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FILE NO. EO-2018-0211

SURREBUTTAL TESTIMONY

OF

MATT MICHELS

ON

BEHALF OF

UNION ELECTRIC COMPANY

d/b/a Ameren Missouri

St. Louis, Missouri
September, 2018

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I. INTRODUCTION

Q. Please state your name and business address.

A. Matt Michels, One Ameren Plaza, 1901 Chouteau Avenue, St. Louis, Missouri 63103.

Q. What is your position with Ameren Missouri?

A. I work in Ameren Services Company's Innovation and Corporate Strategy Department as Director of Corporate Analysis. The Innovation and Corporate Strategy Department provides various corporate support services to Ameren Corporation and its subsidiaries, including Union Electric Company d/b/a Ameren Missouri ("Company" or "Ameren Missouri").

Q. Please describe your educational background and employment experience.

A. I joined Ameren Services Company in 2005 as a Consulting Engineer in Corporate Planning. My responsibilities included coordination and monitoring of projects implemented in conjunction with the integration of processes and systems following the acquisition by Ameren Corporation of Illinois Power Company ("Illinois Power") in October 2004. I was subsequently involved in the integration of combustion turbine facilities acquired by Ameren Missouri in 2006. In September 2008, I was promoted to Managing Supervisor of Resource Planning with responsibility for long-range resource

planning, including Ameren Missouri's Integrated Resource Plan ("IRP") filings and associated analysis. In February 2013, I was promoted to Corporate Analysis Manager, and in June 2017, I was promoted to my current position. In that capacity, I continue to have direct responsibility for Ameren Missouri's resource planning process, including plans related to the acquisition of renewable energy resources.

I earned a Bachelor of Science degree in Electrical Engineering from the University of Illinois at Urbana-Champaign in May 1990. I have been employed by an Ameren company or Illinois Power since June 1990 in various positions related to resource and business planning. During most of that time, my responsibilities have included the development, use and oversight of various planning models used for purposes such as production costing, acquisition evaluation, corporate restructuring, financial forecasting, and resource planning. I have previously testified before the Missouri Public Service Commission ("Commission") in proceedings involving resource planning, renewable energy standards compliance, and energy efficiency cost recovery.

II. PURPOSE OF TESTIMONY

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

A. The purpose of my surrebuttal testimony is to respond to issues raised in the Rebuttal Report submitted by the Missouri Public Service Commission Staff ("Staff") regarding the Company's avoided cost assumptions, differences in the Company's evaluation of demand-side and supply-side resources, and the avoided investment in renewable resources resulting from load reductions due to implementation of demand-side programs pursuant to the Missouri Energy Efficiency Investment Act ("MEEIA"). I will

also address issues raised by Office of the Public Counsel ("OPC") witness Dr. Geoff Marke regarding changes in the Company's IRP load forecast and unit retirement dates.

Q. Please summarize your surrebuttal testimony.

A. My surrebuttal testimony will demonstrate the following:

- The avoided capacity cost estimates and approach used by the Company are consistent with the Company's participation in the capacity market operated by the Midcontinent Independent System Operator, Inc. ("MISO"), where Ameren Missouri purchases the capacity necessary to serve its load based on the level of its load, which is lower when demand-side programs are operated; are based on an approach explicitly recognized by the Commission rules and relied upon by Staff witnesses in prior cases; and are therefore appropriate for use in evaluating the benefits of the MEEIA programs proposed by the Company in its application.
- The Company's evaluation of demand-side resources in its IRP process appropriately recognizes important differences between supply- and demand-side resources while at the same time valuing both on an equivalent basis.
- The avoided transmission and distribution ("T&D") cost estimates used by the Company reflect an approach that the Company has used since 2010 that is widely used and recognized in the industry, are representative of the lower end of the range for avoided T&D costs used in the industry, are based on the Company's marginal cost of system capacity, and are therefore

appropriate for use in evaluating the benefits of the MEEIA programs proposed by the Company in its application.

- The Company's investment in wind resources would need to be greater to comply with the Missouri Renewable Energy Standard ("RES") in the absence of load reductions expected from implementation of MEEIA programs.

