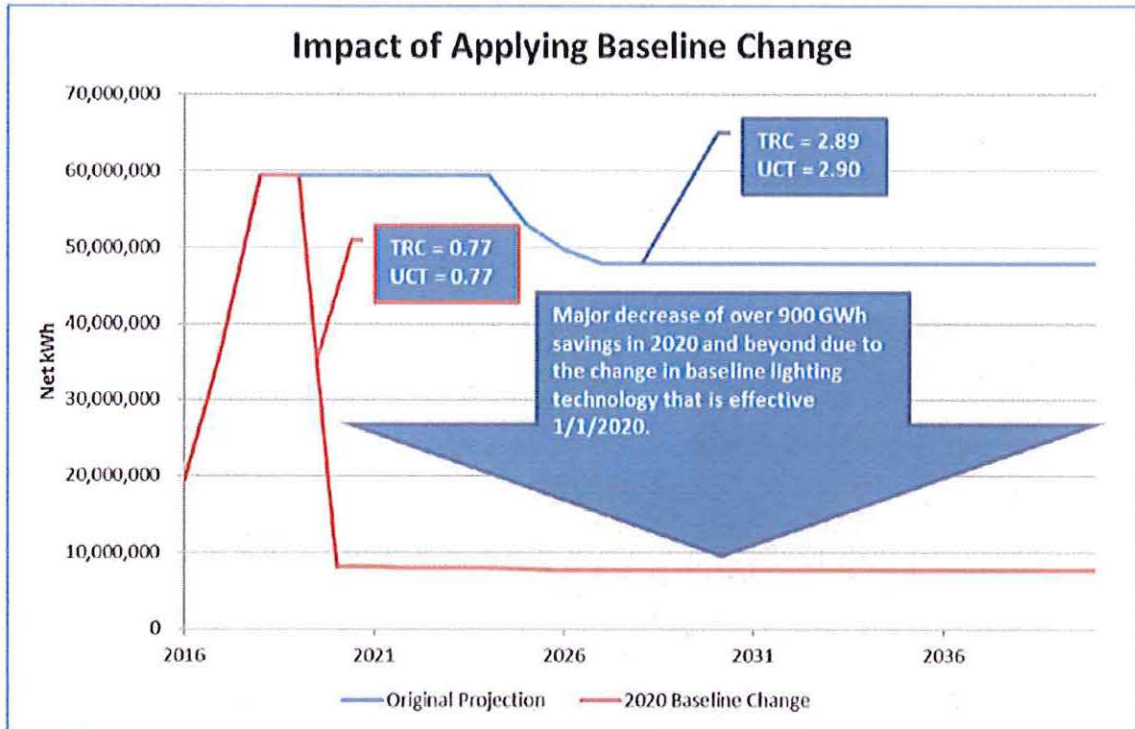


4 **Q.** On page 24, lines 1-4, Mr. Mosenthal indicates that switching from CFLs
5 to LEDs should increase savings. Is this correct?

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

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

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



1

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

6 Q. On page 24, lines 5-10, Mr. Mosenthal claims, "It also appears from
7 Ameren's DSMore files that they are not performing the cost effectiveness screening
8 properly. For example, the DSMore cost-effectiveness ratio for 30-watt CFLs is 0.34.
9 However, this ratio appears to be due in large part to an assumed cost of \$9.27 per bulb.
10 A quick web search tells you that this amount is more than double the actual price of a
11 30-watt CFL and more in line with current LED costs, as shown by the NEEP study."
12 Please comment.

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



7

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

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

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

4 A. The statement is correct with the addition of some qualifiers. It is true that
5 CFLs have much longer lives than the EISA-compliant halogens. It is also true that the
6 “NPV” of the CFLs is less than the “NPV” of the EISA-complaint halogen alternative, over
7 the life of the CFL. However, as mentioned earlier, the effective life of the CFL as the
8 efficient technology, and not the base technology, is quickly coming to an end as the
9 imminent EISA baseline change of 2020 comes into play. On a first cost basis, CFLs
10 typically are not cheaper than halogens. Again, using the internet search of a local supplier
11 as a reference point, the least expensive halogen to be found was priced at slightly less than
12 \$1.75/bulb (requires a 4-pack purchase) and the least expensive CFL to be found was priced
13 at slightly less than \$2.00/bulb (again, requires a 4-pack purchase).

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

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

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

1 cited above that EISA is taking longer than expected to phase in and that halogen bulbs
2 will form a significant portion of the post-EISA market contradicts this assumption. In
3 2020, even though the halogen bulbs may be phased out by EISA, this phase-out can be
4 expected to happen gradually over the course of a few years and should not be applied
5 to the 2016-2018 installations.” Do you agree with these statements?

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

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

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

20

1 **Q. Do you agree with Mr. Mosenthal?**

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

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

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

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

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

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

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

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

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

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

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

14 A. No. Mr. Mosenthal's assessment of the Ameren Missouri MEEIA Cycle
15 2016-2018 measure screening and cost effectiveness analysis is stereotypical in nature.
16 Clearly this type of stereotyping has no place in an evidentiary hearing, nor does Mr.
17 Mosenthal's assumptions and statements about the validity and accuracy of the Ameren
18 Missouri MEEIA Cycle 2016-2018 measure screening and cost effectiveness analysis based
19 on his lack of understanding of the DSMore modeling process for measure, program and
20 portfolio cost effectiveness.

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

3 A. Yes. Mr. Mosenthal states, "... there are significantly more savings going
4 from an incandescent or halogen incandescent to a CFL than going from a CFL to an LED."
5 While this statement is true, Mr. Mosenthal appears to be making an incorrect assumption
6 about a baseline change when an LED is considered as the efficient technology versus a CFL.
7 To the contrary, the same "halogen incandescent" is the baseline from 2016 until the baseline
8 is changed by codes and standards, which in this case is the EISA rule which changes the
9 baseline to CFL beginning in 2020. To be clear, the production of standard "incandescent"
10 bulbs is no longer possible under EISA rules and the standard incandescent bulbs not
11 considered as the baseline for any of the analysis work supporting the MEEIA Cycle 2016-
12 2018 filing.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

12 **Q. Describe the transfer process.**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

19 A. The HEP program did not pass the cost effectiveness test for MEEIA 2016-
20 2018.

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

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

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

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

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

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

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

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

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

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

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

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

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

14 **XVII. AMEREN MISSOURI PROGRAM DESIGN RELATIVE**
15 **TO DRAFT EPA CPP**

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

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

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

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

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

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

17 A. Yes. That is correct.

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

20 A. Yes.

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

2 **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	ConEd	ICF International	2013	2013-2018	32%	16%	5.3%	1.7%	
Michigan	Michigan P&C	GDS Associates	2013	2013-2023	33.8%	15%	3.1%	1.4%	
New Jersey	Rutgers University	BeamNOC Utility Solutions	2012	2010-2016	12.9%	5.90%	1.8%	0.9%	
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	29%	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 Nasant	2012	2013-2018	27.2%	17.3%	4.5%	2.9%	
Tennessee	Tennessee Valley Authority	Global Energy Partners	2011	2009-2030	24.9%	19.6%	1.1%	0.9%	
					Range				0.8% - 2.9% per year
					Average				1.5% Per Year

3

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

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

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

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

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

6 A. The following matrix is a synopsis of my high level review of factors that
7 have a material effect on the magnitude of MAP average annual load reduction percentage
8 used by the EPA in calculating an average annual load reduction of 1.5% for Building
9 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

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

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

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

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

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

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

3 A. Yes.

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

7 A. Yes.

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

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

15 **XVIII. MEEIA RULE ANNUAL LOAD REDUCTION GUIDELINES**

16 **Q. Mr. Woolf also uses Figure 3.3 to compare the Ameren Missouri MEEIA**
17 **2016-2018 annual load reductions to the MEEIA rule guidelines. Please comment.**

18 A. Since the MEEIA rule guidelines ultimately result in annual load reductions of
19 1.9% per year, they are more stringent than the proposed EPA CPP rules. The MEEIA
20 annual load reduction guidelines have no analytical basis. Since the MEEIA guidelines
21 exceed both technical and economic potential for Ameren Missouri, the MEEIA guidelines
22 do not provide a credible benchmark for the Ameren Missouri MEEIA 2016-2018 portfolio.

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

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

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

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

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

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

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

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

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

13 **Q. Is it true that for 2013 and 2014 that Ameren Missouri exceeded the 2013**
14 **and 2014 load reduction targets and did this at less than the MEEIA plan 2013 and**
15 **2014 budgets?**

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

21 **Q. Please show in tabular form the MEEIA 2016-2018 and MEEIA 2013-**
22 **2015 budgets, annual load reductions, and comparisons to actual performance.**

1 A. See table below¹⁰.

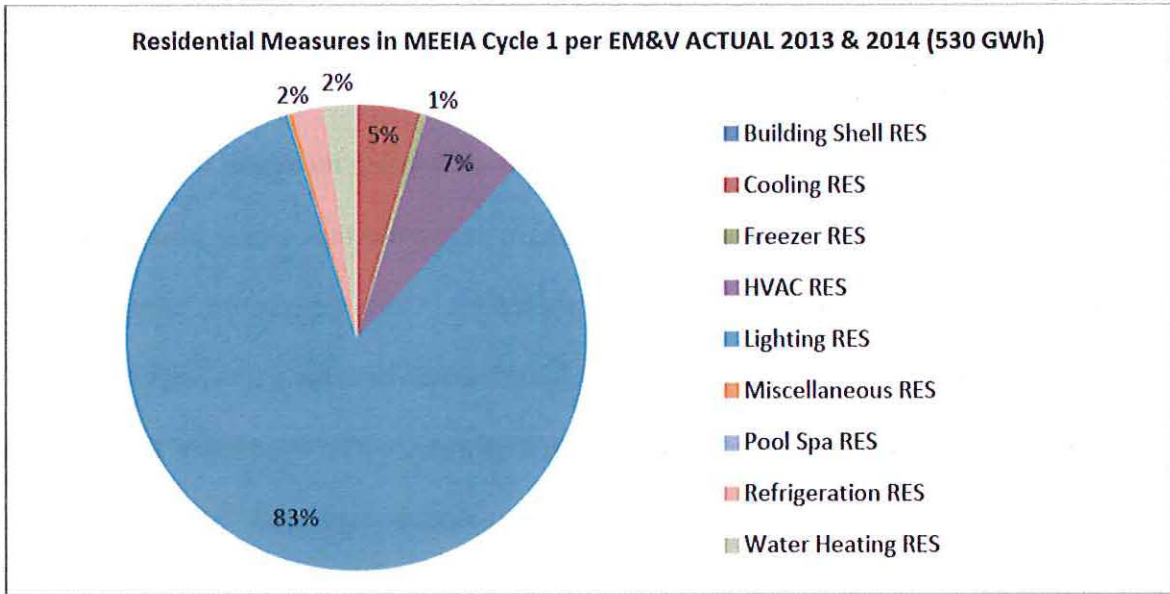
Ameren Missouri Energy Efficiency Programs	MEEIA Cycle 1			3 Yr Total	MEEIA Cycle 2			3 Yr Total	
	2013	2014	2015	3 Yr Total	2016	2017	2018	3 Yr Total	
Portfolio ACTUAL COSTS (\$Millions)	\$ 34.432	\$ 41.518							
Portfolio PLANNED COSTS (\$Millions)	\$ 36.117	\$ 47.121	\$ 64.088	\$ 147,325	\$ 42,828	\$ 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%

3 Q. Please reconcile the differences. Start with the reconciliation of achieved
4 2013 and 2014 load reductions and associated budgets with MEEIA 2013-2015 plans.

