BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of an Investigation of the Cost To Missouri's Electric Utilities Resulting From Compliance with Federal Environmental Regulations.	))))	File No. EW-2012-0065

Ameren Missouri's Reply to Certain Stakeholder Responses

COMES NOW Union Electric Company d/b/a Ameren Missouri (Ameren Missouri or Company) and, as provided for by the Commission's orders in this docket, hereby submits the attached Reply to a portion of the August 25, 2014 Responses from other stakeholders to questions previously posed by the Commission in this docket.

Respectfully Submitted,

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CERTIFICATE OF SERVICE

The undersigned certifies that true and correct copies of the foregoing have been e-mailed or mailed, via first-class United States Mail, postage pre-paid, to the Staff counsel and the Office of the Public Counsel, on this 16th day of September, 2014.

/s/ James B. Lowery

Ameren Missouri Reply to NRDC and Sierra Club Responses
Submitted to the MPSC on August 25, 2014

PLANT ENERGY EFFICIENCY

NRDC Response

In the NRDC submission dated August 25, 2014, the following statements were made:

"EPA applied a conservative and uniform national and regional methodology in determining cost-effective emissions reductions achievable through power plant operational efficiency improvements. This methodology examined the most current literature studying power plant efficiency…"

Reply: Ameren Missouri disagrees that the methodology used by the EPA was "conservative" as discussed in our original response to this matter. In addition, many of the efficiency improvements noted in the "most current literature" have already been applied/installed at Ameren Missouri's coal-fired plants that are slated to remain in operation in 2030. Therefore, Ameren Missouri does not agree that a "uniform" methodology is appropriate for setting realistic efficiency improvement goals for each state/utility.

Sierra Club Response

In the Sierra Club's August 25th submission the following statements were made:

"The Sierra Club has done a significant amount of research into heat rate improvements at coal-fired power plants, and concludes that EPA's target of 6% relative heat rate improvement is achievable."

"EPA's estimate of achievable emissions reductions associated with heat rate improvements is supported by numerous studies, and by EPA's analysis of the costs and associated improvements in heat rate that can be attributed to equipment and system upgrades. EPA's 6% estimate is based on literature reviews, input from engineering experts, vendors, and plant operators, and most importantly, a detailed statistical analysis of emission data that was corrected to account for emission rate variability associated with weather, load, and operational and maintenance practices. EPA used that information to estimate the level of heat rate efficiency improvement achievable if each plant operated under recommended operation and maintenance conditions (*i.e.*, best practices). Based on that analysis, EPA concluded that an estimated 4% reduction in heat rate might be achieved on a coal-steam unit. EPA then estimated an additional 2% reduction associated with the installation and use of certain equipment upgrades.

As EPA acknowledged, however, that 6% estimate is likely conservative, and most EGUs could achieve even greater reductions. Indeed, EPA excluded from its projection some of

the most effective techniques for improving heat rate efficiency, such as turbine blade replacements. Overall, a greater level of efficiency improvement is likely if inexpensive equipment upgrades (4%) and more capital intensive projects, such as turbine blade replacements, are applied to EPA's initial 4% estimate associated with operations and maintenance improvements."

Reply: As stated in Ameren Missouri's original response on these issues, Ameren Missouri disagrees that the 6% heat rate improvement is achievable. Ameren Missouri reviewed the exhibits included as part of the Sierra Club response. Many of the exhibits deal with turbine upgrades. In fact, Sierra Club explicitly calls out turbine projects in their response as shown above: "Indeed, EPA excluded from its projection some of the most effective techniques for improving heat rate efficiency, such as turbine blade replacements." ***Ameren Missouri agrees that turbine blade replacements are an excellent opportunity for heat rate improvement. In fact, Ameren Missouri has already completed that project type on ALL of the units that are slated to remain in operation in 2030. Sierra Club's Exhibit B actually discusses some of the turbine blade replacement work that was completed at our Labadie Energy Center. Since these turbine blade replacements have already been completed, this improvement opportunity is not available to Ameren Missouri. The above discussion stresses a fundamental flaw in the EPA's one-size-fits all proposal; the amount of heat rate improvement available on each unit, and hence the improvement available in each state, can vary significantly based on numerous factors including what efficiency improvements have already been made.***

Finally, on page 15, Sierra Club states:

"As discussed above, EPA's estimate of emissions reductions associated with heat rate improvements is unduly conservative. In particular, EPA's proposed power plant efficiency improvements ignore capital projects such as turbine blade replacements, and underestimate the pollution reductions available through operational changes. EPA should also require existing gas plants to make cost-effective efficiency upgrades. For coal plants, EPA should set the standard based on at least 7-10% efficiency improvements instead of the currently proposed 6% projection."

As outlined above, and in Ameren Missouri's original response on this issue, Ameren Missouri believes that the 6% heat rate improvement goal is not achievable for the Ameren Missouri fleet. Sierra Club again points to turbine blade replacements as a reason to increase the target goal. That type of project has already been conducted on ALL of the Ameren Missouri units that are slated to remain in operation in 2030. Therefore, increasing the standard to 7-10% for Ameren Missouri, and in our opinion most utilities and states, is unsupported.

Sierra Club Response – Exhibit D

Exhibit D consists of a paper at a 2009 EPRI heat rate conference by Dick Storm. The paper deals with coal fired boilers and improving heat rate by focusing on combustion optimization.

Reply: Mr. Storm is well known in the industry and has for many years offered his opinions on how combustion should be optimized. Most of his experience is with large wall fired boilers burning eastern bituminous coals and much of what he states is appropriate for boilers that burn those fuels. However, for tangentially fired boilers (T-fired) burning sub-bituminous PRB coal (most of Ameren Missouri's coal fleet) much of the advice does not apply to these types of units at all Further, even less or almost none of it has any applicability to the cyclone boilers at Sioux, which are fundamentally different than wall-fired boilers.

The paper presented claims heat rate improvements of 300 to 500 btu/kw-hr are achievable for "typical" coal plants. The 10 items in the paper to optimize are: air in leakage, pulverizer performance, optimization of air flow, balance of air and fuel flows, air heater leakage, reheater sprays, reheater steam temperature, superheat spray, superheat temperatures, and carbon in ash. It is Ameren Missouri's opinion, that while optimization of these parameters is important, this sort of improvement on Ameren Missouri's boilers is not possible. Ameren Missouri boiler efficiencies are generally at or very near design efficiencies when changes due to fuel switching from original design bituminous coals to currently burned sub-bituminous coals are taken into account. A more detailed discussion of the parameters above is included below.

Air in leakage by itself is a small player on unit efficiency that mostly impacts auxiliary power requirements a small amount by increasing fan loading. The leakage above that which can be reasonably achieved would be expected to have a small efficiency impact on most of Ameren Missouri's units. Excessive air in leakage can impact slagging and fouling within the boiler, which can in turn affect steam temperature and sprays and other parameters referred to above. Air heater leakage has a similarly small impact on efficiency as it is mainly an impact on auxiliary power from fan loading. Air heater leakage will not impact slagging or fouling. Again, the impact on unit efficiency from air heater leakage would be small.