As a result of demonstrating the foregoing points, I conclude that the Company has appropriately: 1) considered avoided capacity and T&D costs in the evaluation of its proposed portfolio of programs; 2) valued demand-side resources and investments in supply-side resources and delivery infrastructure on an equivalent basis in its IRP planning that supports its MEEIA application; and 3) considered the forgone investment in resources otherwise needed for RES compliance in its proposed Earnings Opportunity ("EO").

III. AVOIDED CAPACITY COSTS

Q. Please briefly describe the Company's approach to estimating avoided capacity costs.

A. Avoided capacity costs are estimated as part of the Company's triennial IRP process, and at other times as needed. The Company's approach is rooted in the operation of the MISO capacity market. The Company bids its resources into MISO's capacity auction and separately purchases capacity to meet its customer demand, also through MISO's capacity auction. The level of the Company's capacity purchases depends entirely on the level of the Company's load. Consequently, if load is reduced by demand-side programs, capacity purchases (and costs) are reduced. To estimate the price of the capacity that is purchased, the Company uses Ventyx's MIDAS model to simulate the addition,

retirement, and dispatch of resources in the market and determine market clearing prices for both energy and capacity for a number of scenarios defined by a range of values for key driver variables. Thus, the Company estimates the market price for capacity in a manner that approximates the operation of the market in reality.[1] For convenience, I will refer to both the use of market-based prices and the need to purchase capacity to serve load regardless of the Company's load and resource balance as a "market-based approach" to estimating avoided capacity costs.

Q. How long has Ameren Missouri been using a market-based approach to estimate its avoided capacity costs?

A. Since no later than 2010 for its 2011 IRP filing, the first IRP filing in which I was involved.

Q. Do the Commission's IRP rules recognize this as a valid approach?

A. Yes. The Commission's IRP rules set forth requirements for estimating avoided capacity costs as part of its rules for evaluating demand-side resources in 4 CSR 240-22.050(5)(A)1, which reads in part:

> The utility avoided demand cost shall include the capacity cost of generation, transmission, and distribution facilities, adjusted to reflect reliability reserve margins and capacity losses on the transmission and distribution systems, **or the corresponding market-based equivalents of those costs**. [Emphasis added.]

Q. Why are adjustments to reflect reliability reserve margins and capacity losses included?

A. The reliability reserve margin adjustment is included to recognize that any change in load is accompanied by a change in reserve capacity need equal to the magnitude

[1] Additional discussion of the development of avoided capacity cost estimates can be found in the Company's 2017 IRP (File EO-2018-0038), Ch. 2, pp. 15-16.

of the load change times the reserve margin (roughly 15-16% in the Company's 2017 IRP). The capacity loss adjustment is included to recognize the loss component of demand for which the Company must maintain sufficient resources and reserve margin at the generation level.[2]

Q. Is Ameren Missouri currently expecting to have sufficient resource capacity to meet its load and reserve margin obligations?

A. Yes. The Company's 2017 IRP analysis shows that the Company has sufficient resources to meet its load and reserve margin obligations through 2033 without adding any new resources. This, of course, is based on key assumptions in the IRP regarding growth in customer demand, penetration of distributed energy resources, and the timing of retirements of existing generating units in the Company's fleet, among other things.

Q. If the Company has sufficient resources to meet its load and reserve margin obligations for at least the next decade, then how do customers realize any benefit associated with demand reductions today?

A. As I mentioned before, Ameren Missouri purchases capacity to meet its load and reserve margin requirements in MISO's capacity auction. When the Company reduces demand via its demand-side programs, those demand reductions result in a direct reduction in the amount of capacity that needs to be purchased, and therefore results in a reduction in customer bills.

[2] Ameren Missouri applies the reserve margin and loss adjustments to the load when estimating avoided capacity costs rather than adjusting the capacity price itself. The calculation yields the same result.

Q. Staff witness J. Luebbert asserts that adding demand-side resource in the near term, "… only creates more opportunity to make increased off-system sales prior to the planned future deferral of a supply-side resource." How do you respond?