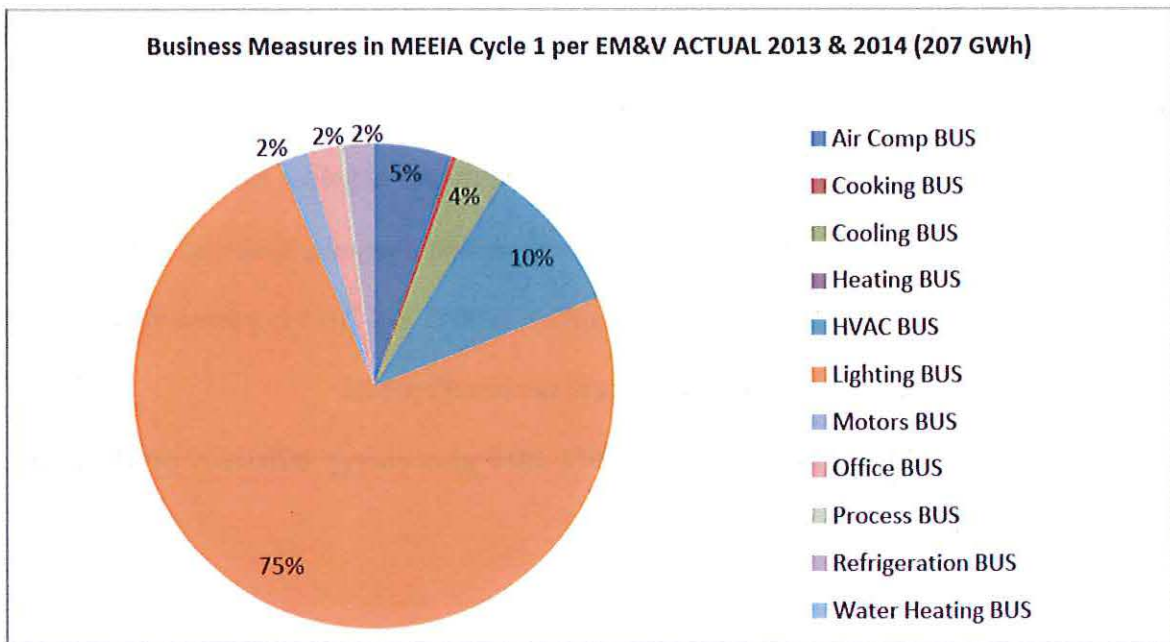
5 A. In order to understand the difference in plan versus actual for 2013 and 2014,
6 it is necessary to know the energy efficiency product mix for both years. The following pie
7 charts show where the energy savings came from in 2013 and 2014.¹¹

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.



1



2

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

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

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

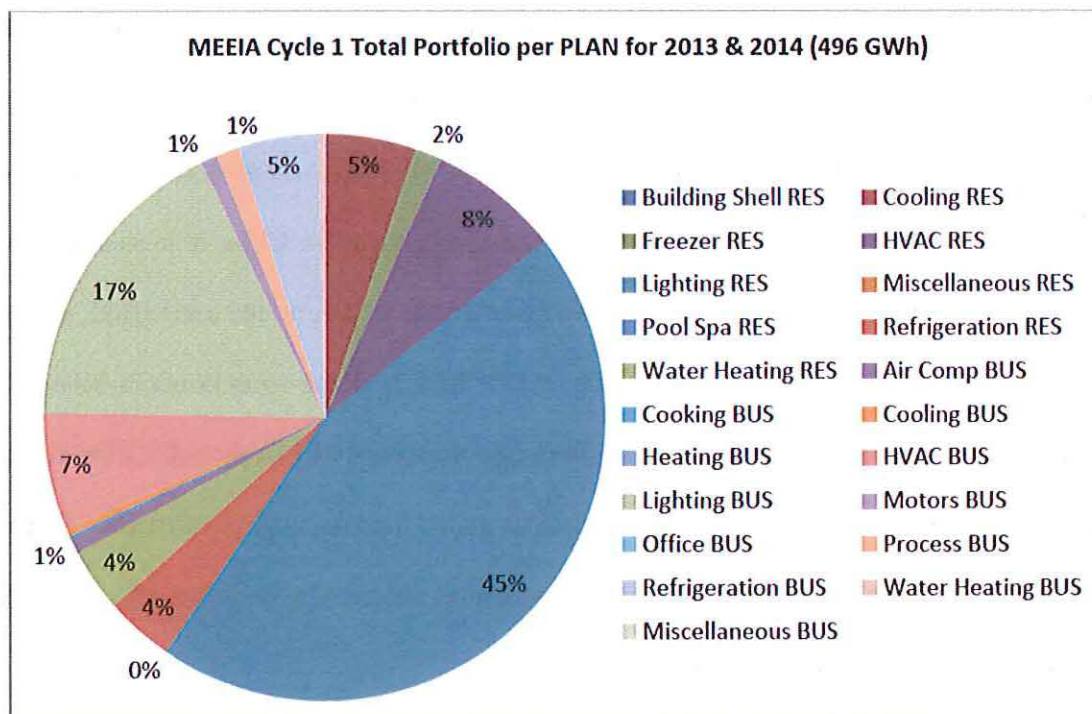
4 A. Ameren Missouri tried to make it very clear that energy efficiency program
5 implementation is primarily a marketing opportunity. Consequently, any plan that was put
6 together in 2012 for implementation in 2013-2015 would be subject to whatever changes the
7 marketplace dictates. In other words,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

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

16 **Q. What was the MEEIA 2013-2015 plan energy efficiency product mix for**
17 **2013 and 2014?**

18 A. See the pie chart below.¹²

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



1

2 **Q. If it was possible for Ameren Missouri to exceed 2013 and 2014 load**
 3 **reduction targets at below budget by focusing on lighting opportunities, should it be**
 4 **reasonable to assume that Ameren Missouri can do the same thing for the MEEIA**
 5 **2016-2018 implementation plan?**

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

9 1. CFLs will not be a cost effective option for Ameren Missouri in MEEIA
 10 2016-2018. The removal of CFLs is a tremendous challenge to address in program planning
 11 for MEEIA 2016-2018. Residential CFLs accounted for approximately 60% of total
 12 (Residential + Business) kWh savings for 2013 and 2014. Not only were CFLs in the
 13 MEEIA 2013-2015 Residential Lighting program, they were significant components of the
 14 Efficient Products, Low Income, Home Energy Performance and New Home programs.

1 An additional point that needs to be made about CFLs concerns the volume of CFLs
2 that can be sold in a given year. Retailers generally sold the majority of CFLs in 4-pack and
3 6-pack packages. After the buy-down from Ameren Missouri, a 6-pack CFL package was
4 priced in the \$2.00 range. Needless to say, the ability to move CFLs in 6-pack packages
5 increased the volume of CFLs sold in the 2013 and 2014. LEDs, on the other hand, are more
6 expensive than CFLs on a first cost basis. After the buy-down from Ameren Missouri, a
7 standard LED should be priced in the \$5.00 range. Retailers will likely sell LEDs in single
8 packages – perhaps in multi-packs but likely less than a 6-pack package of LEDs. Hence, it
9 will not be possible to move the volume of residential efficient lights in MEEIA 2016-2018
10 as were moved in MEEIA 2013-2015.

11 2. Another unique aspect of the Residential Lighting program was the unique
12 opportunity that existed only in 2013. Per the EISA legislation, 2013 was the last year for
13 the manufacture of standard 60-watt incandescent light bulbs. This presented a one-time
14 only opportunity for Ameren Missouri to shift planned sales of CFLs from 2014 and 2015 to
15 2013 to take advantage of the larger energy savings attributable to CFLs in 2013 – thereby
16 maximizing benefits for Ameren Missouri customers. Since the phase out of the manufacture
17 of standard incandescent light bulbs is now complete, this same opportunity will not be
18 replicated in MEEIA 2016-2018.

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

1 3. MEEIA 2013-2015 EM&V results provide the basis for making changes to
2 key drivers for energy savings for key measures going forward. For example, we expect
3 average HOU for residential efficient lighting to decline from 2.9 in 2013 to 2.2 in 2014 to
4 1.8 beginning in 2016. This change alone would reduce the 2013 Residential Lighting
5 program first year savings by $((2.9-1.8)/2.9) = 38\%$.

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

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

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

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

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

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

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

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

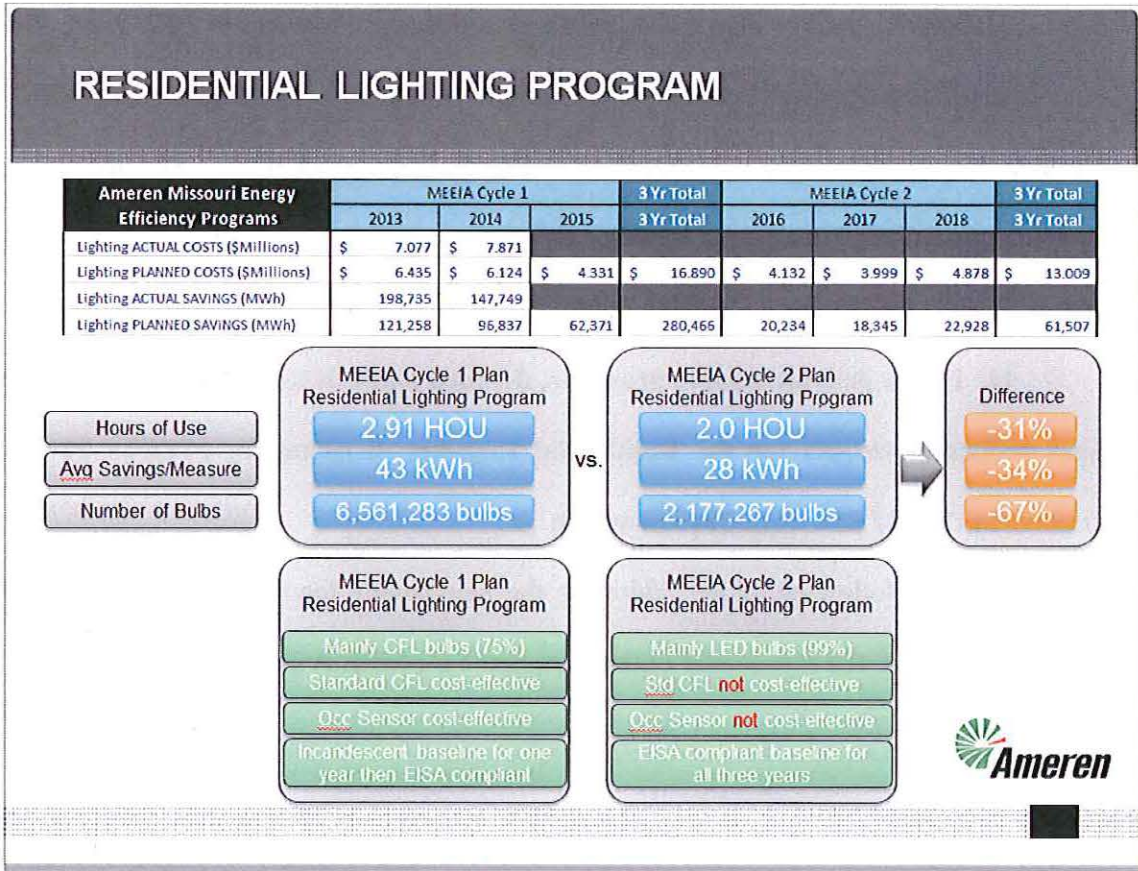
21 The second is that for Business linear fluorescent lighting, Ameren Missouri received
22 authorization from the Commission to use a T-12 baseline for a limited time in MEEIA
23 2013-2015.

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

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

9 A. The following slide¹³ addresses the key drivers for differences in annual load
10 reduction goals for the Residential Lighting program for MEEIA 2016-2018.

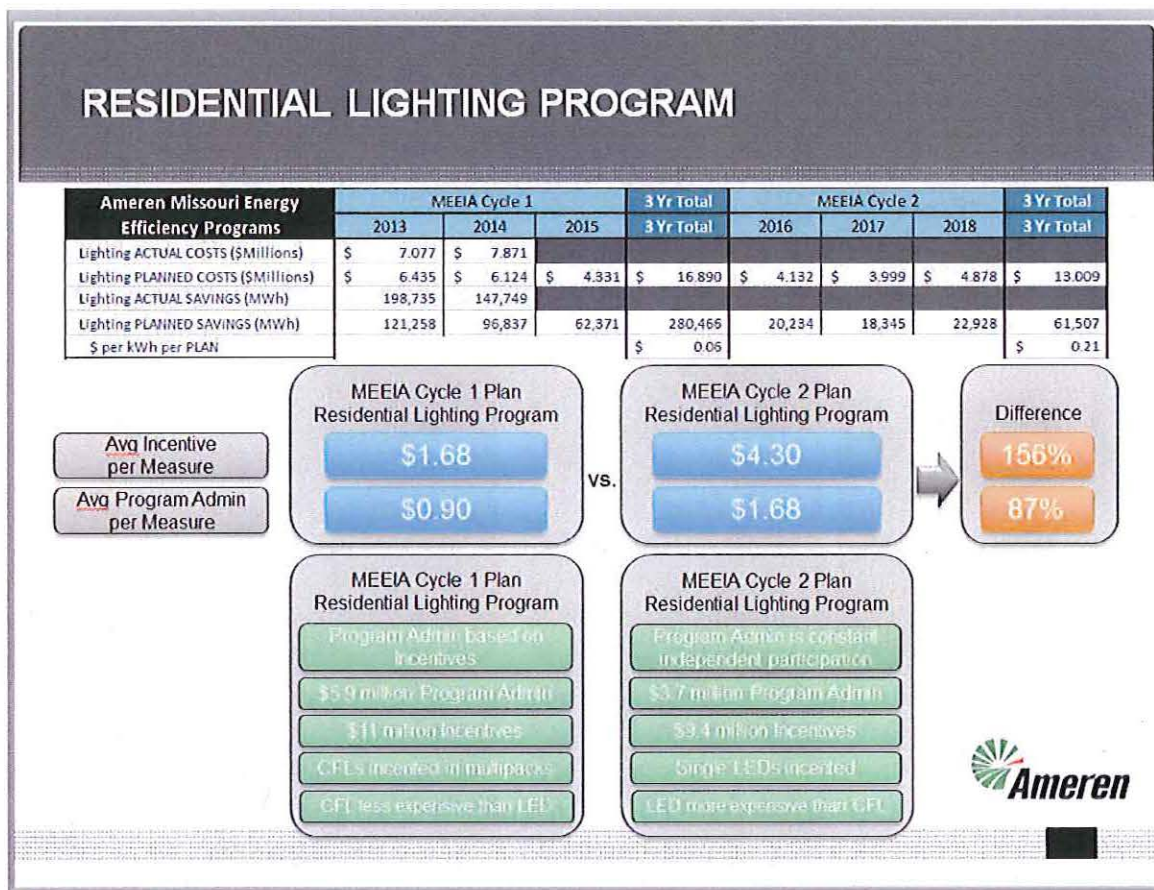
¹³ Costs shown reflect the program administration and incentive costs. Portfolio costs or below-the-line costs are not included in this data. Savings reflect energy savings at the meter.