Generally, Ameren Missouri pulverizers are maintained on regular outage intervals and performance measurements such as fineness are regularly taken. We have seen impacts on combustion occasionally but these are the exception rather than the rule and have little impact on the performance parameters listed. Likewise, Ameren Missouri does not routinely have issues with slagging and fouling in the boiler that impact performance in the areas of steam temperatures, spray flows, or on other performance parameters. This is a result of proper sootblowing, installing additional sootblowers as required, good combustion optimization (outlined below), along with boiler components designed to minimize slagging and fouling impacts.

Generally speaking, steam temperatures on Ameren Missouri boilers are at design with minimal or expected spray flows. No boiler that operates at design steam temperatures

has zero spray flow. Also, it would be rare for a boiler to have high spray flows and low steam temperatures because if temperatures were low, spray flows would be reduced until temperatures were at design. As a result, there are little or no efficiency gains to be realized on Ameren Missouri boilers in the area of steam temperatures or spray flows.

For optimization of air flow and the balance of air and fuel flows, these impact the combustion process directly and impact the carbon in the ash. Carbon in the ash is a direct loss on boiler efficiency. CO emissions from the boiler can act as an indicator of poor combustion and possible higher carbon in ash. Ameren Missouri uses neural net optimizers on most of our units to continually optimize the combustion process with the goal of lower NOx, while at the same time, maintaining reasonable CO emissions. For our T-fired units, our carbon in the fly ash is usually less than 0.5%, which means the efficiency loss for carbon in ash is less than 0.1%. This is due not only to our optimization, but also the PRB coal which we burn which has a high volatility and burns more readily. It would be difficult to achieve values this low when burning bituminous coals or on wall fired units.

In summary, Ameren Missouri disagrees that improvements of 300 to 500 btu/kw-hr, or roughly 3-5%, are achievable due to combustion optimization. Actual losses from the parameters identified in this paper are much smaller for Ameren Missouri units, on the order of perhaps 0.5%, and better than most other utility boilers. This is in part due to the design of the boilers as well as the fuel burned, but also due to the continual neural net combustion optimization Ameren Missouri employs. Only some portion of this actual loss could be recovered and likely at a very significant expense.

RENEWABLE ENERGY

Sierra Club Responses

III. Building Block 3 – Increase generation from zero- and low-emitting sources

a. Is the EPA's assumption of 1.3 million MWh of renewable generation in 2012 correct?

Sierra Club believes that EPA may have underestimated the potential for renewable energy generation because the proposed rule does not explicitly account for distributed solar resources installed across the state of Missouri.

Reply: Ameren Missouri has assumed that it was EPA's intent to include only non-customer-owned renewable generation in its baseline. Under that assumption, the 1.3 million MWh assumption is accurate.

b. How could Missouri grow renewable generation from 1.3 million MWh to 2.8 million MWh? What would be the difference in cost of taking this path versus the

business-as-usual path? What would be the difference in rate impact versus the business-as-usual path?

Business-as-usual:

When comparing the cost of a lower-carbon portfolio to "business-as-usual" it is critically important to fully and accurately account for all costs associated with a business-as-usual scenario. As Sierra Club has repeatedly cautioned, Missouri's very large coal fleet faces significant investment in air and water pollution controls to bring the plants into compliance with existing and proposed regulations. In its report to the Commission, PSC Staff recognized that "[b]ased on [] current information, not including effluent or coal combustion residuals (CCR) cost estimates, the overall capital cost to Missouri electric utilities and potentially their customers would be in the approximate range of $2,968,100,000 to $3,211,100,000. Including effluent and CCR cost estimates would raise the total capital cost range to $4,758,130,000 to $5,001,130,000."[15] When the cost of compliance with EPA's impending effluent limitation guidelines and coal combustion residual rule are considered, the overall environmental compliance cost to Missouri utilities balloons to approximately $12.6 billion.[16]

In light of these costs and risks facing coal-fired generation, continuing on a business-as-usual path is not tenable, and the utilities understand this. Indeed, Missouri utilities are already taking steps to mitigate business-as-usual costs by phasing out old coal-fired generation without new capacity, given that the utilities are long on capacity. Ameren, for example, recently announced the retirement of its Meramec coal-fired power plant with no new generation likely needed in its wake.[17] At the same time, wind energy is abundant and cheap. For every coal unit that is retired, Missouri ratepayers can invest the money saved on costly retrofits into abundant and inexpensive, zero-emission clean energy. [18]

Cost-saving clean energy:

In order to both protect Missouri ratepayers and evaluate the expansion of renewables in Missouri, the PSC must ensure that utilities engage in comprehensive, forward-looking planning. Failing to do so elevates the risk that large investments in retrofitting coal units will turn out to be imprudent and leave the Commission with the difficult choice of whether to pass those costs on to ratepayers or force utility shareholders to bear them after they have already been incurred. To obviate this risk, the PSC should simply ensure that utilities follow its integrated resource planning ("IRP") rules. For example, Commission rules specify that "renewable energy resources on the utility-side of the meter, including a wide variety of renewable generation technologies" are supply-side resources and "shall be considered as supply-side resource options."[19] Accordingly, utilities are required to "collect generic cost and performance information *sufficient to fairly analyze*" renewable supply-side resource additions. CSR 240-22.040(1) (emphasis added). Unfortunately, utilities are failing to supplement supply-side resources with renewables such as low-cost wind power-purchase agreements (PPAs), as the Sierra Club noted most recently in comments filed regarding KCP&L's and GMO's 2014 IRP Updates.[20]

Beyond selecting supply-side resources to meet *capacity* needs, utilities should consider whether renewable PPAs represent low-risk, low-cost options for meeting its customers' *energy* demands. As an example, both KCP&L's and GMO's recent experiences demonstrate that long-term wind PPAs can secure energy at competitive prices.[21] When the wind is blowing and the wind energy delivered is the least-cost option, utilities can either temporarily ramp down coal and gas generation or sell any excess energy off-system. Either option could be a boon to ratepayers, who would benefit from the resulting decreased fuel and environmental compliance costs and/or from the value of the sales. These effects might also reduce the net present value rate of return ("NPVRR") of a given IRP plan. Further, utilities must consider distributed generation technologies as candidate resource options. This Commission's rules explicitly require utilities to analyze distributed generation technologies during the IRP process: "supply-side candidate resource options that the utility passes on for further evaluation in the integration process shall represent a wide variety of supply-side resource options with diverse fuel and generation technologies, including a wide range of . . . technologies for distributed generation."[22]

Unfortunately, this rule remains widely under-implemented. For example, KCP&L and GMO are required to analyze "candidate resource options" more thoroughly than other potential resource options, and to include them in one or more alternative resource plans.[23] Yet, for at least the past three years, both utilities have omitted distributed generation technologies from their lists of supply-side candidate resource options during the IRP and annual update processes.[24]