A. This statement reveals a basic understanding on the part of Mr. Luebbert of the value of demand reductions, albeit with reliance on a shorthand characterization of how the benefits are actually realized through the MISO market. The sale of capacity resources and the purchase of capacity for load are often referred to in net terms, with net revenues simply meaning that the value of capacity sold into the MISO market in excess of the cost of purchasing capacity for load. Regardless of how it is characterized, the result is a decrease in net costs to customers for any reduction in load, regardless of whether or not the Company has sufficient resources in its portfolio to satisfy the MISO planning reserve requirement.[3]

Q. Mr. Luebbert cites the definition of avoided costs included in the Commission's MEEIA rules. Is the approach used by the Company under the Commission's IRP rules consistent with that definition?

A. Yes. The Commission has crafted rules for the IRP process and MEEIA that are complementary. This is important because of the clear link between the IRP and the implementation of demand-side programs under MEEIA. As Mr. Luebbert states, the MEEIA rules define avoided costs as, "… the cost savings obtained by substituting demand-side programs for existing and new supply-side resources." Importantly, the definition includes both existing and new supply-side resources. As I mentioned

[3] In terms used in the Company's Fuel Adjustment Clause, the reductions in capacity purchases resulting from reductions in load would be realized through reductions in Net Base Energy Costs or Actual Net Energy Costs.

previously, Ameren Missouri purchases the capacity it needs to serve its load through MISO's capacity auction. That capacity is supplied by various existing resources within the MISO market, including Ameren Missouri's resources. The MISO capacity auction is itself an existing supply-side resource. When Ameren Missouri implements demand-side programs and realizes reductions in load as a result, the amount of capacity it needs to purchase in the MISO auction to serve its load is reduced. Therefore, the Company has, in fact, substituted demand-side resources for existing supply-side resources.

Q. Does Mr. Luebbert's characterization of avoided costs reveal a conceptual problem with the Staff's position?

A. Yes, it does. Mr. Luebbert appears to assume that to avoid a cost associated with existing or new supply-side resources, it is necessary to avoid an investment. Clearly this is not the case, as resource costs may take forms other than a direct utility investment in a utility-owned generating plant. If avoided costs were limited only to utility investments, then avoiding the cost of capacity under power purchase agreements ("PPAs"), as one example, would be excluded from consideration. But it would be nonsensical to claim that avoiding payments to a seller under a PPA is not a "real" avoided cost. If the utility reduces its load enough via demand-side management, it won't need the PPA at all and it will, unquestionably, have avoided costs.

Q. Does Mr. Luebbert apply the same requirement to avoided energy costs that he applies to avoided capacity costs? That is, does he assert that avoided energy costs only begin at the point a utility places a new generating unit into operation?

A. No. It is not clear why he makes this distinction for avoided capacity costs and not for avoided energy costs because exactly the same principles apply. As with

capacity, Ameren Missouri sells the energy produced by its generators into the MISO market and separately purchases energy from the MISO market to serve its load. As with capacity, the net of the value of energy sold from generation and the cost of energy purchased to serve load are often described and presented as net purchases or off-system sales.

Q. Is Ameren Missouri generally a net seller or net purchaser of electricity?

A. Ameren Missouri has, for a number of years, been a net seller of electricity in MISO, and based on the Company's 2017 IRP, is expected to be a net seller of electricity for nearly all of the 20-year planning horizon. Mr. Luebbert is correct not to apply a "need" test in assessing the Company's application of avoided energy costs. He should similarly not apply a "need" test in assessing the Company's application of avoided capacity costs. Doing so is not only conceptually flawed, it ignores the reality that load reductions due to demand-side management reduce (avoid) capacity and energy costs in the MISO market.

Q. Have any Staff witnesses previously recognized the market cost of capacity associated with incremental changes in load?