1

2 The next slide¹⁴ 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.

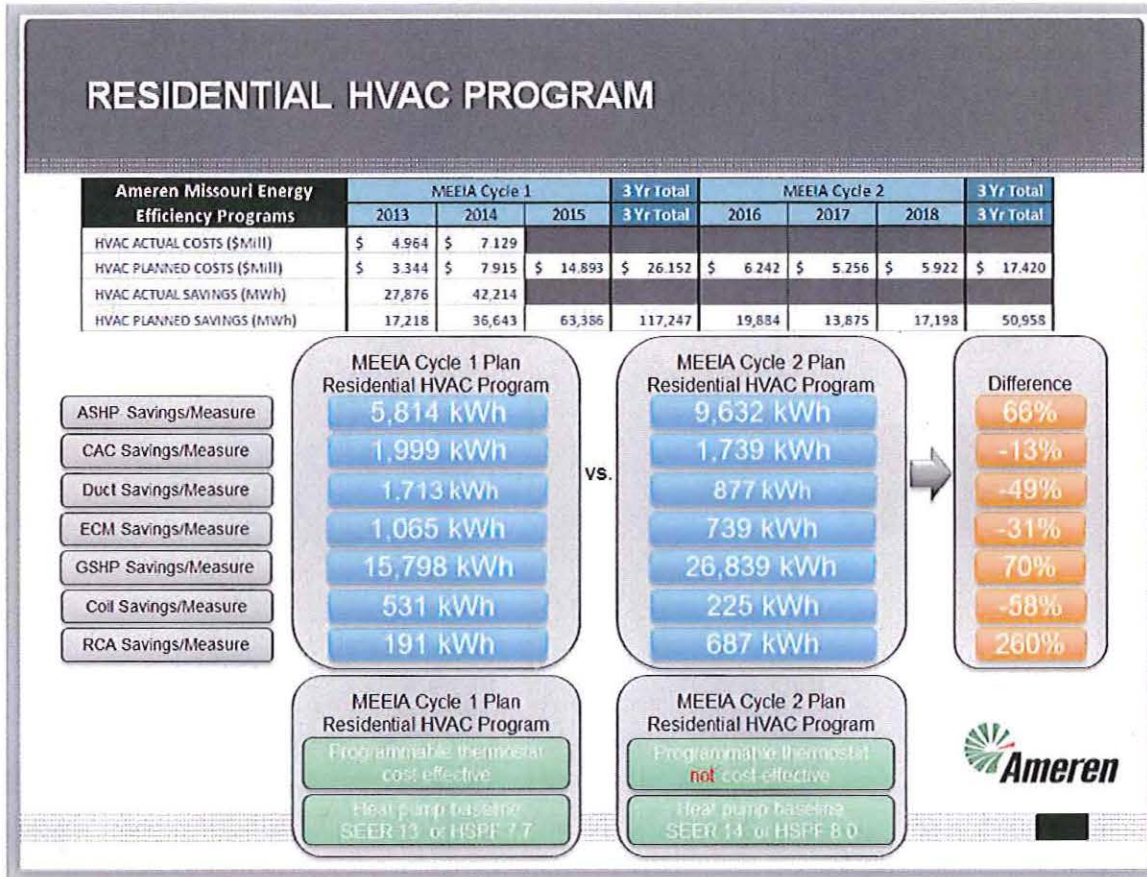


1

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

5 **A. The following slide¹⁵ addresses the key drivers for differences in annual load**
 6 **reduction goals for the Residential HVAC program for MEEIA 2016-2018.**

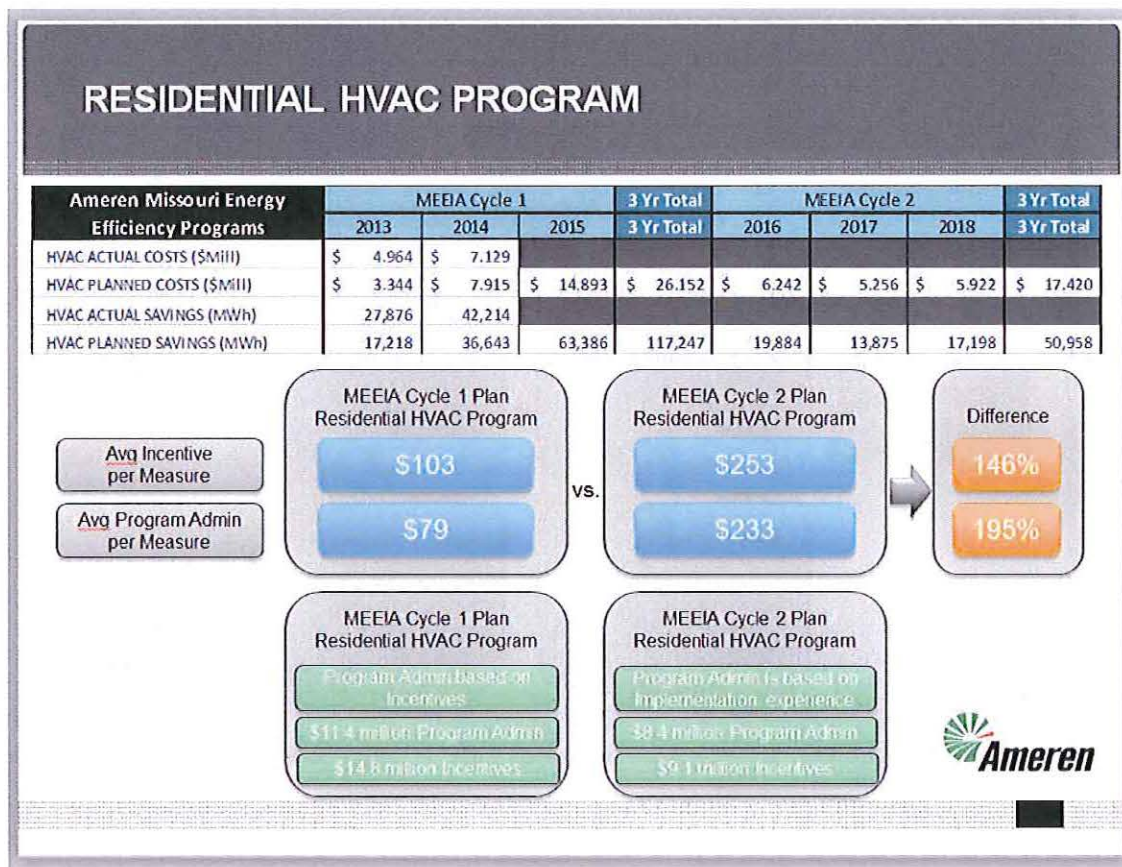
¹⁵ Costs shown reflect the program administration and incentive costs. Portfolio costs or below-the-line costs are not included in this data. Savings reflect energy savings at the meter.



1

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

1 The next slide¹⁶ includes differences in budgets:



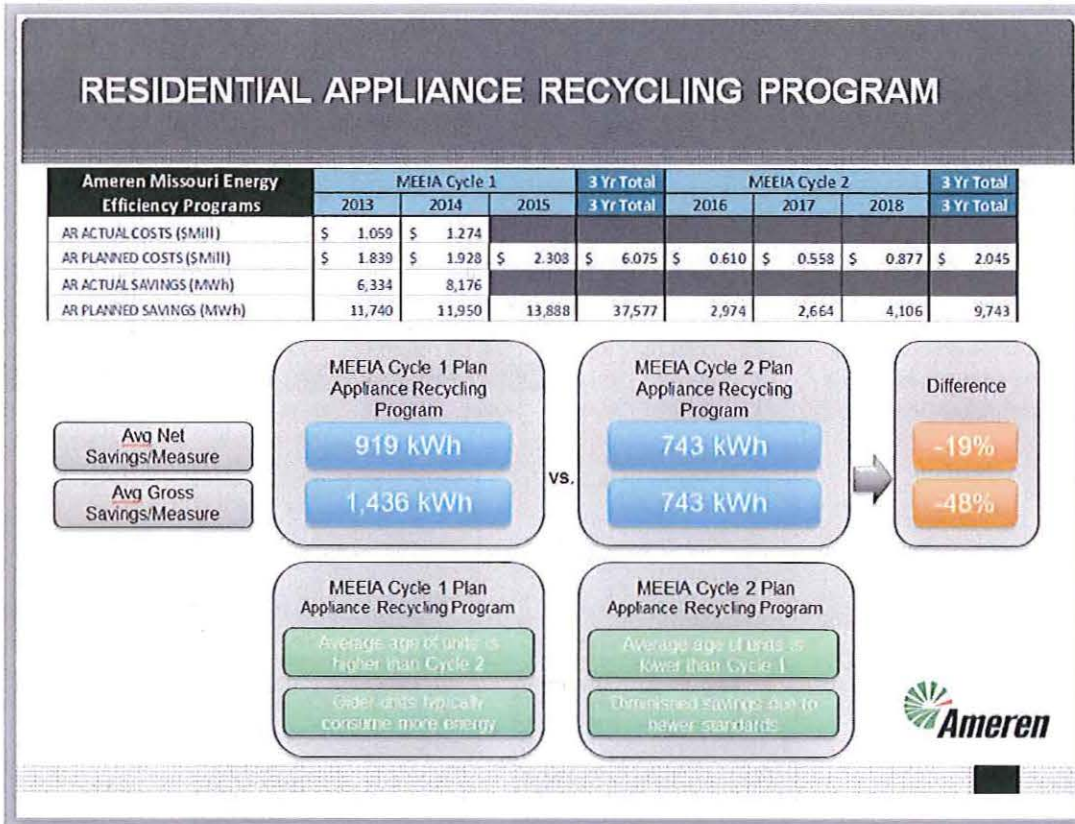
2

3 **Q. Please provide a more granular, detailed analysis underlying the budget and**
 4 **load reduction targets for the Residential Appliance Recycling program for MEEIA**
 5 **2016-2018 relative to the MEEIA 2013-2015 program.**

6 **A. The following slide¹⁷ addresses the key drivers for differences in annual load**
 7 **reduction goals for the Residential Appliance Recycling program for MEEIA 2016-2018.**

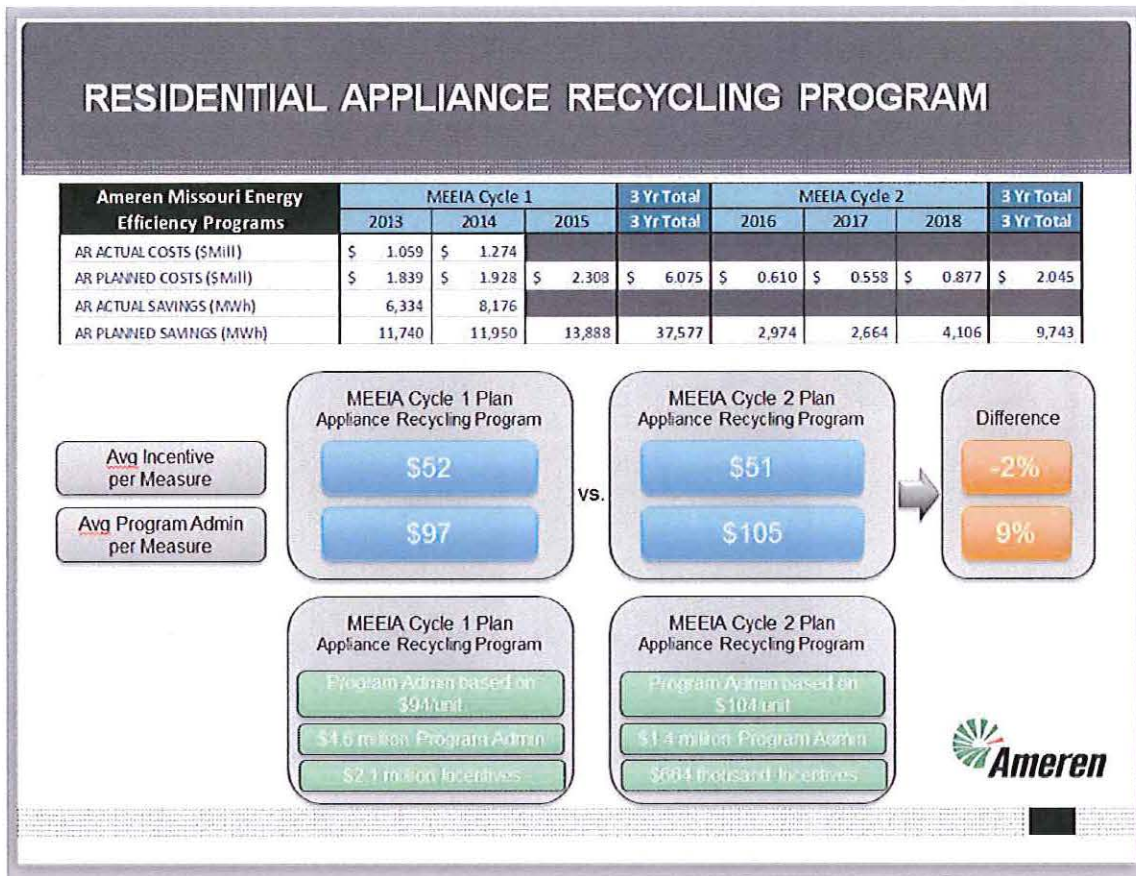
¹⁶ Costs shown reflect the program administration and incentive costs. Portfolio costs or below-the-line costs are not included in this data. Savings reflect energy savings at the meter.