The Commission should order utilities to comply with 4 CSR 240-22.040(4) by evaluating a range of distributed generation technologies and analyzing whether programs to support distributed generation could lower the NPVRR for ratepayers. In particular, utilities should model resource plans that incorporate a variety of levels of renewables to supply energy in addition to existing supply-side resources that meet capacity needs. When wind is anticipated to be available, models should assume either: 1) decreased generation from other resources, such as from coal and gas units—and therefore decreased fuel and compliance costs—and/or 2) increased off-system sales. Further, utilities should develop realistic assumptions for the cost of wind in order to fairly analyze this resource, as well as evaluate distributed generation technologies as candidate resource options. Missouri's utilities know that clean energy and energy efficiency can save customers money. Ameren is already deploying a set of efficiency programs that, once implemented over the next three years, will lead to its customers saving $500 million on energy bills. KCP&L announced in January that new wind energy and an investment in energy efficiency could save its customers $1 billion. There are stories like this from around the region. MidAmerican in Iowa, Xcel in Minnesota, and Lincoln Electric System in Nebraska have all announced significant customer savings by adding wind energy to their portfolios.

New clean energy is not just the result of state renewable energy standards; clean energy is good business and is responsive to consumer demand. Missouri's AECI is not required to meet the state's RES, yet it continues to add wind because it makes good business sense. The city of Springfield invested in nearly 5MW of solar because the investment

was a smart one for the city. In 2004, voters in Columbia approved a Renewable Energy Standard for Columbia Water & Light (CWL). Independence Power & Light is currently at 5% renewable energy, and according to the city's 2011 Master Plan, IPL plans on reaching 10% renewable by 2018. Last month, the Independence City Council adopted a resolution affirming the Master Plan's 10% by 2018 goal and setting a new 15% renewable goal by 2021. If the comparison is done well to a true business-as-usual scenario, Sierra Club believes that Missouri ratepayers stand to save money if the state shifts away from coal and invests the avoided retrofit costs instead in clean energy.

Reply: Ameren Missouri notes that Sierra Club does not appear to have responded to the questions as to how Missouri could expand renewable generation to 2.8 million MWh or what additional cost might be incurred, regardless of how "business as usual" is defined. Ameren Missouri notes that compliance with the RES does not require that renewable generation be sited in Missouri, nor is it based on the presumption that exclusively siting all renewable generation for RES compliance in Missouri is possible or likely. The RES allows for purchases of RECs, purchases of renewable energy (with RECs), and use of RECs from utility-owned renewable generation from both inside and outside the state of Missouri. Compliance with the RES is also subject to a 1% rate impact limitation that Ameren Missouri has found to be a constraint on meeting the RES portfolio targets. Ameren Missouri also notes that the RES applies only to investor-owned utilities in Missouri. Ameren Missouri stands by its initial response as to how the target value could be achieved and what the cost implications would be. Ameren Missouri takes no position at this time with respect to any other assertions made by Sierra Club on this point and reserves the right to take a position on such points in the future.

c. EPA's proposed rule solicits comment on an alternative method of calculating the renewable energy target under building block 3 based on economic and technical potential of renewable energy generation in each state. Under this alternative method in the proposed rule, Missouri's RE target under building block 3 would be 12.8 TW-h of renewable energy beginning in 2020 (0.5 TW-h of Utility scale solar, 4.9 TW-h of wind generation, 0.2 TW-h of biomass, and 7.2 TW-h of hydropower) (vs. 2.7 TW-h of renewable energy generation by 2030 in the proposed method). Could Missouri achieve this alternative RE target. If so, at what cost?

At the outset, Sierra Club notes that EPA's estimate of renewable energy under building block 3 is an estimate of the renewable energy that is reasonably achievable for each state. The Clean Power Plan does not require Missouri to achieve 12.8 TWh of renewable energy beginning in 2020. That is merely an estimate of the amount of renewable energy Missouri can reasonably be expected to achieve. The proposed rule makes clear that the state ultimately has broad discretion to choose any combination of diverse carbon reduction measures, so long as the state meets its overall carbon reduction target. Although EPA's estimate is not a firm target, Sierra Club believes that EPA's 12.8 TWh projection for renewable energy is achievable. Sierra Club notes that Missouri's RPS is already slated to add 8,503,685 MWhs of renewable energy by 2030—or approximately 70% of EPA's estimated achievable renewable energy generation. With an extension of

the RPS or additional purchases to make up the difference, Sierra Club is confident Missouri would be able to achieve 12.8TWh of renewable energy by 2030, should Missouri choose to use this path a compliance option.

Reply: Ameren Missouri notes that Sierra Club has relied, as it did in its response to part b., on expected RES compliance to assess the probability of achieving the alternate target. Ameren Missouri notes again that compliance with the RES allows for purchases of RECs, purchases of renewable energy (with RECs), and use of RECs from utility-owned renewable generation from both inside and outside the state of Missouri and that RES compliance is subject to a 1% rate impact limitation. Ameren Missouri stands by its initial response as to whether the target value could be achieved and what the cost implications could be. Ameren Missouri takes no position at this time with respect to any other assertions made by Sierra Club on this point and reserves the right to take a position on such points in the future.

NRDC Responses

Missouri also has ample renewable energy resources to achieve far more than U.S. EPA assumed when setting the target for Missouri.

EPA's projection of 2.8 million MWh of Renewable Energy for Missouri by 2030 is lower than the state could easily achieve through existing market forces and policies alone. While Missouri's wind resource is smaller than that of Kansas or Iowa, it is still substantial, and the 14th best in the country. NREL estimates that Missouri could generate over 810 million MWh/year from wind power alone, on the conservative assumption that only 80-meter turbines with at least a 30% capacity factor are built. This is nearly 300 times more renewable energy than what EPA projects, and about 10 times Missouri's total electrical load. In order to meet EPA's extremely modest target of 2.8 million MWh, Missouri would need to install only 1,066 MW of new wind power by 2030. By comparison, Missouri already had 459 MW of wind power online as of 2010, all of which came online in a brief 3-year period. To meet EPA's projection, Missouri would merely need to barely double this capacity over the next 16 years with falling prices and improving technology.

In addition to Missouri's strong wind resource, it also has a very good solar resource. Nevertheless, Missouri currently has only 49 MW of solar PV. But even this modest solar deployment employs nearly 3,000 people at 72 companies. New Jersey, with a smaller solar resource base, has over 1,087 MW of solar already. Assuming Ameren's conservative 14.4% (as opposed to NREL's 19.3%) capacity factor, Missouri's solar PV systems currently provide nearly 62,000 MWh of energy per year. If Missouri were to even match, by 2030, New Jersey's *current* level of solar PV deployment, it would be half way to the 2.8 million MWh RE in EPA's projection. Ameren has announced plans to build an additional 5.7 MW solar array, which would increase statewide solar generation by 10%, but this small increase does not even begin to scratch the surface of the state's massive solar potential. Nationwide, the solar PV market grew by 41% in 2013, representing 29% of all new installed capacity nationwide.