A. Yes. In File No. EC-2014-0224 and again in File No. ER-2014-0258, Staff witness Sarah Kliethermes included costs for capacity as part of her estimation of the incremental costs to serve the aluminum smelter formerly owned by Noranda and served by Ameren Missouri. In File No. EC-2014-0224, Ms. Kliethermes testified as follows:

> Q. Have you determined a reasonable quantification of Ameren Missouri's wholesale energy cost for serving Noranda?
>
> A. Yes. I have applied historical MISO Day-Ahead Locational Marginal Prices ("DA LMP") to Noranda's historical load. I have made reasonable allowance for other costs associated with serving load **including capacity**, and relied on amounts presented by Mr.

> Dauphinais to make allowances for MISO Tariff Schedule 26-A Multi-Value Project charges in some instances. [Emphasis added.]

Ms. Kliethermes later explained in her testimony that she relied on MISO 2014-2015 planning year rates for capacity costs. In File No. ER-2014-0258, Ms. Kliethermes testified as follows:

> Q. What is the cost, on a dollar-per-MWh basis, that Ameren Missouri would not incur but-for service of Noranda?
>
> A. The costs that Ameren Missouri would not incur but-for serving Noranda [i.e., costs it would avoid] are best approximated by considering the value of (1) wholesale energy at the Day-Ahead market price to meet Noranda's energy requirements, (2) ancillary services supportive of Noranda's energy requirements, (3) transmission charges incurred on service of load associated with Noranda's energy requirements, and (4) an allocation of capacity costs associated with Noranda's demand coincident with MISO system peak. [Emphasis added.]

Q. Did any party in either of the above-cited cases express disagreement with the inclusion of capacity costs in the estimation of the incremental cost to serve load?

A. No. While there were differing views on whether to use historical values or forecasted values for the market *price* of capacity, the inclusion of a cost for capacity itself was not in dispute. There was complete agreement on the fact that if Ameren Missouri did not serve Noranda (i.e., its load would go down by the amount of the now-absent Noranda load), it would avoid both energy and capacity costs. That is equally true if load is reduced due to implementation of demand-side management measures.

Q. At the time the above-cited cases were being adjudicated, did Ameren Missouri have sufficient capacity to meet its load and reserve margin obligations?

A. Yes. In fact, the Company's 2014 IRP filing showed that the Company expected to have between 400 and 1,000 MW more in resource capacity than it needed to

meet its load and reserve margin obligations for the subsequent eight years, without the implementation of demand-side programs.[4] The obvious conclusion to be drawn from Staff's position in those cases is that Staff recognized incremental capacity *costs* even when there was no incremental *investment* in new generating capacity required. Similarly, it should be obvious that there can be capacity cost *savings* even when no new *investment* in generating capacity is avoided through demand-side management measures.

Q. Did Staff express any concern regarding the Company's estimates of avoided capacity costs or their use in the Company's 2014 IRP filing?

A. No.

Q. Did Staff express any concern regarding the Company's estimates of avoided capacity costs or their use in the Company's 2017 IRP filing?

A. No.

Q. Are avoided capacity costs an important consideration in the evaluation of demand-side programs on either a stand-alone basis or as part of a utility's IRP analysis?

A. Avoided capacity costs are very important to the evaluation of demand-side programs in any context. Within the context of IRP analysis, avoided capacity costs serve as a means of fairly valuing the capacity positions, either an excess or a shortfall, of the various alternative resource plans utilities evaluate. Outside of broader IRP analysis, avoided capacity costs are necessary in determining the cost effectiveness of potential demand-side programs. Avoided capacity costs are a key focus of any analysis of demand-side resources.

[4] Ameren Missouri 2014 IRP (File EO-2015-0084), Ch. 9 – Appendix A, p. 4 shows the simplified capacity balance for Plan K, which reflects no demand-side programs after the Company's MEEIA Cycle 1 portfolio.

Q. Do you believe that prior to the filing of the Company's application in this case, Staff understood the important role of avoided capacity cost estimates and their application to the evaluation of demand-side resources?

A. Yes.

IV. VALUING DEMAND-SIDE RESOURCES EQUAL TO SUPPLY AND INFRASTRUCTURE INVESTMENTS

Q. Mr. Luebbert contends that the Company has not valued demand-side investments equal to traditional investments in supply and delivery infrastructure because it only considered supply-side resource additions at the time the Company would fall short of its load and reserve margin requirement. Is he correct?