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.



1

1 The next slide¹⁸ shows differences in budgets:



2

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

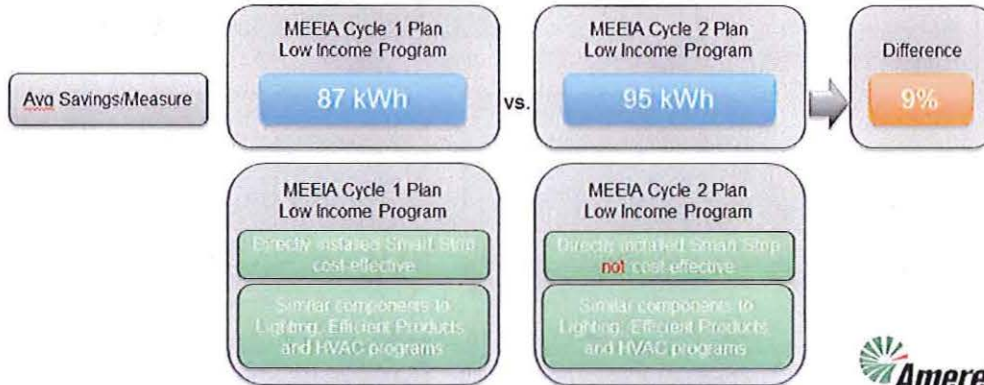
6 **A. The following slide¹⁹ addresses the key drivers for differences in annual load**
7 **reduction goals for the Residential Low Income program for MEEIA 2016-2018.**

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.

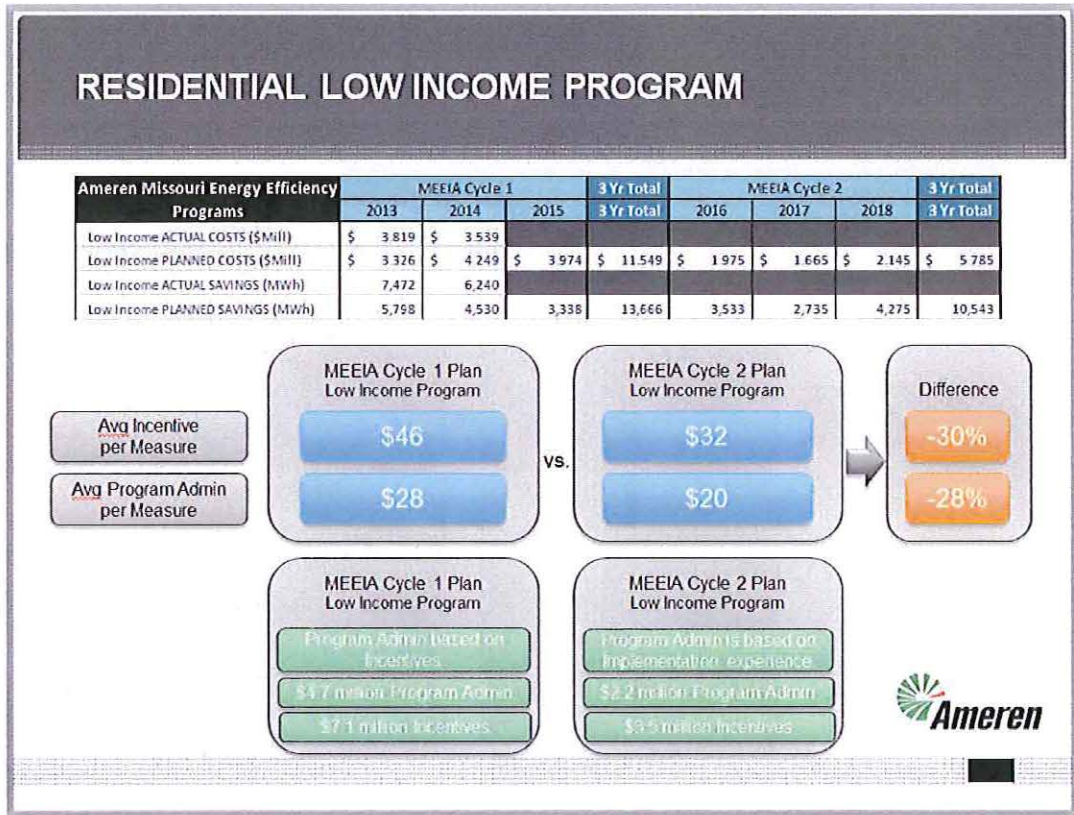
¹⁹ Costs shown reflect the program administration and incentive costs. Portfolio costs or below-the-line costs are not included in this data. Savings reflect energy savings at the meter.

RESIDENTIAL LOW INCOME PROGRAM

Ameren Missouri Energy Efficiency Programs	MEEIA Cycle 1			3 Yr Total	MEEIA Cycle 2			3 Yr Total
	2013	2014	2015	3 Yr Total	2016	2017	2018	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



1 The next slide²⁰ shows differences in budgets:



2

3 **Q. Please provide a more granular, detailed analysis underlying the budget and**
 4 **load reduction targets for the Residential Efficient Products program for MEEIA 2016-**
 5 **2018 relative to the MEEIA 2013-2015 program.**

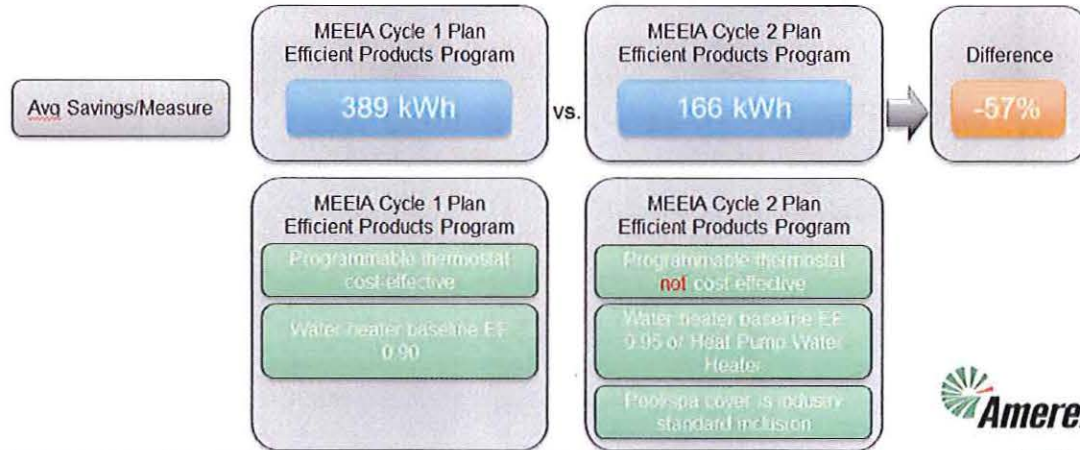
6 **A. The following slide²¹ addresses the key drivers for differences in annual load**
 7 **reduction goals for the Residential Efficient Products program for MEEIA 2016-2018.**

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.

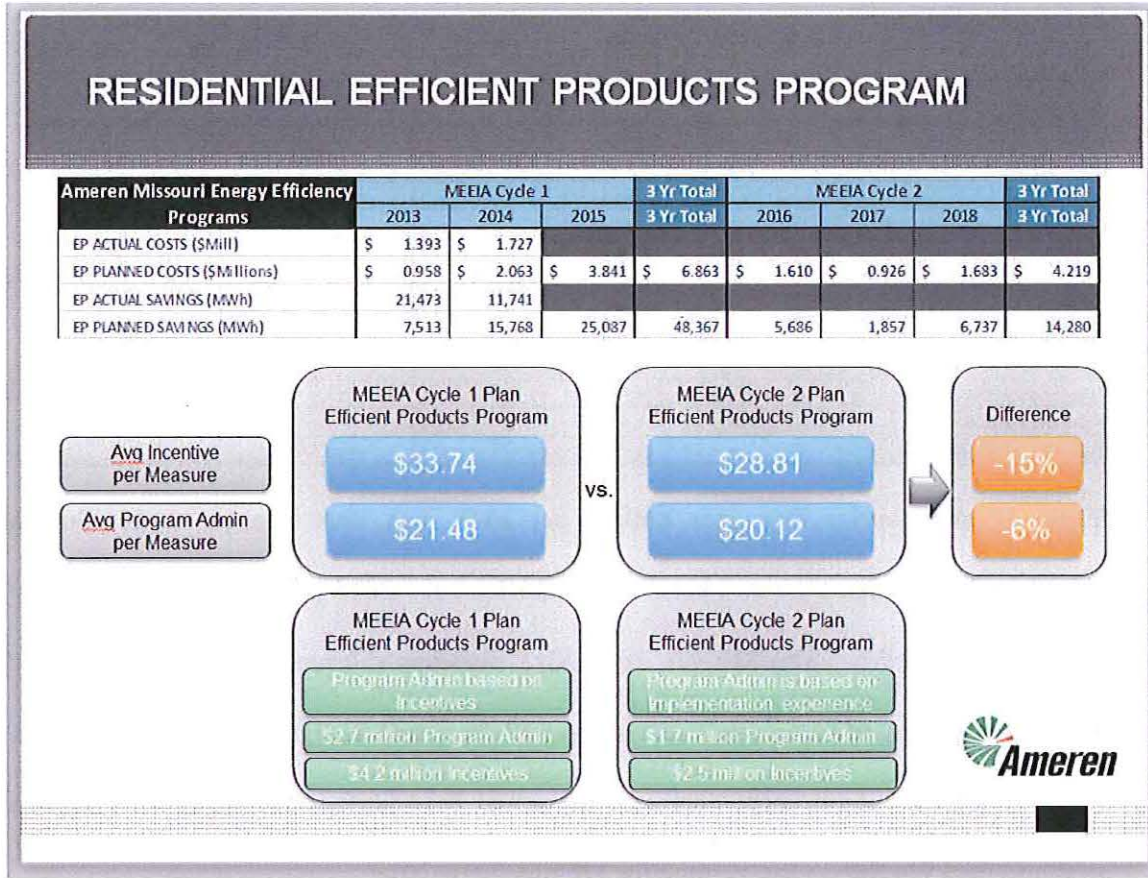
RESIDENTIAL EFFICIENT PRODUCTS PROGRAM

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



1

1 The next slide²² shows differences in budgets:



2

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

5 **A.** There are two important considerations to keep in mind. First, the Business
 6 portfolio does not have the CFL issue. Second, the Business portfolio is expected to produce
 7 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.

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

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	
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%

3
4 There is one metric, first year dollars per kWh cost, that appears to be fluctuating
5 significantly between the two plans. The MEEIA 2013-2015 plan budget had a three-year
6 value of \$0.17/kWh. The MEEIA 2016-2018 plan has a three-year value of \$0.26/kWh.
7 This represents a 56% increase in cost per kWh absent a significant event such as the
8 removal of CFLs. Even more notable is the actual 2014 performance of \$0.10/kWh relative
9 to the \$0.26/kWh three-year average for MEEIA 2016-2018.

10 **Q. Please explain the relative difference.**

11 **A.** There are three reasons that explain the difference. The first point to note is
12 that the Business incentive budget on a \$/kWh basis has almost doubled from a range of
13 \$0.07/kWh to \$0.10/kWh to \$0.18/kWh for MEEIA 2016-2018. This is for several reasons.
14 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.