Missouri's voter-enacted Renewable Electricity Standard calls for the state's investor-owned utilities to derive at least 15% of their energy sold from renewable resources by 2021 Based on Projected 2030 IOU sales of 67.4 million MWh, the RES would require 10.1 million MWh per year of RES-qualifying energy (8.9 million, excluding existing large hydroelectric). Missouri's target for non-hydro renewable energy from IOUs only is therefore about three times as high as EPA's projection for the entire state.[1] If Missouri merely meets its RES targets with new renewables beginning in 2012, it can meet between 55% and 77% of its compliance obligations under the Clean Power Plan from this policy alone. (See Appendix A).

EPA applied a conservative and uniform national and regional methodology in determining cost-effective emissions reductions achievable through power plant operational efficiency improvements. This methodology examined the most current literature studying power plant efficiency, which identified opportunities for cost-effective upgrades in the range of 8.7% to 15%. Rather than adopt these more aggressive findings, EPA performed a comprehensive statistical analysis of actual historic plant operations over an 11-year period and examined industry best practices and equipment upgrade options. This analysis examined 884 power plants responsible for 96% of all carbon emissions during the study period. This study determined that, on average, employing operational best practices can provide a 4% improvement in plant efficiency at no cost or low cost, and that equipment upgrades can provide an additional 2% efficiency improvement, for a total of 6% improvement. EPA determined these upgrades to be cost effective purely on the basis of fuel cost savings at current coal prices. Additional upgrades may become cost effective if the price of coal rises.

Like the EPA's projected Energy Efficiency and Renewable Energy projections, the plant efficiency projections do not take into account granular state-level policies and technical and economic potential improvements. Individual states with many older power plants are likely to find potential for greater efficiency gains than the 6% improvement projected by EPA at many plants, but the least efficient plants may also be better candidates for reduced dispatch or retirement than for renewed investment in efficiency upgrades. For this reason, Missouri should not assume that a uniform efficiency increase of 6% per power plant should be a component of its implementation plan. Rather, it should pursue emissions reductions strategies that will provide the state with maximum economic, health, and environmental benefits, so that it can meet its performance standard in a manner most suited to local conditions and priorities. The state should therefore maximize emissions reductions from existing statewide clean energy policies before pursuing additional reductions from plant upgrades, which may be more costly and may imprudently prolong the life of the state's oldest and most polluting resources.

[1] In-state energy multipliers, reliance on RECs, and resources included in Missouri's RPS, but potentially excluded for the purposes of Clean Power Plan compliance may somewhat reduce the total amount of RPS-qualified energy that Missouri can apply to meeting its targets, but it is clear that Missouri is in a strong position to vastly outstrip EPA's projection even considering these limitations on the RPS.

Reply: Ameren Missouri notes that NRDC has relied in part on estimates of potential that are unconstrained by any factors other than raw wind resources. Other factors that may constrain the development of wind generation include capital and financing constraints, technical and logistical constraints (labor, material, management and other resources), site permitting and land lease agreements and the fact that the current RES compliance requirement has a 1% rate cap limit. Ameren Missouri notes that NRDC has estimated an amount of additional wind capacity (1,066 MW) needed to achieve the 2.8 million MWh target that is higher than that estimated by Ameren Missouri. If this is the case, it would be more challenging to site and construct sufficient wind generation to meet the 2.8 million MWh target. Ameren Missouri takes no position at this time with respect to any other assertions made by NRDC on this point and reserves the right to take a position on such points in the future.

CUSTOMER ENERGY EFFICIENCY

NRDC Responses

EPA adopted a very conservative approach to in its estimates regarding how much efficiency could be achieved in each state. For example, EPA assumed that Missouri would do nothing on energy efficiency between 2012 and 2017, which is certainly not the case given that KCPL, GMO and Ameren programs are delivering substantial savings now. EPA also assumed that Missouri would only ramp up to a 1.5% annual reduction achieving only a 9 percent reduction in demand cumulatively by 2030, and assumed nothing with respect to additional efficiency from building codes, appliance standards, or CHP deployment that can happen over and above the utility programs. By contrast, ACEEE estimates that Missouri could use efficiency to reduce carbon by 21%.

In fact, the current rules implementing the Missouri Energy Efficiency Investment Act (MEEIA) set soft targets which, if met, would result in a cumulative reduction in load of 18% in Missouri for the major investor owned utilities by 2030 relative to a businesses-as-usual scenario. Doing so would require only that Missouri ramp up their investments in energy efficiency gradually to where leading states across the country are already today. Moreover, this 18% reduction is achievable through utility programs alone, and assumes nothing with respect to appliance standards, building codes, private financing and deploying combined heat and power projects. We are aware that the Missouri utilities have asserted that they can only achieve a portion of this savings, and NRDC has commented in the past to this extensively regarding the analytical problems inherent in the recent potential studies performed by Ameren. This rule gives Missouri another opportunity to evaluate the potential for cost-effective efficiency in Missouri.

A final note on Missouri's current experience with energy efficiency -- there has been far too little focus on how successful these programs have actually been. In fact, these programs are working to make our electric system cleaner, more reliable, and more affordable, and in the process, we are seeing the beginnings of a robust energy efficiency industry in Missouri.

- Ameren's first programs under MEEIA saved 337 million kilowatt-hours in their first year, which will mean net savings of $140 million for its customers just from

this year's measures. This level of savings is more than 150% of the utility's first year savings goal, showing the potential to scale up savings quickly.

- KCPL just got approval for plans that will save customers $34 million, cutting carbon emissions by more than 100,000 tons. This program also adds an additional 25 million kilowatt-hours to GMO savings targets, approximately doubling the level of savings KCP&L is pursuing through these two affiliates.

Reply: The August 19, 2014 edition of the St. Louis Post-Dispatch, the day after the MPSC sponsored meetings for all stakeholders to respond to questions related to the EPA proposed GHG rules, printed the following quotation from NRDC:

"There's no reason they can't do four to five times as much as they're doing now" for energy efficiency, said Ashok Gupta of the Natural Resources Defense Council.

This statement has no basis in fact and blatantly overstates the potential for energy efficiency in Missouri. From the Ameren Missouri service territory perspective, the following table represents the annual energy efficiency load reductions that Ameren Missouri committed to achieving in its MEEIA Cycle 1 DSM programs covering the 3-year implementation period 2013-2015:

Table 1.2 Incremental Savings and Costs

	2013	2014	2015
Energy Delivery (MWH)	37,476,879	37,844,450	38,146,206
Energy Efficiency Savings (MWH)	240,397	255,445	297,260
System Peak (MW)	7,533	7,591	7,640
Peak Demand Reductions (MW)	39	54	77
Total Budget	$35,239,613	$45,965,915	$64,087,685
% MWH reduction (from energy delivery)	0.6%	0. 7%	0.8%
% MW reduction (from system peak)	0.5%	0.7%	1.0%

Note: The projected energy delivery, energy savings, system peak, and demand reductions are based on values at the meter.