A. No, and it is important to understand a couple of distinctions to recognize why. First, valuing demand-side investments equal to supply-side and delivery infrastructure investments does not mean that they have to be treated in exactly the same manner in every respect. Rather, it means that they should be given equal opportunity to compete as resource alternatives and should be *valued* on the same basis. MEEIA was enacted to remove barriers to valuing demand-side resources equal to supply-side and infrastructure investments. The same kinds of value should be attributed to both, and that value should be based on the same assumptions. This is the essence of integrated resource planning.

Second, the reason demand-side resources cannot be *treated* in exactly the same manner as supply and delivery investments, even as they are *valued* on an equal basis, is because they are in fact very different.

- Supply-side resources are placed in service at a moment in time. Demand-side resources are implemented on a more-or-less continuous basis.

- The output capability and other characteristics of supply-side resources is known in advance; in fact, they are explicitly designed to achieve those characteristics (e.g., if a utility builds a 600 megawatt plant, it knows it is adding 600 megawatts of capacity at the moment it puts it in service). However, there is uncertainty as to the eventual magnitude of energy and demand savings that will be achieved as a result of implementing demand-side programs, chiefly because such programs are voluntary on the part of customers.
- Conventional generation resources, such as natural gas-fired combined cycle generators, can be sized and constructed to achieve a specific level of output in a relatively short period of time. An equivalent level of load reduction from demand-side programs may take many years to develop.
- Demand-side resources are subject to individual customer choices, allowing customers to tailor their participation to meet their own specific needs. Utility investments in supply-side resources are built to serve all customers regardless of their individual needs.
- Demand-side resource implementation is much more flexible. It can be adjusted over time to account for changes in performance and cost-effectiveness. Construction of new supply-side resources represents a much firmer commitment and cannot be "dialed back" once completed; once the utility owns a 600 MW unit, it owns it.

- Demand-side resources are generally much more cost-effective than supply-side resources and generate net benefits to an extent that most supply-side resources cannot.

There are numerous other differences between demand- and supply-side resources, from how they are accounted for to how their performance is evaluated, that highlight the need to treat them differently while valuing them equally and considering and evaluating them on an equivalent basis.

Q. You mention that demand-side resources generally result in higher levels of benefits relative to their costs. Are there any supply-side resources that would be expected to generate benefits in excess of their costs?

A. Yes. The clearest current example is wind generation resources. Our 2017 IRP analysis showed that wind resources are expected to provide net benefits over the life of the assets. This is why our IRP preferred resource plan shows that Ameren Missouri expects to be able to fully comply with the requirements of the RES without violating the statutory 1% retail rate impact limitation. The Company's testimony in File No. EA-2018-0202, in which Ameren Missouri is seeking a Certificate of Convenience and Necessity ("CCN") to acquire and operate a 400 MW wind farm, affirms the Company's expectation that wind resources placed into service in the next two years will generate net benefits for customers over the life of the assets. However, wind resources provide relatively little benefit in terms of dependable capacity due to their intermittent nature. As a result, wind resources alone are not considered effective resources for meeting peak demand and reserve margin requirements.

Q. Are there any other generation resource types that the Company's IRP analysis shows could be expected to generate net benefits for customers?

A. No. While it is possible that continued improvements in solar technology and costs could result in solar generation that generates net benefits, our IRP analysis to date does not show that any other supply-side resources would be expected to generate net benefits over their lives.

Q. How does Ameren Missouri evaluate demand-side resources as part of its IRP analysis?

A. We evaluate different combinations of energy efficiency and demand response, each at two different levels defined by the Company's DSM Potential Study. The DSM Potential Study provides estimates of load reductions and associated costs for both Realistic Achievable Potential ("RAP") and Maximum Achievable Potential ("MAP"). We also evaluate plans with no additional demand-side resources to assess the relative value of different levels of energy efficiency and demand response and for contingency planning purposes.

Q. What do you assume about the timing of demand-side resources in the IRP?

A. We assume that programs will be implemented on a continuous basis at the levels demonstrated to be cost-effective in the Company's DSM Potential Study.