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

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

16 The third point is that federal and state office buildings and schools have been
17 considered 100% freeriders for MEEIA 2016-2018 as a result of federal and Missouri
18 mandates on building energy efficiency requirements. These mandates were either not in
19 effect or not explicitly defined in prior Ameren Missouri DSM Potential studies. Yet, federal
20 and state office buildings and schools may participate in Ameren Missouri MEEIA 2016-
21 2018 business programs. This means that Ameren Missouri must budget for providing
22 financial incentives for federal and state office buildings and schools to participate in
23 Ameren Missouri programs but may not claim energy savings associated with those budgets.

1 Again, this is based on the explicit federal and Missouri directives I discussed at length
2 previously in my testimony. The net effect is that approximately 25,000 MWh of Business
3 load reduction potential spread across MEEIA 2016-2018 has been removed from the
4 MEEIA 2016-2018 plan but an incentive budget of approximately $\$0.18 \times 25,000,000 \text{ kWh} =$
5 $\$4,500,000$ has been added to the MEEIA 2016-2018 budget to account for the fact that
6 federal and state office buildings and schools may participate in the Ameren Missouri
7 MEEIA 2016-2018 energy efficiency programs.

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

10 A. The incentive budget, as discussed, accounts for $\$0.18/\text{kWh}$ of the $\$0.26/\text{kWh}$
11 budget. That is an additional $\$4,500,000$ in incentives for federal and state office buildings
12 and schools for which there are no commensurate energy savings due to the assumption of
13 100% free ridership. An additional $\$4,500,000$ spread over a total MEEIA 2016-2018
14 Business cumulative portfolio of 260,716 MWh equates to an additional $\$0.017/\text{kWh}$
15 incentive adder. The total incentive component becomes $\$0.18/\text{kWh} + \$0.017/\text{kWh} =$
16 $\$0.197/\text{kWh}$. The differential with $\$0.26/\text{kWh}$ is $\$0.26/\text{kWh} - \$0.197/\text{kWh} = \$0.063/\text{kWh}$
17 for program administration costs.

18 **Q. What are your final thoughts about the reconciliation of the MEEIA**
19 **2013-2015 plan and actual load reductions and budgets to the same for MEEIA 2016-**
20 **2018?**

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

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

9 **XX. CONCLUSIONS**

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

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

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

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

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

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

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

1 assumptions and methodologies. However, when the results of the same studies and analyses
2 do not align with the perceptions of stakeholders, stakeholders or their representatives then
3 submit testimonies on the studies and analyses as if no stakeholder collaboration ever even
4 occurred. Significant resources are spent by all parties and their clients and/or customers in
5 the conduct of the Ameren Missouri DSM Regulatory Stakeholder Advisory meetings. It is
6 important that the collaborative process be honored otherwise resources expended in
7 furtherance of these efforts are wasted. The fourth and last risk relates to the accountability
8 that the Ameren Missouri energy efficiency team has to implement and deliver results on
9 robust energy efficiency programs. We issued numerous data requests to better understand
10 the analyses they did of the Ameren Missouri workpapers for the MEEIA 2016-2018 filings.
11 Either no analyses were done or a small portion of Ameren Missouri's workpapers may have
12 been cited. We issued numerous data requests to understand the analyses, documentation
13 and workpapers that accompanied policy recommendations regarding how Ameren Missouri
14 should run its energy efficiency programs going forward. In the vast majority of responses,
15 witnesses stated that no analyses were performed. Rather, witnesses relied on their past
16 experience when making policy recommendations on the Ameren Missouri MEEIA 2016-
17 2018 filing.

18 **Q. Does this conclude your surrebuttal testimony?**

19 **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) File No. EO-2015-0055
Regulatory Changes in Furtherance of Energy)
Efficiency as Allowed by MEEIA.)

AFFIDAVIT OF RICHARD A. VOYTAS

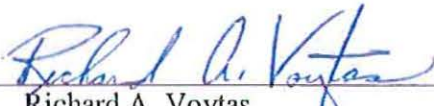
STATE OF MISSOURI)
) ss
CITY OF ST. LOUIS)

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

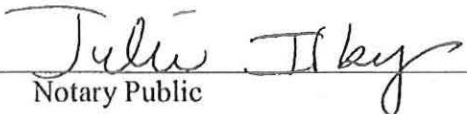
1. My name is Richard A. Voytas. I work in the City of St. Louis, Missouri, and I am employed by Ameren Services Company as Director of Energy Efficiency/Demand Response.

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.

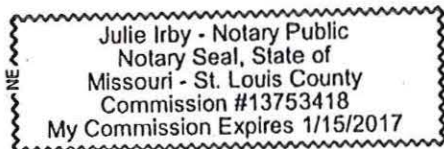
3. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct.


Richard A. Voytas

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


Notary Public

My commission expires:



APPENDIX A

Richard A. Voytas Professional Background and Qualifications

Richard A. Voytas is Director – Energy Efficiency and Demand Response in the Corporate Planning Department at Ameren Services in St. Louis, MO. His team is responsible for supporting the Ameren Missouri and Ameren Illinois operating companies Demand Side Management implementation activities with analytic support related to program design, implementation, and evaluation and compliance filings with statutory requirements.

Mr. Voytas has served as Chair of the Executive Board of the Association For Demand Response and Smart Grid (“ADS”). He represented Ameren on the Leadership Group of National Action Plan For Energy Efficiency from 2006-2009. He chaired and the EPRI Demand Response Systems project set in 2009-2010. In 2007, he chaired the NERC DSM Influence On Reliability Task Force.

Mr. Voytas has been with Ameren for 40 years in positions ranging from Plant Engineering to Fuel Procurement to Resource Planning and in Energy Efficiency and Demand Response. He has a B.S. in Mechanical Engineering from the University of MO-Rolla and a MBA from St. Louis University. He is also a registered professional engineer.

Mr. Voytas has sponsored testimony in proceedings at the Federal Energy Regulatory Commission (“FERC”), the Illinois Commerce Commission (“ICC”), and the Missouri Public Service Commission (“MPSC”).

Mr. Voytas has testified in past proceedings before the MPSC on issues related to load research, weather normalization of sales, load forecasting, integrated resource planning, energy

APPENDIX A

efficiency and demand response, acquisition of more than 2,000 MW of combustion turbine generators ("CTGs"), transfer of the former Metro East service territory, acquisition of Noranda load, the Ameren Missouri 2013-2015 MEEIA implementation plan, and 2013 Ameren Missouri MEEIA EM&V related Change Requests.

Stakeholder Interactions during DSM Potential Study

There was significant communication with Stakeholders regarding the development of the Ameren Missouri Demand Side Market Potential Study. Stakeholder feedback was considered and where applicable used in the development of the Ameren Missouri DSM Portfolios that are analyzed within the IRP.

June 28, 2012: An email was sent to the Ameren Missouri EE Regulatory Stakeholder Advisory Team requesting review and comments of the Bidders List and RFP to complete a DSM Potential Study for Ameren Missouri. Only one correspondence with comments was submitted. Andrew Linhares of Renew Missouri (in conjunction with Hale Powell) provided comments July 6, 2012. Adam Bickford of Missouri Department of Natural Resources confirmed that they did not have any comments July 10, 2012.

July 6, 2012: Andrew Linhares of Renew Missouri submitted comments in conjunction with their energy efficiency expert, Hale Powell. Note: Renew Missouri was the only Stakeholder to submit comments to the RFP.

July 10, 2012: An email was sent to Andrew Linhares of Renew Missouri in response to the review and comments submitted by Renew Missouri (in conjunction with Hale Powell) to the Bidders List and RFP to complete a DSM Potential Study for Ameren Missouri. An additional email was sent to the Ameren Missouri EE Regulatory Stakeholder Advisory Team expressing gratitude for considering review of the Bidders List and RFP to complete a DSM Potential Study for Ameren Missouri.

August 27, 2012: A 4-hour meeting with Ameren and the Ameren Missouri EE Regulatory Stakeholder Advisory Team included a presentation by Ameren summarizing the anticipated schedule, summary of bidder responses, and Ameren recommendations regarding the Ameren Missouri DSM Potential Study RFP.

August 29, 2012: An email was sent to the Ameren Missouri EE Regulatory Stakeholder Advisory Team in response to Stakeholder requests, concerning the Ameren Missouri DSM Potential Study RFP, expressed during the August 27, 2012 DSM Stakeholder meeting. The email included the bid from EnerNOC, status of asking bidders to consider rebidding, and the proposed re-bid schedule. John Rogers of Staff provided a response that Staff does not support a variance from the April 1, 2014 compliance date for the Ameren Missouri IRP. Ryan Kind of the Department of Economic Development provided a response that OPC would support an alternative recommendation (to the Ameren recommendation presented during the August 27 meeting) in favor of proceeding with a rebidding process and delaying the April 1, 2014 Ameren Missouri IRP compliance date.

August 30, 2012: An email was sent to the Ameren Missouri EE Regulatory Stakeholder Advisory Team requesting comments and input from remaining Stakeholders regarding the rebidding process and delaying the April 2014 IRP filing schedule. Phil Mosenthal of Optimal Energy (in conjunction with Hale Powell) provided a response that the April 2014 IRP compliance date isn't accurate, the EnerNOC bid is too expensive, and that the Potential Study isn't needed at that time.

September 13, 2012: An email was sent to the Ameren Missouri EE Regulatory Stakeholder Advisory Team requesting availability in an effort to schedule a follow-up meeting to the August 27th Stakeholder discussion regarding EnerNOC rebidding for the DSM Potential Study.

September 18, 2012: The purpose of the meeting was to have a discussion regarding Ameren recommending to proceeding with finalizing a contract with EnerNOC, acknowledging the fact that the Study will not be completed in time for the April 2014 IRP filing and recommending a solution. The consensus between Ameren and the Ameren Missouri EE Regulatory Stakeholder Advisory Team was that there were no additional concerns with hiring EnerNOC for the Potential Study and Ameren would follow up with EnerNOC to report that EnerNOC won the bid.

September 21, 2012: An email was sent to Stakeholders with the timeline discussed in the September 18th meeting, MS Project file with a Gantt chart, and MS Excel file showing a cut-and-paste of the tasks and dates from the MS Project file.

September 25, 2012: The purpose of the meeting was to discuss the draft schedule, developed by Matt Michels in conjunction with Rick Voytas, showing the timeline for the expected completion of the 2012 Ameren Missouri DSM Potential Study, the 2014 IRP filing and the December 2014 MEEIA filing. No decisions were made or recommended.

October 11, 2012: An email was sent to the Ameren Missouri EE Regulatory Stakeholder Advisory Team requesting available meeting times for October 31 to present the initial discussion of the Ameren Missouri DSM Potential Study. John Rogers of Missouri Public Service Commission responded that Staff was available to meet.

A meeting invitation for October 31 was sent to the Ameren Missouri EE Regulatory Stakeholder Advisory Team for a kickoff meeting to the Potential Study project where Stakeholders can discuss and inquire any issues or comments pertaining to the Potential Study with EnerNOC or Ameren.

October 31, 2012: An Introductory Stakeholder Workshop was held that identified the study team members, the study objectives, and tasks to be performed in the study. Stakeholder comments and suggestions were requested and a list of action items was developed and addressed in the following weeks.

November 5, 2012: An email was sent to the Ameren Missouri EE Regulatory Stakeholder Advisory Team as a supplement to the October 31, 2012 meeting. The meeting summary draft, initial measure lists of energy efficiency and emerging technologies, TVA Potential Study, and demand side rates presentation was attached to the email.

November 14, 2012: Ameren Missouri sent an email to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Team with the final meeting notes of the October 31, 2012 meeting.

November 19, 2012: Ameren Missouri sent an email to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Team as a follow-up to the EE measure list with emerging technologies. The initial measure lists of Distributed Generation and Combined Heat & Power (DG/CHP), Demand Response (DR), and demand-side rate measures were attached.

November 20, 2012: An email was sent to the Ameren Missouri EE Regulatory Stakeholder Advisory Group proposing meeting dates and times to discuss Demand-side Rates and Market Research. Additional meeting date and times to discuss the sample design/selection and survey design for the Ameren Missouri DSM Electric Potential Study were proposed.

November 28, 2012: Ameren Missouri held its quarterly Ameren MO DSM Stakeholder Group meeting where updates on the Potential Study were presented.

November 29, 2012:

An email was sent to the Ameren Missouri EE Regulatory Stakeholder Advisory Team, as requested during the November 28, 2012 meeting, with comments from Hale Powell regarding inverted block rates and distributed generation technology.

Adam Bickford (MDNR) sent an email with MDNR's comments to the measure list.