The average annual percentage load reduction to be achieved is (0.6% + 0.7% + 0.8%)/3 = 0.7%.

Four times the MEEIA Cycle 1 average annual load reduction is 4 x 0.7% = 2.8%. Five times the MEEIA Cycle 1 average annual load reduction is 5 x 0.7% = 3.5%. Ameren Missouri is not aware of any electric utility or jurisdiction in the nation that has ever reported consistent annual energy savings in the 2.8% to 3.5% of annual sales range.

The 2013 Ameren Missouri DSM Potential Study was updated to reflect actual measure savings from 2013 programs and based on Ameren Missouri customer primary market research shows the following levels of the four types of energy efficiency potential:

Summary of cumulative, Net, Program-Level Efficiency Potential per 2014 IRP Filing*						
	2016	2017	2018		2025	2030
Baseline Projection (GWh)	30,249	30,449	30,694		32,228	33,721
Cumulative Savings (GWh)						
Realistic Achievable Potential	105	242	426		1,296	1,844
Maximum Achievable Potential	139	326	576		1,780	2,505
Economic Potential**	858	1,374	1,923		5,674	7,718
Technical Potential**	1,242	1,955	2,728		7,563	9,858
Cumulative Net Savings as a % of Baseline						
Realistic Achievable Potential	0.3%	0.8%	1.4%		4.0%	5.5%
Maximum Achievable Potential	0.5%	1.1%	1.9%		5.5%	7.4%
Economic Potential	2.8%	4.5%	6.3%		17.6%	22.9%
Technical Potential	4.1%	6.4%	8.9%		23.5%	29.2%

Technical potential is a strictly an academic construct with no real world application. It represents the savings due to energy efficiency measures that result if <u>all</u> of the most efficient, commercially available measures are adopted by customers, regardless of cost. If the average annual technical potential, which is based on statistically valid science, is 29.2%/15 = 1.95%, it is physically impossible to achieve anything higher on an average annual basis. NRDC's statement that Ameren Missouri could achieve "4 to 5 times" what it is currently achieving implies that Ameren Missouri could achieve average annual load reductions in the 2.8% to 3.5% range which is technically impossible much less even worthy of discussion as being remotely achievable.

NRDC's written comments to the MPSC are dated August 25, 2014. NRDC's position is that the EPA "adopted a very conservative approach to its estimates regarding how much efficiency could be achieved in each state." NRDC's position is based on the following four perspectives. Each NRDC perspective is then followed by Ameren Missouri's analysis.

<u>NRDC perspective No. 1: Exclusion of codes and standards:</u>

<u>Reply</u>: NRDC acknowledges that federal and state building codes and appliance efficiency standards happen over and above utility programs. NRDC, however, does not acknowledge that the impact of codes and standards are built into the electric sales

forecasts. Therefore, for NRDC to imply that the quantification of codes and standards as part of each state achieving the EPA's goals is a viable compliance option necessarily means that states would be double counting savings as energy efficiency programs and as embedded load reductions to the sales forecasts. That being said, if Missouri opts to include codes and standards in its compliance plan, Missouri should specify how they will quantify annual energy savings attributable to codes and standards towards meeting the EPA energy efficiency annual load reductions goals.

NRDC Perspective No. 2: EPA assumed Missouri would do nothing on energy efficiency between 2012 and 2017:

Reply: Ameren Missouri has reviewed the EPA models and modeling assumptions and the EPA technical guide and can find no reference to any assumption that EPA intended to provide any guidance relative to counting utility energy efficiency program savings starting in 2012 or any subsequent year towards meeting cumulative load reduction goals specified for 2030. However, should Missouri opt to include rationale to count Missouri utility program energy efficiency savings for years 2012-2016 in its compliance plans, Missouri should quantify those savings and propose alternative annual load reduction targets to meet the EPA's cumulative load reduction targets by 2030.

NRDC Perspective No. 3: ACEEE estimates that Missouri could use efficiency to reduce carbon by 21%

Reply: This is an obscure reference to an undated, unnamed ACEEE study with a carbon reduction estimate without a reference year attached. The relationship between the carbon reduction goal and the EPA cumulative energy efficiency load reduction goal for Missouri by 2030 is not addressed by NRDC. To the best of our knowledge, ACEEE conducted its only Missouri specific study titled "MISSOURI'S ENERGY EFFICIENCY POTENTIAL: OPPORTUNITIES FOR ECONOMIC GROWTH AND ENERGY SUSTAINABILITY
Dated August 2011, Report Number E114." The ACEEE report specifically calls for the following ramp rates in terms of annual energy efficiency load reduction potential: 0.3% in 2012, 0.5% in 2013, 0.7% in 2014 and 2015, and 1% in 2016. ACEEE recommended reconvening after 2016 to reach consensus on achievable annual load reduction targets for 2016 and beyond.

NRDC Perspective No. 4: MEEIA set soft targets which, if met, would result in a cumulative reduction in load of 18% in Missouri for the major investor owned utilities by 2030

Reply: The current rules implementing MEEIA set soft targets that have no analytic basis, no DSM potential study underpinnings, and are not based on any Missouri specific market research – demographic, psychographic or appliance saturation. Rather, the MEEIA soft targets mimic those states that have Energy Efficiency Resource Standards ("EERS") in place. NRDC states that leading states already today are meeting the aggressive EERS annual load reduction targets. The fact of the matter is that leading states with EERS in place have agreed to creative and aggressive approaches to report that they have met aggressive annual load reduction goals. The following matrix illustrates how EERS states are required by state law to report annual energy efficiency savings:

Provisions within each state EERS that impacts performance assessment											
	Rate Caps	Use Gross Savings	Credit for Renewables	Credit for Combined Heat and Power	Credit for Utility Infrastructure Improvements	Credit for Codes and Standards	Credit for Earlier Years EE Load Reductions	Credit for Demand Response as EE	Credit for Self Directed Energy Savings	Non-TRC Cost Effectiveness Test	Fuel Neutrality
Arizona											
Arkansas											
California											
Colorado											
Connecticut											
Hawaii											
Illinois											
Indiana*											
Iowa											
Maine											
Maryland											
Massachusetts											
Michigan											
Minnesota											
Nevada											
New Mexico											
New York											
North Carolina											
Ohio**											
Oregon											
Pennsylvania											
Rhode Island											
Texas											
Vermont											
Washington											
Wisconsin											

It is interesting to note that the state with the least creative and aggressive reporting requirements, Indiana, is the state that enacted legislation in 2014 to rescind its EERS mandates. Regardless, this matrix shows that if creative reporting approaches are allowed by the EPA for states to report annual energy efficiency savings, the EPA cumulative load reduction targets by 2030 may be able to be met. Creative and aggressive reporting includes the following:

- ***a. Report gross rather than net savings for energy efficiency programs***
- ***b. Take credit for achieving legislated building codes and appliance efficiency standards***
- ***c. Take credit for customer self-directed energy savings***
- ***d. Apply a multiplier to energy efficiency savings if demand response programs are also enacted***
- ***e. Take credit for utility infrastructure energy efficiency improvements***
- ***f. Take credit for combined heat and power energy savings as energy efficiency***
- ***g. Allow a portion of renewable energy to count towards meeting energy efficiency mandates***
- ***h. Use alternative cost effectiveness tests and avoided cost constructs to allow more energy efficiency measures to be cost effective***
- ***i. Take credit for prior year (prior to EERS standards effective dates) energy efficiency savings.***

If Missouri is willing to allow, and the EPA is willing to accept, creative and aggressive reporting approaches similar to those states where EERS is the energy efficiency operating model, Missouri may have a more realistic possibility of achieving the 2030 cumulative load reduction targets set by the EPA. That being said, the use of creative reporting of annual customer load reductions attributable to utility energy efficiency

programs will overstate the actual benefits received by customers directly attributable to utility sponsored energy efficiency program costs.

Sierra Club Responses

IV. Building Block 4 – Increase cumulative benefits of energy efficiency programs
a. What will it take for Missouri to achieve the demand-side EE targets in the proposed rule: Starting in 2017 ramp up incremental demand-side EE by 0.2% per year until it reaches 1.5% per year, and then continue achieving 1.5% incremental EE growth each year thereafter with cumulative demand-side EE savings of 9.92% of electricity sales in 2030? Please include in your response an analysis of the EPA's findings on energy efficiency potential in comparison to the utility's findings from its most recent potential study, and from actual results from MEEIA programs, if applicable.

Missouri utilities are already seeing tremendous energy savings—and customer savings— through use of the Missouri Energy Efficiency Investment Act (MEEIA). The law sets a target of offsetting 9.9% of Missouri's investor-owned electricity sales through energy conservation by 2020. If all Missouri utilities met the MEEIA goals, the state would be on track to meet its Clean Power Plan target about *nine years* ahead of schedule.[25]

Resource planning processes are again critical when considering energy efficiency. In evaluating the economics of its existing supply-side resources, utilities must allow demand-side resources to compete directly against them. To the extent that demand-side resources are less costly, utilities must incorporate them into their preferred resource plans to maximize benefits to ratepayers. Further, utilities must complete DSM potential studies, consistent with the requirements of 4 CSR 240-3.164(2). This process must allow for frequent and meaningful stakeholder input with a mechanism to address along the way. This is all important because, put simply, utilities are leaving energy savings on the table.[26]

The cost of demand-side resources continues to decline. Energy efficiency and demand response are low-cost resources that provide long-term, reliable resource adequacy benefits. MEEIA's full potential should be realized in order to maximize benefits to ratepayers, utilities, local businesses, and the environment. Despite utility efforts thus far, Missouri's enormous energy efficiency resource remains largely untapped. To illustrate, in 2009, the Federal Energy Regulatory Commission's ("FERC") National Assessment of Demand Response Potential found that if demand response efforts in Missouri were expanded statewide to a level defined by the study as "achievable participation," then by 2019 demand response could cost-effectively reduce Missouri's peak load by over 14% (2,982 MW).[27] The FERC study further found that, even if the only changes to demand response efforts made in Missouri were to take then-existing programs in some parts of the country and implement them in Missouri— which the study defined as an "expanded business-as-usual" scenario—the result would be a cost effective reduction in Missouri's peak load of 9% (1,899 MW) by 2019.[28] Moreover, in its 2013 State Energy Efficiency Scorecard, the American Council for an Energy-Efficient Economy ranked Missouri 43rd in the nation.[29] We urge the Commission to push Missouri utilities to move beyond their initial energy efficiency forays, forging a path forward where utilities can take advantage of economies of scale as they expand program offerings to ratepayers.

b. How could Missouri achieve the 8.7 million MWh of avoided generation attributable to energy efficiency used in EPA's calculation? What would be the difference in cost of taking this path versus the business-as-usual path? What would be the difference in rate impact versus the business-as-usual path?

As noted, the answer to this question requires the correct calculation of business-as-usual.[30] Additionally, the Commission should exercise its authority in IRP and rate dockets to ensure utilities are not constraining energy efficiency in its modeling. Sierra Club has commented on this in past dockets, and believes utilities are leaving cost-effective energy efficiency on the table as they constrain planning and economic models to avoid choosing EE as a resource.

Reply:

1. ***MEEIA Rule Soft Targets: Similar to the perspective of NRDC, the Sierra Club states that if all Missouri utilities met the MEEIA rule targets Missouri would be on track to meet its Clean Power Plan target about nine years ahead of schedule. Ameren Missouri's response is identical to its response to NRDC. The MEEIA targets have no analytic basis, no DSM potential study underpinnings, and are not based on any Missouri specific market research – demographic, psychographic or appliance saturation. Rather, the MEEIA soft targets mimic those states that have Energy Efficiency Resource Standards ("EERS") in place. NRDC states that leading states already today are meeting the aggressive EERS annual load reduction targets. The fact of the matter is that leading states with EERS in place have agreed to creative approaches to "report" that they have met aggressive annual load reduction goals.***

2. ***Declining cost of demand-side resources: In addition, the Sierra Club makes the statement "The total cost of demand-side resources continues to decline." Ameren Missouri DSM Potential studies, on the other hand, show a significant increase in DSM program costs as incremental energy savings for key measures such as light bulbs shrink due to ever increasing federal lighting efficiency standards while incremental costs to market the post CFL lighting technologies, i.e., LEDs, increase. The levelized cost of energy efficiency has increased substantially from earlier levels.***

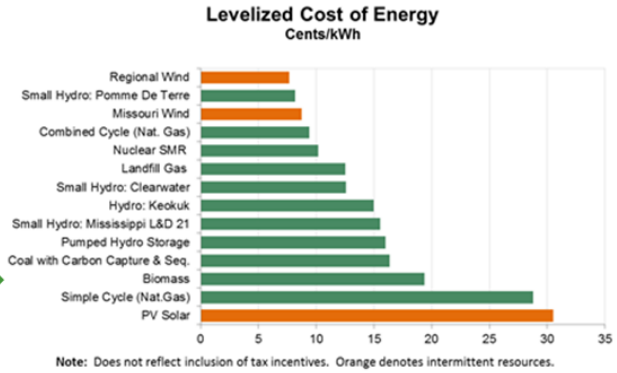
   More striking, however, is the incremental cost of going from realistic to maximum achievable ("RAP" and "MAP") energy efficiency potential. The following slide illustrates the levelized cost of energy efficiency for the incremental energy savings in going from RAP to MAP:

Levelized Cost ($/MWh)		
Through	2034	2044
RAP	57	40
MAP	81	57

Levelized Incremental Cost ($/MWh)		
Through	2034	2044
RAP-->MAP	148	106

The levelized costs of incremental energy savings from MAP relative to RAP is $106/MWh or 10.6 cents per kWh

Higher levelized cost than the top supply side options, including wind, natural gas and nuclear

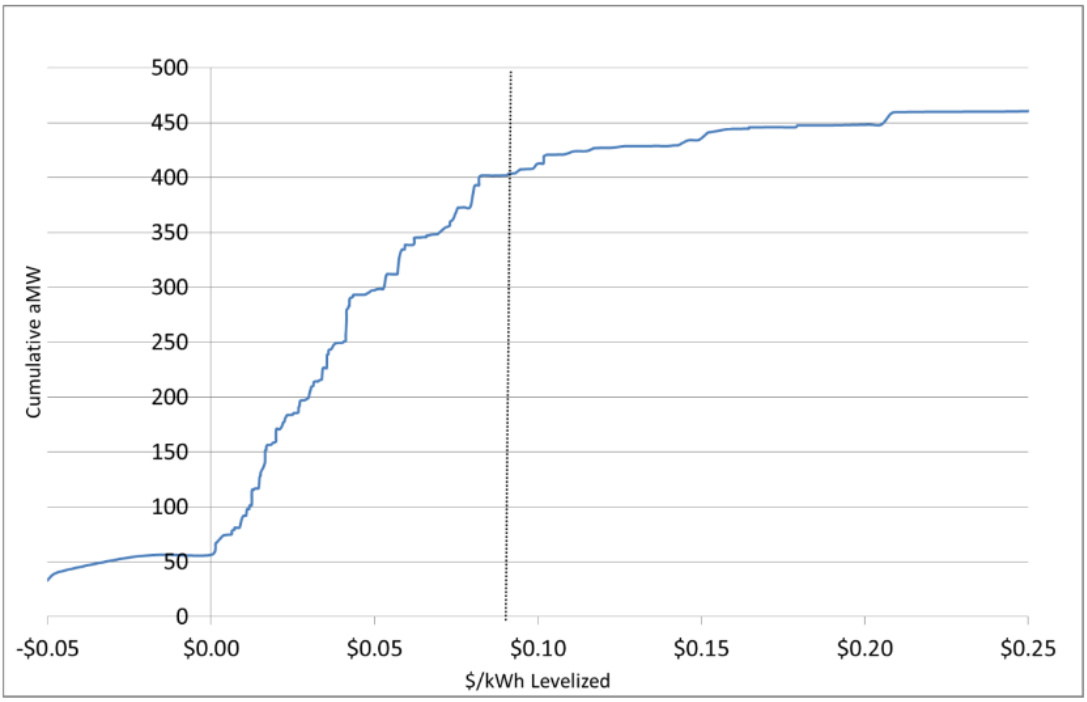


As the slide shows, the levelized cost of incremental energy savings from MAP relative to RAP is 10.6 cents per kWh which is a higher levelized cost than the leading supply side options. The same concept of the relatively high levelized costs of incremental energy savings from MAP relative to RAP is confirmed and replicated in the 10 DSM Potential studies that EPA used to establish average annual load reduction targets of 1.5%.

Aside from the EPA modeling assumptions that went into the development of Building Block 4, there is a plethora of information in the public domain about recent demand-side regulatory filings from utilities and energy efficiency organizations stating the energy efficiency program costs are on the rise. For example:

A. ***Indiana: Passed SB 340 which nullified Indiana's EERS requirements. Issues for the passage of the law included concerns that decreasing benefits and increasing costs of achieving EERS requirements may be detrimental to customers.***
B. ***Ohio: Passed SB 310 which is a two-year freeze on annual increases in standards for renewable energy and energy efficiency. Issues for passage of the bill were similar to those in Indiana:***
C. ***Florida: Florida's four main investor owned utilities proposed to scale back energy efficiency programs due to increasing costs and decreasing benefits.***
D. ***Kentucky: Kentucky's main investor owned utilities, KU and LG&E, note the following in their most recent regulatory filing: "The Companies project that the monthly bill impact of the new DSM/EE programs and program enhancements will be $4.68 for LG&E residential electric customers and $3.78 for KU residential electric customers using 1,000 kWh per month. The current DSM/EE charge for LG&E residential electric customers is $4.39 and $3.49 for KU residential electric customers."***
E. ***Portland General Electric ("PGE") 2013 IRP Plan: The 2013 PGE IRP plan shows the following energy efficiency supply curve which clearly shows significantly increasing levelized costs for energy efficiency:***

Figure 4-2: Achievable EE resource supply curve for PGE



F. MidAmerican: Showed increasing per unit costs for energy efficiency in its 2014-2018 five-year energy efficiency implementation plan.

G. LBNL: "The Cost of Saved Energy for Utility Customer-Funded Energy Efficiency Programs in the United States" February 2014: This study showed the difficulty, actually the impossibility, of estimating levelized costs of energy efficiency programs by state or by utility due to the fact that reporting is consistently inconsistent.

3. Demand Response: Sierra Club cites a 2009 FERC National Assessment of Demand Response Potential study in an attempt to illustrate that Missouri's energy efficiency resource remains "largely untapped". Although there can be linkages between demand response and energy efficiency, the EPA GHG Building Block 4 models and modeling assumptions do not include demand response.

NRDC and Sierra Club Response

EPA adopted a very conservative approach to in its estimates regarding how much efficiency could be achieved in each state. For example, EPA assumed that Missouri would do nothing on energy efficiency between 2012 and 2017, which is certainly not the case given that KCPL, GMO and Ameren programs are delivering substantial savings now.

Reply: NRDC and Sierra Club assert that the EPA adopted a very conservative approach to in its estimates regarding how much efficiency could be achieved in each

state. The facts prove that EPA adopted a very aggressive approach in its estimates regarding how much efficiency could be achieved in each state.