Q. Why don't you adjust the timing of demand-side resources to match the expected timing of the Company's need for resources to meet load and reserve margin requirements?

A. For a couple of reasons. First, demand-side resources are only included in alternative plans if they are cost-effective; that is, only if they are expected to produce net benefits. The DSM Potential Study found that the benefit-cost ratios as measured using the Total Resource Cost ("TRC") test for energy efficiency and demand response programs were 2.04 and 2.24, respectively, at the RAP level included in the Company's preferred resource plan. That is, the benefits were estimated to be more than twice the costs to achieve them, including out-of-pocket costs incurred by customers.

Second, demand-side resources are built up incrementally over years, and the prospective results are uncertain. Demand-side resources are built through the promotion of programs by Ameren Missouri and the voluntary participation of its customers. Because programs are voluntary on the part of customers, the utility has no direct control of the level of participation. If we assumed, for example, that we could wait until 2030 to begin implementing DSM programs but then found that we were not able to achieve the levels of load reductions needed to avoid building a new supply-side resource in 2034, we would have missed the opportunity to make adjustments to program implementation that would have allowed us to avoid a supply-side resource.

Q. It almost sounds like the continuous implementation of demand-side programs serves as a sort of insurance policy against the need to deploy new generating resources. Is that a useful way of thinking about demand-side resources?

A. Yes, with one important exception. In this case, the insurance policy *pays* the holder rather than charging a premium because the programs are expected to generate benefits far in excess of their costs.

Q. Mr. Luebbert notes that the future benefits of demand-side programs are, "variable and difficult to predict accurately." How do you respond?

A. This is true of any resource decision, and it is why the avoided cost estimates are based on a probable range of outcomes determined as part of our IRP analysis. In the IRP analysis, variables that can't be accurately predicted but could affect the Company's selection of its preferred resource plan are referred to as "critical uncertain factors." Key among these critical uncertain factors are those that affect the market price of energy and capacity in MISO, which include natural gas prices, load growth, unit retirements, and the cost of carbon dioxide emissions. Ameren Missouri estimates ranges of values, with probabilities, for each of these variables and creates scenarios using different combinations of different values for each. We then use a sophisticated model that simulates the broader electricity market to determine market clearing prices for energy and capacity. The scenarios themselves, including the resultant energy and capacity prices, are used in the Company's risk analysis as part of the development of its IRP. To represent the full range of outcomes, we calculate probability-weighted-average prices for both energy and capacity and use those prices to calculate avoided costs.

Q. Does Ameren Missouri evaluate the risk of changes in its avoided costs?

A. Yes, in both the DSM Potential Study and in the IRP. In the DSM Potential Study, the Company evaluated avoided cost sensitivities to determine the impact on the cost effectiveness of measures considered for inclusion in the potential portfolios. That analysis found that the number of cost effective measures could be reduced by 15% under the low avoided cost sensitivity. In the IRP, the Company evaluated the performance of all alternative resource plans, including those with various levels and combinations of energy

efficiency and demand response, under a full range of scenarios for avoided energy and capacity costs. Our analysis concluded that it was economically beneficial to implement demand-side programs after accounting for this risk.

Q. Returning to the idea of demand-side resource implementation as an insurance policy against the need to deploy new generating resources, what kinds of risks are being mitigated?

A. I think of those risks generally as "planning risks" and they include changes to both demand and supply. On the demand side, utilities, including Ameren Missouri, are placing greater emphasis on electrification, including electric vehicles. Aside from electrification, differences from our base assumption regarding penetration of customer-owned solar and other factors may result in higher or lower peak demand than our IRP planning case. On the supply side, changes in the viability of generating units can result in sudden and significant changes in the Company's capacity position and resource need. This could include retirements due to economics driven by a host of factors, including changes in environmental regulation, operating costs, market prices, or a catastrophic equipment failure.

Q. OPC witness Dr. Geoff Marke presents a comparison of Ameren Missouri's various IRP load forecasts from 2005 through 2017. Is there any additional context needed in assessing the conclusions he draws from this comparison?