November 30, 2012: Ryan Kind sent an email in response to the November 19, 2012 email. OPC supported including behavior modification measures in the Potential Study so a comprehensive assessment of all significant measures that can contribute to achieving all cost effective DSM savings were included. Randy Gross sent an email with comments pertaining to DG/CHP and demand-side rates measures.

December 3, 2012:

John Rogers sent an email supporting Ryan Kind's email sent November 30, 2012 and that the "spillover" effect should be evaluated during the Potential Study. Henry Robertson forwarded an email from Phil Mosenthal regarding NRDC's review of the measure lists to add measures for compressed air, commercial laundry and street lighting.

December 7, 2012: Ryan Kind sent an email supplemental to the email he sent November 30. OPC supported the comments from NRDC (sent December 3, 2012) that pointed out the need to add measures that cover compressed air, commercial laundry and street lighting. OPC also commented on the DG, Demand-Side rates and DR measure designs.

December 12, 2012: Ameren Missouri sent an email to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Team cancelling the December 17, 2012 webinar due to a conflict in schedules and requesting the best times to reschedule.

December 14, 2012: Ameren Missouri sent a meeting request for a demand-side rates webinar scheduled for December 20, 2012.

December 10, 2012: Ameren Missouri sent an email to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Team reporting that EnerNOC accepted the majority of the recommendations for additional measures to be included in the Potential Study and that Ameren Missouri was in the process of completing an economic analysis of a conversion of the existing Ameren Missouri street lighting stock to LED technology.

December 19, 2012:

Ameren and EnerNOC hosted a discussion regarding the sample design/selection and survey design for the Ameren Missouri DSM Electric Potential Study.

Ameren Missouri sent an email to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Team with the program interest and saturation market research surveys for residential and business customers. The email also included the market research plan.

December 20, 2012:

The Brattle Group led a demand-side rates webinar. Ameren Missouri sent a subsequent email to the Stakeholders with the PowerPoint presentation from the demand-side rates webinar and information to complete a survey regarding demand-side rates.

Andrew Linhares (Renew Missouri) sent an email to SAG members summarizing the conclusion of a conversation between Phil Mosenthal and Hale Powell regarding "opt out" customers. Both agreed that opt out customers should be included in the market research surveying and that on-site information should be collected as EnerNOC originally envisioned, but program participation of opt out customers should not be included in the estimate of achievable savings potential.

John Rogers (MPSC) sent a responding email stating that the concerns raised by some Stakeholders regarding the treatment of opt out customer in the Potential Study are not conducive for a good use of limited Potential Study resources.

December 21, 2012:

Phil Mosenthal (Optimal Energy) sent an email with comments on the business program interest survey.

Hale Powell (Renew Missouri) sent an email with comments on the business survey.

December 27, 2012: Per the request of The Brattle, Ameren sent an email to Stakeholders and Ameren as a reminder to complete the demand-side rates survey.

January 7, 2013:

Ameren Missouri sent an email to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Team as a follow-up from the market research webinar with EnerNOC December 19, 2012. An attachment to the email responded to concerns raised regarding the market research plan and the survey questionnaires in a memo issued by EnerNOC January 4, 2013.

Adam Bickford (MDNR) sent a responding email with comments to EnerNOC's January 4, 2013 memo.

Phil Mosenthal (Optimal Energy) sent a responding email with comments to the January 4 memo.

January 9, 2013: John Rogers of Staff sent an email to Rick Voytas requesting that Rick ensure EnerNOC is aware of the ACEEE Report Number U131 - Frontiers of Energy Efficiency: Next Generation Programs Reach for High Energy Savings. Rogers also inquired if EnerNOC would be incorporating the programs' designs and approaches (described in the attached ACEEE report) that can gain higher customer participation and achieve high savings per customer in the near future through innovative technologies, program designs and marketing. Voytas sent a subsequent email responding to Rogers with an overview of the program design plans for the Ameren Missouri DSM Potential Study.

January 17, 2013: Ameren Missouri sent an email to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Team subsequent to the email sent January 7, 2013 with attachments of the comments submitted by Phil Mosenthal and Adam Bickford on the behalf of Missouri Department of Natural Resources. The email also provided EnerNOC's response to Phil's comments and Adam's comments received regarding the market research plan and the survey questionnaires.

January 24, 2013: Ameren Missouri sent an email to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Team with a presentation summarizing the results of the demand-side rates survey created by The Brattle Group.

January 29, 2013: Ameren Missouri sent an email to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Team requesting feedback indicating acceptance or rejection to the recommendations by The Brattle Group regarding the demand-side rates aspect of the 2013 Ameren Missouri Potential Study.

February 8, 2013: Ameren Missouri sent an email to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Team with an attached memo providing a response addressing stakeholder concern of reaching owners of rental property during the market research aspect of the 2013 Ameren Missouri Demand Side Management Potential Study. The memo reports the efforts explored by Ameren Missouri to ensure the Potential Study identifies and includes owner input and Ameren Missouri's recommendation.

February 14, 2013: Phil Mosenthal sent an email supporting EnerNOC's focus group proposal sent to Stakeholders February 8, 2013.

February 20, 2013: Adam Bickford sent an email supporting the focus group proposal sent to Stakeholders February 8, 2013 but suggested the focus groups be held in St. Louis, Jefferson City, and Cape Girardeau. Ryan Kind sent an email supporting DNR's recommendations to have 4 focus groups held in St. Louis, Jefferson City, and Cape Girardeau.

February 22, 2013: Ameren Missouri sent an email accepting the request by DNR and Ryan Kind to have 4 focus groups held in St. Louis, Jefferson City, and Cape Girardeau. The email also addressed Ryan Kind's concern with the low match rate between the DataRaker database on County Assessor information and the Ameren MO customer accounts.

March 6, 2013: Ameren Missouri held its quarterly Ameren MO DSM stakeholder Group Meeting where updates on the Potential Study were presented.

March 27, 2013: Ameren Missouri sent an email to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Team with the confirmed dates and locations of the focus groups facilitated by YouGov|Definitive Insights to explore input from rental property owners.

July 26, 2013: Ameren Missouri sent an email to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Group requesting feedback of preferences for the four (4) proposed meeting times to discuss the results of the primary market research of the 2013 DSM Ameren Missouri Potential Study.

August 16, 2013: Ameren Missouri sent an email to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Group as a follow-up to the email sent July 26, 2013 requesting feasible meeting times to discuss the results of the primary market research because only one Stakeholder responded.

September 10, 2013: Presentation discussing the primary market research results and potentials of the Ameren Missouri DSM Potential Study.

September 13, 2013: Ameren Missouri sent an email to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Team with an attached memo providing a response addressing some concerns raised by stakeholders to address a subset of the questions from the meeting held September 10, 2013 to discuss the primary market research results and EE potentials.

September 18, 2013: Ameren Missouri sent an email to Stakeholders with the presentation and updated bid revision from EnerNOC to complete the Ameren Missouri Potential Study.

September 19, 2013: Ameren Missouri sent a request to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Group to discuss the EE program level, DR, and CHP/DG analyses results and potentials of the current Ameren Missouri DSM Potential Study.

September 20, 2013: Ameren Missouri sent an email to the Ameren Missouri EE Regulatory Stakeholder Advisory Team addressing concerns raised by stakeholders pertaining to the presentation given September 10, 2013, discussing the primary market research results and EE potentials of the Ameren Missouri DSM Potential Study.

September 27, 2013: Ameren Missouri sent an email to the Ameren Missouri EE Regulatory Stakeholder Advisory Group proposing to change the October 2, 2013 date to present the results of the 2013 DSM Ameren Missouri Potential Study since only 2 Stakeholders responded and there were resource constraints and project schedule variations from original plans. Geoff Marke

responded to the September 27, 2013 email apologizing for not responding to the meeting request sent September 19, 2013.

October 4, 2013: Geoff Marke sent an email with comments from Missouri Division of Energy responding to the September 10, 2013 presentation and subsequent responses. Andrew Linhares resent the comments submitted by Renew Missouri and NRDC.

October 25, 2013:

Ameren Missouri sent a request to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Group to select from the proposed dates and times to discuss the EE program level, DR, and CHP/DG analyses results and potentials of the current Ameren Missouri DSM Potential Study. MPSC and Renew Missouri responded with preferences for the proposed dates and times.

Ryan Kind (OPC) responded stating he was unavailable for all of the proposed dates and times to discuss the EE program level, DR, and CHP/DG analyses results and potentials.

October 28, 2013: Ameren responded to Ryan Kind's email expressing efforts to accommodate all parties and emphasized that all material, as usual, would be available to all stakeholders in electronic format. Ameren offered to meet separately with Ryan Kind at a convenient time.

October 29, 2013:

Ryan Kind (OPC) responded stating he was disappointed that Ameren could not schedule a meeting at a time when he was available given his ongoing interest and participation in the project and asked Ameren to provide a recording of the meeting.

Ameren responded to Ryan Kind's request stating that provisions to record the meeting and make it available to Stakeholders were made.

October 30, 2013: Ameren and EnerNOC hosted a meeting to present and discuss the EE program level, DR, and CHP/DG analyses results and potentials of the current Ameren Missouri DSM Potential Study.

November 1, 2013: An email was sent to the Ameren Missouri EE Regulatory Stakeholder Advisory Team with a link to access the recording of the presentation given October 30, 2013, discussing the EE, DR, and CHP/DG analyses of the Ameren Missouri DSM Potential Study. The email also included an offer to schedule a meeting to discuss any concerns or to review the meeting materials.

November 8, 2013: Ameren sent an email to Stakeholders with four (4) draft volumes of the Potential Study report and responses to prior stakeholder questions, concerns and comments with the DSM Potential study.

November 11, 2013: Ameren sent an email to Stakeholders as a follow-up from the email sent to Stakeholders November 8, 2013. Another volume of the Potential Study report was attached. A revised PowerPoint presentation from the October 30th Ameren Missouri DSM Potential study webinar was attached.

November 14, 2013: Ameren Missouri held its quarterly Ameren MO DSM Stakeholder Group meeting attended by Ameren, MPSC Staff, Office of Public Council, MO Department of Natural Resources, Renew Missouri, MO Industrial Interveners, Sierra Club, and NRDC. Rick Voytas discussed the Potential Study with Stakeholders for about 2 hours.

November 15, 2013:

Geoffrey Marke (MPSC) sent an email to Rick Voytas (Ameren) expressing gratitude of the information presented during the November 14, 2013 quarterly Ameren MO DSM Stakeholder Group meeting, requesting the research by YouGov Definitive Insights on "say-do" take rates that informed the residential and business sector methodologies, and requesting market research segmentation information.

Ameren Missouri sent a request to the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Team to select from the proposed dates and times to discuss/review comments pertaining to the Potential Study.

November 19, 2013:

Rick Voytas (Ameren) sent an email to Geoffrey Marke (MPSC) requesting clarification of Marke's request sent November 15, 2013 regarding segmentation information for Ameren Illinois.

Geoffrey Marke (MPSC) sent an email to Rick Voytas (Ameren) clarifying a request of figures that show the demographics, perceptions of Ameren Missouri, and Household EE (and DR) usage as seen in the Ameren Illinois Potential Study.

November 20, 2013: Ameren Missouri sent a meeting request for December 4, 2013 to participate in the discussion of the final report for the current Ameren Missouri DSM Potential Study.

November 25, 2013: Ameren sent the final volume, Volume 1: Executive Summary, of the draft volumes for the 2013 Ameren Missouri DSM Potential Study report to Stakeholders.

November 26, 2013: Andrew Linhares sent an email to the Stakeholders and Ameren with comments from Renew Missouri and the Natural Resources Defense Council (NRDC). The email also contained attachments of a report referenced within the comments and the documentation request submitted by Renew MO and NRDC.

November 27, 2013: Geoff Marke sent an email with comments/questions of Staff pertaining to the volumes of the Ameren Missouri DSM Potential Study report.

December 2, 2013:

Ameren sent an email to the Ameren Missouri EE Regulatory Stakeholder Advisory Group addressing comments submitted to Ameren November 15, 2013 by Andrew Linhares for Renew Missouri and NRDC and Geoff Marke for Missouri Public Service Commission. Due to email size constraints, the responses were delivered via four (4) emails.

Geoffrey Marke sent an email responding to Ameren and the Stakeholders requesting a copy of the white paper that outlines the methodology of the development of the adjustment factors by YouGov.

Andrew Linhares sent an email responding to Ameren and the Stakeholders with joint comments of Renew MO and NRDC concerning the Vol. 1 Executive Summary of the Ameren Missouri Potential Study.

December 3, 2013: Ameren sent an email to Stakeholders stating the intent to provide a white paper that outlines the methodology of the development of the adjustment factors.

December 4, 2013: Ameren hosted a conference call with the Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Group to discuss stakeholder's concerns with the draft reports for the 2013 Ameren MO DSM Potential Study.