EPA set a sustainable target of 1.5% annual load reduction from sales as the long-term energy efficiency load reduction target. EPA based this assessment by extracting the Maximum Achievable Potential ("MAP") estimates of potential from the following DSM Potential studies:

TABLE 1

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

State	Client	Analyst	Study Year	Study Period	End-year Projected Potential as % of Baseline Sales		Average Annual Projected Potential as % of Baseline Sales	
					Economic	Achievable	Economic	Achievable
Arizona	Salt River Project	Cadmus Group	2010	2012-2020	29%	20%	3.2%	2.2%
California	California Energy Commission	California Energy Commission	2013	2014-2024	Not reported	9.6%	N/A	0.9%
Colorado	Xcel Energy	Kema, Inc.	2010	2010-2020	20%	15%	1.8%	1.4%
Delaware	Delaware DNR/DEC	Optimal Energy, Inc.	2013	2014-2025	26.3%	Not reported	2.2%	N/A
Illinois	ComEd	ICF International	2013	2013-2018	32%	10%	5.3%	1.7%

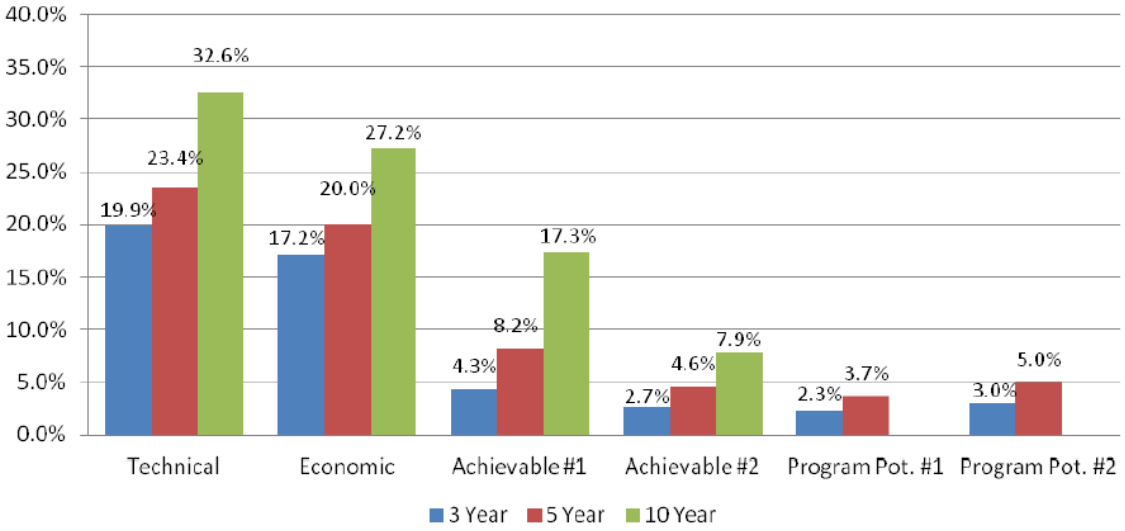
Michigan	Michigan PSC	GDS Associates	2013	2013-2023	33.8%	15%	3.1%	1.4%
New Jersey	Rutgers University	EnerNOC Utility Solutions	2012	2010-2016	12.8%	5.90%	1.8%	0.8%
New Mexico	State of New Mexico	Global Energy Partners	2011	2012-2025	14.7%	11.1%	1.1%	0.8%
New York	ConEd	Global Energy Partners	2010	2010-2018	26%	15%	2.9%	1.7%
Pacific Northwest (Idaho, Montana, Oregon, Washington)	US Department of Energy	Lawrence Berkeley National Laboratory	2014	2011-2021	11%	Not reported	1.9%	Not reported
Pennsylvania	Pennsylvania PUC	GDS Associates and Nexant	2012	2013-2018	27.2%	17.3%	4.5%	2.9%
Tennessee	Tennessee Valley Authority	Global Energy Partners	2011	2009-2030	24.8%	19.8%	1.1%	0.9%
			Range					**0.8% - 2.9% per year**
			Average					**1.5% Per year**

What the EPA labels as "Achievable" potential in Table 1 is actually Maximum Achievable Potential ("MAP") as specifically defined in each study rather than Realistic Achievable Potential ("RAP"). MAP, by definition in each DSM Potential Study used by the EPA in Table 1, is defined as the hypothetical upper limit of achievable potential. The potential studies in the EPA list address the almost boundless risk and uncertainty associated with sustaining MAP level annual load reductions because there is very limited real world experience where utilities pay the MAP level of incentives, which is 100% of the incremental costs of all energy efficiency measures, over an extended period of time.

The mere fact that EPA derived the estimate of 1.5% sustainable annual load reductions from the MAP estimates of a handful of DSM Potential studies is proof positive of the aggressive nature of the EPA proposed goals for energy efficiency. However, the EPA's estimate is actually even more aggressive when the details within each potential study are understood. The EPA's estimate of 1.5% annual load reductions is actually overstated due to the following:

1. ***EPA erred in transposing DSM Potential study results for some of the potential studies. For example, EPA shows Pennsylvania as having the largest average annual potential of 2.9%. EPA made a transposition error. The Pennsylvania study showed the following achievable potential estimates for the 3-year period covering June 1, 2013 through May 31, 2016, the 5-year period through May 31, 2018, and the 10-year period through May 31, 2023:***

Figure 1-2: Energy Efficiency Potential Savings Summary for Commonwealth of Pennsylvania



(Energy Efficiency Potential as a Percent of Forecasted Pennsylvania kWh Sales For the Baseline Period of June 2009 through May 2010)

Achievable #1 potential represents the highest possible potential. The 3-year potential on an average annual basis is 4.3%/3 = 1.4%. The 5-year potential on an average annual basis is 8.2%/5 = 1.6%. The 10-year potential on an average annual basis is 17.3%/10 = 1.7%. There is no average annual potential of 2.9% in the Pennsylvania study cited by the EPA. If 1.7% was substituted for the 2.9% used by the EPA to calculate an achievable sustainable annual load reduction target of 1.5%, the average would decrease to 1.3%.

2. ***Gross vs. Net Potential: 8 out of the 10 potential studies cited by the EPA to arrive at the average annual load reduction of 1.5% are based on gross rather than net savings from utility energy efficiency programs. Missouri IOUs are judged on the performance of net savings. The difference between gross and net savings represents naturally occurring energy efficiency or energy efficiency that would happen in the absence of IOU energy efficiency programs. Naturally occurring energy efficiency is built into the IOU energy forecasts. Therefore, using gross energy efficiency potential as the basis for establishing average annual sustainable load reduction targets from energy efficiency overstates potential.***

3. ***Potential Studies With Completion Dates Prior to 2020: 6 out of 10 potential studies cited by the EPA to arrive at the average annual load reduction of 1.5% are based on studies that have completion dates on or prior to 2020. This overstates potential by not***

capturing the full impact of the most significant federal and states appliance efficiency standards and building codes – most especially residential lighting.

In summary, the ten DSM potential studies cited by the EPA as the basis for calculating an average annual sustainable load reduction target of 1.5% through 2030 should be considered aggressive since they are based on highly uncertain results of maximum achievable potential studies from an extremely small sample of 10 DSM potential studies, six of which do not attempt to estimate energy efficiency potential beyond 2020. The highest potential of the 10 studies is from the Pennsylvania statewide study from 2012. The potential is misrepresented as 2.9% when the study actually shows it to be 1.7%. 8 of the 10 studies cite gross rather than net potential which overstates the amount of energy efficiency attributable to IOU energy efficiency programs. Finally, 6 of the 10 studies have completion dates of 2020 or earlier which understates the detrimental effects of new appliance efficiency standards and building codes on IOU energy efficiency program potential.