A. Yes. First, as Dr. Marke notes, one of the drivers in the changes to the Company's IRP load forecast is the loss of load associated with the aluminum smelter formerly owned by Noranda. That lost load accounts for roughly 500 MW of the roughly 700 MW change in peak demand in 2017 and approximately 4.2 million MWh in annual

energy sales of the roughly 4.8 million MWh change in sales in 2017. Second, it should be noted that, at the time they were produced, these forecasts did not include the implementation of further demand savings from energy efficiency or demand response programs but do include the effects of program implementation up to that point. The differences in the 2017 load forecast include the energy and demand savings from the Company's MEEIA Cycle 2 of approximately 144 MW and 0.4 million MWh. Between the loss of Noranda and the inclusion of MEEIA 2 savings not included in the 2014 IRP load forecast, we can account for nearly all of the change in load between the 2014 IRP load forecast and the 2017 IRP load forecast for 2017. While changes in sales outlook have dropped in the wake of the housing and financial crisis of the prior decade, recent changes have been modest, and the overall change is not nearly as dramatic as Dr. Marke implies.

Q. Dr. Marke also raises questions as to changes in the Company's assumed retirement dates for natural gas and oil fired combustion turbine generators between the Company's 2014 and 2017 IRP filings. Can you explain the changes?

A. Yes. As noted in each of the two IRP filings in question, the Company made generic assumptions for retirement of these small and older gas and oil fired units with the expectation that they would not be economically viable in the long-term due to expensive equipment failures and the diminishing availability of compatible parts. As noted in the Company's 2014 IRP, the decision to retire Howard Bend was based on short-term economics because of the expectations I just mentioned. Specifically, we evaluated the cost of repairs relative to the capacity value of the unit in the MISO market.[5] In that regard, we used the same approach in our application of expected capacity value that we used in our

[5] In general, these units operate for very few hours during a year. As a result, the value of energy is negligible in the assessment of unit economics.

broader IRP analysis and our estimation of avoided costs for use in evaluating demand-side program cost effectiveness. We plan to continue to operate the remaining units until such time as the benefits no longer exceed the total costs of operation.

Q. Are there plausible events that may cause the Company to need new resources sooner than 2034 in the absence of continued demand-side program implementation?

A. Yes. In Ameren Missouri's 2017 IRP, we evaluated alternative resource plans reflecting the early retirement of coal generation. In the alternative resource plan in which Rush Island is retired at the end of 2024, Plan M, we assumed continued implementation of demand-side resources and show available capacity in excess of load and reserve margin requirements of 927 MW in 2025. If we excluded demand-side resources, we would instead see a capacity shortfall of 533 MW. This is below the build threshold – a deficit of 300 MW – we have established for resource planning. To meet our load and reserve margin requirements would necessitate the deployment of new supply-side resources at that time, likely in the form of natural gas-fired combined cycle generation at a capital cost of roughly $1 billion.

Likewise, Plan N reflects retirement of Labadie at the end of 2024 and also includes continued implementation of demand-side resources, resulting in a capacity deficit of 267 MW in 2025, short of the threshold established for addition of a supply-side resource. However, if we again excluded demand-side resources, that deficit would increase to 1,727 MW and necessitate the addition of new generation at a capital cost of roughly $3 billion.

Q. You mentioned previously that Ameren Missouri purchases capacity to serve its load in the MISO capacity auction. Couldn't the Company simply purchase

more capacity for a few years while it deployed new demand-side resources and avoid the investment in new supply-side resources?

A. Not if we are to adhere to our assessment of the risk that would be involved. That is the very type of situation that was considered in establishing the build threshold of a 300 MW deficit. This threshold was established in consultation with Ameren Missouri's Energy Management and Trading function and is based on the extent to which the Company believes it can rely on the MISO market to meet its load and reserve margin obligations and maintain resource reliability.

Q. What is the likelihood of events that would result in the kinds of early retirements the Company evaluated in its IRP analysis?