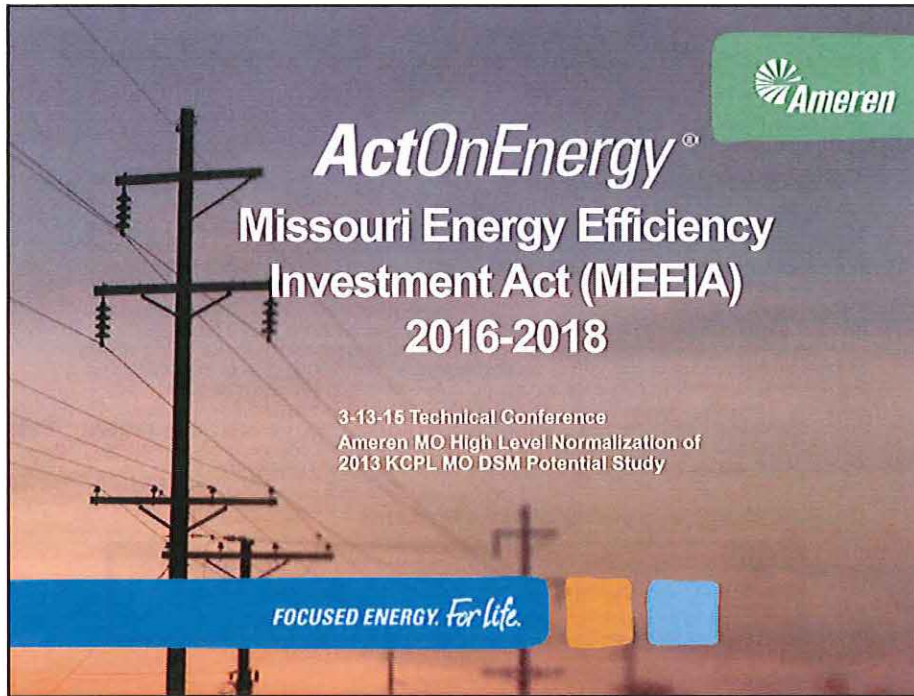
December 5, 2013: Ameren sent an email to Stakeholders as a follow-up to the September 4, 2013 teleconference with the whitepaper from YouGov Definitive Insights describing the "Say/Do"

adjustment factor for take rates. Adam Bickford sent an email with comments of Missouri Department of Natural Resources regarding DG, CHP and Rate Design measure lists for the Ameren Missouri Potential Study.

December 9, 2013: Ameren sent an email to Stakeholders responding to comments submitted by Renew Missouri, NRDC and Staff that served as the basis for discussion during the December 4, 2013 teleconference.

December 18, 2013: Ameren sent an email to Stakeholders with an updated version of EnerNOC and Ameren responses to comments provided by Ameren Missouri Energy Efficiency Regulatory Stakeholder Advisory Group regarding the review of the draft volumes of the Ameren Missouri 2013 DSM Potential Study.



February 3, 2014: Ameren hosted a meeting with Stakeholders at the GOB with telecommunication access to discuss the 2014 Integrated Resource Plan (IRP). The presentation included a discussion pertaining to demand-side resource analysis including the preliminary portfolios for residential and business EE programs for implementation during 2016, 2017, and 2018.



Objective

- Attempt To Normalize (at least directionally) KCPL MO DSM Potential Study to Ameren MO 2013 DSM Potential Study
- Account for and attempt to quantify (if there is a plausible basis):
 1. Results reported on a gross basis with no deduction for naturally occurring energy efficiency
 2. Removal of opt-out customers from results
 3. Inclusion of natural gas benefits in electric cost effectiveness analyses
 4. Differences between EM&V and Deemed TRM incremental measure energy savings
 5. Measure vs. program level potential
 6. Removal of CHP
 7. Calibration or lack thereof to Company end-use sales forecast
 8. EUL – revert to inefficient baseline at end of EUL
 9. Sales forecast differences
 10. Avoided cost assumptions
 11. Baseline technology assumptions
 12. Emerging but unknown efficient technologies

Comparing (2) studies done by (2) contractors using (2) proprietary models on a measure by measure basis would require significant resources.

 2 

Naturally Occurring Energy Efficiency Adjustment



Naturally Occurring Energy Efficiency

The first step in assessing naturally occurring energy efficiency is to define it. Codes and standards are typically not included in the definition of naturally occurring conservation, while consumer response to energy prices (short and long term) and early technology adoption are.

The first step in quantifying naturally occurring energy efficiency is to develop a codes and standards baseline that reflects the appropriate assumptions about codes and standards. This baseline should not include changes in retail energy price or the effects of early adoption of new high-efficiency technologies. The next step is to characterize a baseline forecast that includes an energy price forecast and assumptions about early adopters. The latter can be obtained from the EIA Annual Energy Outlook forecast and adjust it to reflect information for a specific utility. The difference between the codes and standards baseline forecast and the second baseline forecast with naturally occurring conservation will be the estimate of naturally occurring energy efficiency.

Naturally Occurring energy efficiency is not free ridership.

Based On A Compilation Of Studies Used By The EPA In The Development of Building Block #4, Assume 20% Reduction in Gross Potential To Account For Naturally Occurring Energy Efficiency.



Step 1: Remove CHP From Potential (Focus On Energy Efficient Equipment)

Realistic Achievable Potential					Realistic Achievable Potential						
Cumulative Energy Savings Potential (MMBtu)					Cumulative Energy Savings Potential (MMBtu)						
KCP&L MO	Energy Efficiency	Demand Response	O-P	Total	% of Baseline	KCP&L MO	Energy Efficiency	Demand Response	O-P	Total	% of Baseline
2014	62,448	0	0	62,448	0.7%	2014	62,448	0	0	62,448	0.7%
2015	142,326	0	2,880	145,207	1.6%	2015	142,326	0	2,880	145,207	1.6%
2016	243,564	0	5,761	249,324	2.8%	2016	243,564	0	5,761	249,324	2.8%
2017	361,950	0	14,402	376,352	4.2%	2017	361,950	0	14,402	376,352	4.2%
2018	493,627	0	25,924	519,551	5.7%	2018	493,627	0	25,924	519,551	5.7%
2019	632,351	0	40,925	673,277	7.4%	2019	632,351	0	40,925	673,277	7.4%
2020	771,622	0	57,824	829,446	9.2%	2020	771,622	0	57,824	829,446	9.2%
2021	903,953	0	77,577	981,530	10.9%	2021	903,953	0	77,577	981,530	10.9%
2022	1,024,713	0	99,580	1,124,293	12.7%	2022	1,024,713	0	99,580	1,124,293	12.7%
2023	1,121,386	0	121,389	1,242,775	13.7%	2023	1,121,386	0	121,389	1,242,775	13.7%
2024	1,229,458	0	141,551	1,371,009	14.9%	2024	1,229,458	0	141,551	1,371,009	14.9%
2025	1,335,957	0	158,628	1,494,585	15.9%	2025	1,335,957	0	158,628	1,494,585	15.9%
2026	1,397,238	0	172,423	1,569,661	16.7%	2026	1,397,238	0	172,423	1,569,661	16.7%
2027	1,473,661	0	182,606	1,656,267	16.7%	2027	1,473,661	0	182,606	1,656,267	16.7%
2028	1,546,620	0	190,919	1,737,539	17.3%	2028	1,546,620	0	190,919	1,737,539	17.3%
2029	1,613,966	0	195,466	1,809,432	17.8%	2029	1,613,966	0	195,466	1,809,432	17.8%
2030	1,677,600	0	198,748	1,876,348	18.3%	2030	1,677,600	0	198,748	1,876,348	18.3%
2031	1,739,135	0	200,836	1,940,001	18.7%	2031	1,739,135	0	200,836	1,940,001	18.7%
2032	1,799,322	0	202,540	2,001,862	19.1%	2032	1,799,322	0	202,540	2,001,862	19.1%
2033	1,858,858	0	202,893	2,061,751	19.3%	2033	1,858,858	0	202,893	2,061,751	19.3%

See Appendix L In KCPL DSM Potential Study For A Copy Of This Spreadsheet.

Step 2: Adjust For Naturally Occurring Energy Efficiency

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KCP&L MO	Realistic Achievable Potential				
	Energy Efficiency	20% Deduction	CHP	Total	% of Baseline
2014	60,448	48,359		48,359	0.5%
2015	142,326	113,861		113,861	1.3%
2016	243,564	194,851		194,851	2.2%
2017	361,950	289,560		289,560	3.2%
2018	493,627	394,901		394,901	4.4%
2019	632,391	505,913		505,913	5.5%
2020	771,622	617,297		617,297	6.7%
2021	903,953	723,162		723,162	7.8%
2022	1,024,713	819,770		819,770	8.7%
2023	1,132,386	905,909		905,909	9.5%
2024	1,229,458	983,566		983,566	10.3%
2025	1,316,357	1,053,086		1,053,086	10.9%
2026	1,397,328	1,117,863		1,117,863	11.4%
2027	1,473,661	1,178,929		1,178,929	11.9%
2028	1,545,620	1,236,496		1,236,496	12.3%
2029	1,613,966	1,291,173		1,291,173	12.7%
2030	1,677,600	1,342,080		1,342,080	13.1%
2031	1,739,195	1,391,356		1,391,356	13.4%
2032	1,799,322	1,439,457		1,439,457	13.7%
2033	1,858,858	1,487,086		1,487,086	13.9%

Removal Of Opt Out Customers

From KCPL DSM Potential Study

Opt Out Customers – The potential results of this study does not exclude opt-out customers. At the time of this report development, the list of opt-out customers was very much in flux due to changes in customer decision-making regarding opt-out. As such, we collectively agreed with the Companies that we would not reduce the potential results of this study to exclude opt-out customers. However, we note that the latest data available indicated that, for GMO, approximately 19% (on an energy consumption basis) of GMO's large C&I customers were likely to opt out⁴. Data were not available for KCP&L MO and KCP&L KS.

Assume 10% Of KCPL-MO C&I Customers Opt Out of DSM Programs.
Approximately 70% of KCPL MO's portfolio is C&I. 10% x 70% = 7%
portfolio reduction to account for Opt Out.

Step 3: Adjust For Opt-Out

[BACK](#)

KCP&L MO	Realistic Achievable Potential				
	Cumulative Energy Savings Potential (MWh)				
	Energy Efficiency	20% Deduction	Opt -Out Out	Total	% of Baseline
2014	60,448	48,359	44,974	44,974	0.5%
2015	142,326	113,861	105,891	105,891	1.2%
2016	243,564	194,851	181,211	181,211	2.0%
2017	361,950	289,560	269,291	269,291	3.0%
2018	493,627	394,901	367,258	367,258	4.0%
2019	632,391	505,913	470,499	470,499	5.1%
2020	771,622	617,297	574,087	574,087	6.2%
2021	903,953	723,162	672,541	672,541	7.2%
2022	1,024,713	819,770	762,387	762,387	8.1%
2023	1,132,386	905,909	842,495	842,495	8.9%
2024	1,229,458	983,566	914,717	914,717	9.5%
2025	1,316,357	1,053,086	979,370	979,370	10.1%
2026	1,397,328	1,117,853	1,039,612	1,039,612	10.6%
2027	1,473,661	1,178,929	1,096,404	1,096,404	11.1%
2028	1,545,620	1,236,496	1,149,941	1,149,941	11.5%
2029	1,613,966	1,291,173	1,200,791	1,200,791	11.8%
2030	1,677,600	1,342,080	1,248,135	1,248,135	12.1%
2031	1,739,195	1,391,356	1,293,961	1,293,961	12.4%
2032	1,799,322	1,439,457	1,338,695	1,338,695	12.7%
2033	1,858,858	1,487,086	1,382,990	1,382,990	13.0%

The Inclusion Of Natural Gas Benefits In KCPL MO Electric Program TRCs (extract from 8/28/2013 Navigant slide)

- KCP&L's last DSM potential study was conducted by Navigant (Summit Blue) in 2007. The 2007 study did not include a baseline study.
- A fresh study was needed to support the rollout of the MEEIA programs. The objectives for the current study are:
 - Develop an accurate baseline to facilitate estimation of savings potential going forward.
 - Estimate electric efficiency and demand response potential from 2014-2033 for both KCP&L and KCP&L Greater Missouri Operations (GMO).
 - Satisfy the requirements of MO 4 CSR 240 regarding rules for conducting a potential study.
 - Develop savings/cost estimates for input to KCP&L/GMO Integrated Resource Plans.
 - Develop a set of EE/DR programs with the ultimate goal of achieving all cost-effective demand-side savings.
 - Impact type scope: Energy (MWh) and Peak Coincident Demand (MW).
 - **Conduct benefit-cost analyses of DSM measures and programs. This analysis includes gas impacts from electric measures.**

The exclusion of natural gas benefits may make home energy reports and most building shell measures (both RES and C&I) cost ineffective. We estimate a 25% reduction to the portfolio.

Step 4: Remove Natural Gas Benefits

KCP&L MO	Realistic Achievable Potential					
	Cumulative Energy Savings Potential (MWh)					
	Energy Efficiency	20% Deduction	Opt-Out Out	No Natural Gas	Total	% of Baseline
2014	60,448	48,359	44,974	33,730	33,730	0.4%
2015	142,326	113,861	105,891	79,418	79,418	0.9%
2016	243,564	194,851	181,211	135,908	135,908	1.5%
2017	361,950	289,560	269,291	201,968	201,968	2.2%
2018	493,627	394,901	367,258	275,444	275,444	3.0%
2019	632,391	505,913	470,499	352,874	352,874	3.9%
2020	771,622	617,297	574,087	430,565	430,565	4.7%
2021	903,953	723,162	672,541	504,406	504,406	5.4%
2022	1,024,713	819,770	762,387	571,790	571,790	6.1%
2023	1,132,385	905,909	842,495	631,872	631,872	6.7%
2024	1,229,458	983,566	914,717	686,038	686,038	7.2%
2025	1,316,357	1,053,086	979,370	734,527	734,527	7.6%
2026	1,397,328	1,117,863	1,039,612	779,709	779,709	8.0%
2027	1,473,661	1,178,929	1,096,404	822,303	822,303	8.3%
2028	1,545,620	1,236,496	1,149,941	862,456	862,456	8.6%
2029	1,613,966	1,291,173	1,200,791	900,593	900,593	8.9%
2030	1,677,600	1,342,080	1,248,135	936,101	936,101	9.1%
2031	1,739,195	1,391,356	1,293,961	970,471	970,471	9.3%
2032	1,799,322	1,439,457	1,338,695	1,004,021	1,004,021	9.5%
2033	1,858,858	1,487,086	1,382,950	1,037,243	1,037,243	9.7%

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Update TRM To Reflect KCPL Specific EM&V Based On Primary Data

– Significant differences: examples from Ameren MO EM&V include...

- Refrigerator recycling from 1465 to 800 kWh per unit
- RES Lighting HOU from 2.9 to 2.0
- 80% realization rate for RES HVAC in general
- No home or business electronics
- No copiers
- No dehumidifiers
- No occupancy sensors
- 50% reduction for smart power strips
- No commercial open refrigeration cases

Assume an arbitrary adjustment of 10% to the entire portfolio – too difficult to analyze and quantify without more knowledge of measure screening process.

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Step 5: Adjust TRM For EM&V

KCP&L MO	Realistic Achievable Potential						
	Energy Efficiency	20% Deduction	Opt-Out	No Natural Gas	Adjust For EM&V	Total	% of Baseline
2014	60,448	48,359	44,974	33,730	30,357	30,357	0.3%
2015	142,326	113,861	105,891	79,418	71,476	71,476	0.8%
2016	243,564	194,851	181,211	135,908	122,318	122,318	1.4%
2017	361,950	289,560	269,291	201,968	181,771	181,771	2.0%
2018	493,627	394,901	367,258	275,444	247,899	247,899	2.7%
2019	632,391	505,913	470,499	352,874	317,587	317,587	3.5%
2020	771,622	617,297	574,087	430,565	387,508	387,508	4.2%
2021	903,953	723,162	672,541	504,406	453,965	453,965	4.9%
2022	1,024,713	819,770	762,387	571,790	514,611	514,611	5.5%
2023	1,132,386	905,909	842,495	631,872	568,684	568,684	6.0%
2024	1,229,458	983,566	914,717	686,038	617,434	617,434	6.4%
2025	1,316,357	1,053,086	979,370	734,527	661,075	661,075	6.8%
2026	1,397,328	1,117,863	1,039,612	779,709	701,738	701,738	7.2%
2027	1,473,661	1,178,929	1,096,404	822,303	740,073	740,073	7.5%
2028	1,545,620	1,236,496	1,149,941	857,456	776,210	776,210	7.7%
2029	1,613,955	1,291,173	1,200,791	900,593	810,534	810,534	8.0%
2030	1,677,600	1,342,080	1,248,135	936,101	842,491	842,491	8.2%
2031	1,739,195	1,391,356	1,293,961	970,471	873,424	873,424	8.4%
2032	1,799,322	1,439,457	1,338,695	1,004,021	903,619	903,619	8.6%
2033	1,858,858	1,487,086	1,382,990	1,037,243	933,518	933,518	8.8%

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Measure Vs. Program Level Potential (It Appears KCPL Study Based On Measure Level Potential)

"2.1.4 Energy Consumption Breakdown and Forecast

Navigant's potential study analysis is conducted at the measure level and is disaggregated by customer segment. As a result, the breakdown of energy consumption at the customer segment level combined with measure-level savings characteristics (which in some cases vary by customer segment) are the key drivers of potential study output. As a result, the potential study approach does not rely on a forecast that is broken down by customer end-use category. Some potential study approaches rely heavily on the end-use category breakdown, as they estimate savings as a fraction of the end-use category consumption. However, since this model is more granular and uses a bottom-up approach aggregating the savings of each measure, the end-use breakdown assumptions provided in this section are for information purposes only."

Program potential is less than measure potential. Not all measures, i.e., electronics are suitable for utility DSM programs. Interactive effects eliminate many measures from being cost effective in whole building programs such as RES New Construction. Interactive effects make many business measures such as occupancy sensors and commercial refrigerator cases cost ineffective.

For Ameren MO, Program RAP is 54% of Measure RAP. For KCPL, assume Program RAP is 80% of Measure RAP.

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Step 6: Adjust To Show Program RAP

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KCP&L MO	Realistic Achievable Potential							
	Energy Efficiency	20% Deduction	Opt.-Out Out	No Natural Gas	Adjust For EM&V	Adj. For Prog. Pot.	Total	% of Baseline
2014	60,443	48,359	44,974	33,730	30,357	24,285	24,285	0.3%
2015	142,326	113,851	105,831	79,418	71,476	57,181	57,181	0.6%
2016	243,554	194,851	181,211	135,908	122,318	97,854	97,854	1.1%
2017	351,550	283,550	269,291	201,568	181,771	145,417	145,417	1.6%
2018	433,627	384,901	357,258	275,444	247,699	198,320	198,320	2.2%
2019	632,391	505,913	470,499	352,874	317,587	254,069	254,069	2.8%
2020	771,622	617,297	574,087	430,565	387,508	310,007	310,007	3.4%
2021	903,953	723,162	672,541	504,406	453,965	363,172	363,172	3.9%
2022	1,024,713	819,770	762,387	571,790	514,611	411,689	411,689	4.4%
2023	1,132,355	905,909	842,495	631,872	568,684	454,948	454,948	4.8%
2024	1,223,458	983,556	914,717	686,038	617,434	493,947	493,947	5.2%
2025	1,316,357	1,053,085	979,370	734,527	661,075	528,850	528,850	5.5%
2026	1,337,328	1,117,863	1,033,612	779,709	701,738	561,391	561,391	5.7%
2027	1,473,661	1,178,929	1,095,404	822,303	740,073	592,058	592,058	6.0%
2028	1,545,620	1,236,456	1,149,941	862,456	776,210	620,958	620,958	6.2%
2029	1,613,966	1,291,173	1,200,791	900,593	810,534	648,427	648,427	6.4%
2030	1,677,600	1,347,080	1,248,135	936,101	842,491	673,993	673,993	6.6%
2031	1,733,195	1,391,355	1,293,951	970,471	873,424	698,739	698,739	6.7%
2032	1,799,322	1,439,457	1,338,695	1,004,021	903,619	722,895	722,895	6.9%
2033	1,853,858	1,487,085	1,382,990	1,037,243	933,518	746,815	746,815	7.0%

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High Electric Sales Forecast (Excerpt From 2013 Ameren MO Study)

Economic Growth

Another major driver for the analysis is the economic growth assumption in the baseline projection. The reference case aligns with the assumptions used for Ameren's load forecast. For this sensitivity analysis, a low-high band was developed.

- For the low load growth case, customer growth was assumed to be flat in each sector.
- For the high load growth case, customer growth was 20% over the reference case in each year.

As expected and shown in Table 7-3, the potential savings are lower in the low economic case and higher in the high economic case.

Table 7-3 Comparison of Baseline Projection, MAP and RAP for Economic-Growth Sensitivity

	2016	2017	2018	2025	2030
RAP Potential Energy Savings (GWh)					
Reference case	339	561	806	2,697	3,958
Low load growth	301	492	690	2,180	3,155
High load growth	421	690	1,000	3,383	4,861
MAP Potential Energy Savings (GWh)					
Reference case	510	833	1,179	3,753	5,377
Low load growth	452	729	1,018	3,026	4,278
High load growth	635	1,029	1,466	4,719	6,616

KCP&L MO Study Assumes a **1.0% CAGR sales forecast**. Ameren MO Study Assumes **0.6%**. Could Account For As Much As **20% Increase In KCP&L MO Potential**. However, This Difference Is Not Quantified In This Analysis.

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Higher Avoided Costs (Excerpt From 2013 Ameren MO Study)

Table 7-2 EE Potential - Comparison of Avoided Cost Sensitivity Cases (GWh)

	2016	2017	2018	2025	2030
RAP Potential Energy Savings (GWh)					
Reference case	339	561	806	2,697	3,958
Higher avoided costs	395	650	932	2,968	4,229
Increase in potential savings	56	89	126	270	271
RAP Potential Energy Savings (% of Baseline)					
Reference case	1.1%	1.8%	2.6%	8.4%	11.7%
Higher avoided costs	1.3%	2.1%	3.0%	9.2%	12.5%
Increase in potential savings	0.2%	0.3%	0.4%	0.8%	0.8%
MAP Potential Energy Savings (GWh)					
Reference case	510	833	1,179	3,753	5,377
Higher avoided costs	592	963	1,360	4,116	5,727
Increase in potential savings	82	130	181	363	350
MAP Potential Energy Savings (% of Baseline)					
Reference case	1.7%	2.7%	3.8%	11.6%	15.9%
Higher avoided costs	2.0%	3.2%	4.4%	12.8%	17.0%
Increase in potential savings	0.3%	0.5%	0.6%	1.1%	1.0%

Avoided Costs For KCPL and Ameren MO Are Highly Confidential and not published. Assuming Costs Are Not An Order of Magnitude Different, Higher Avoided Costs For KCPL Could Increase Potential Between KCPL and Ameren MO By 7%. *This difference is not quantified in this analysis.*

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High Level Final Observations

KCPL MO	Realistic Achievable Potential							
	Energy Efficiency	20% Deduction	Opt-Out Out	No Natural Gas	Adjust For EM&V	Adj. For Prog. Pot.	Total	% of Baseline
2014	60,448	48,359	44,974	33,730	30,357	24,285	24,286	0.3%
2015	142,326	113,851	105,891	79,418	71,476	57,181	57,181	0.6%
2016	243,564	194,851	181,211	135,508	122,318	97,854	97,854	1.1%
2017	361,950	289,560	269,291	201,568	181,771	145,417	145,417	1.6%
2018	493,627	394,901	367,258	275,444	247,899	198,320	198,320	2.2%
2019	632,391	505,913	470,439	352,874	317,587	254,069	254,069	2.8%
2020	771,622	617,297	574,087	430,565	387,508	310,007	310,007	3.4%
2021	903,953	723,162	672,541	504,406	453,965	363,172	363,172	3.9%
2022	1,024,713	819,770	762,337	571,790	514,611	411,689	411,689	4.4%
2023	1,132,336	905,909	842,495	631,872	568,684	454,948	454,948	4.8%
2024	1,229,458	983,565	914,717	685,038	617,434	493,947	493,947	5.2%
2025	1,316,357	1,053,086	979,370	734,527	661,075	528,860	528,860	5.5%
2026	1,397,328	1,117,853	1,039,612	779,709	701,738	561,391	561,391	5.7%
2027	1,473,651	1,178,929	1,095,404	822,303	740,073	592,058	592,058	6.0%
2028	1,545,620	1,235,436	1,149,941	862,456	776,210	620,968	620,968	6.2%
2029	1,613,966	1,291,173	1,200,791	900,993	810,534	648,497	648,497	6.4%
2030	1,677,600	1,347,080	1,248,135	936,101	847,351	673,933	673,933	6.6%
2031	1,739,195	1,391,356	1,293,961	970,471	879,424	698,739	698,739	6.7%
2032	1,799,322	1,439,457	1,338,695	1,004,021	903,619	722,835	722,835	6.9%
2033	1,858,858	1,487,086	1,382,990	1,037,243	935,518	746,815	746,815	7.0%

The Ameren MO Potential Study starts in 2016 rather than 2014. When 2014 and 2015 are removed from the KCPL Potential study the **cumulative RAP in 2033 is 6.4%** when normalized to the Ameren MO study. Additional adjustments for different load forecast growth rates and different avoided costs were not made. Conversely, if the Ameren MO DSM Potential study was normalized to the KCPL study, Ameren MO estimates of potential would increase commensurately.