A. While it would be extremely difficult, if not impossible, to assess the probability of such events, it is important to understand that the potential exists in the context of resource planning, and specifically in making determinations regarding the continued implementation of demand-side resources. The highly cost-effective nature of demand-side programs provides a compelling reason to continue offering such programs to create benefits, while at the same time mitigating risks that could result in a sudden and significant need for resources.

V. AVOIDED T&D COSTS

Q. What is Ameren Missouri's approach to estimating avoided T&D costs for its IRP analysis?

A. Ameren Missouri develops its estimates of avoided T&D based on the marginal cost of system capacity and the expectation of system-wide savings in T&D

infrastructure over a long period of time. This is a widely used and recognized approach in the industry, and the Company has been using this approach since 2010.

Q. What evidence do you have that the approach the Company uses is widely used and recognized in the industry?

A. One example that demonstrates this is a paper published by the Regulatory Assistance Project in 2012 entitled *US Experience with Efficiency As a Transmission and Distribution Resource*.[6] In that paper, the authors describe both passive and active deferrals of T&D investment. Active deferrals involve the targeting of load reductions to specific areas of the grid to avoid the need for explicitly identified grid investments. Passive deferrals involve the long-term reduction of grid infrastructure resulting from system-wide load reductions resulting from broad-based demand-side programs. The authors note that, at that time, the active deferral approach was not widely used for a variety of reasons, including the highly technical and specialized nature of T&D planning and the diffuse nature of transmission planning.

Another, and more recent, example is a study entitled *Avoided Energy Supply Components in New England: 2018 Report* ("Synapse Report").[7] I have attached the study report as Schedule MRM-S1. In the report, the authors present a six-step approach for estimating avoided transmission and distribution costs on a dollar-per-kilowatt basis to be applied to load reductions. The authors specifically note how such estimates are to be applied:

> **These generic avoided T&D costs are not intended to represent the potential value of targeted load reductions**, as part of non-wire alternatives to specific transmission and distribution projects.

[6] Chris Neme and Rich Sedano, Regulatory Assistance Project (2012).
[7] Synapse Energy Economics, Resource Insight, Les Deman Consulting, North Side Energy, and Sustainable Energy Advantage (2018).

> Analysis of targeted non-wire alternatives requires information about the cost and timing of the specific project to be avoided and the amount of load reduction required to defer project need for one or more years.
>
> **The goal of these generic avoided-cost computations is not to identify specific projects that can be avoided, but to estimate the overall, long-term ratio of T&D savings per kW of avoided load growth** (and hence of a kW of peak savings). In this approach, historical data can be as meaningful as forecast data, and the sunk costs of planned additions are as relevant as the future costs.
>
> **The avoided T&D value is generally applied as if every kW of load reduction in any location will have the same value. This is a useful simplification, which is reasonable for widespread energy efficiency programs.** [Emphasis added.]

Q. Is it necessary for a utility to experience overall growth in its load in order to realize avoided T&D benefits?

A. No. Even in a system with no load growth, there are often pockets of load growth and pockets of load decline. The Synapse Report discusses this very situation:

> Some utilities have experienced little or no overall growth in total load for some years and may forecast little growth in peak loads for some years. Nonetheless, a utility can have load-related investments to address parts of their service territories that are experiencing load growth. Dividing the load-related investments by zero, a negative number, or even a small positive load growth will produce meaningless results. **In those situations, the utility may either use historical data from a period with load growth**, or compute the avoided cost per kilowatt growth for the fraction of the system that has experienced growth. [Emphasis added.]

The bold highlighted passage above is precisely the approach Ameren Missouri has used in its estimation of avoided T&D costs.

Q. Mr. Luebbert contends that the Company's estimation of avoided T&D costs is reliant on an expectation of overall load growth. How do you respond?

A. This is not correct. Just as is recommended by Synapse et al., the Company has simply selected a study period for which significant overall load growth was available

to mathematically calculate the marginal cost of transmission and distribution infrastructure. Once again, the Company's avoided T&D costs are not intended to represent the value of targeted load reductions, but rather the value of long-term reductions in the cost of grid infrastructure. As further noted by Synapse et al. (2018):

> In some places and times, even small load reductions that keep load below the capacity of existing equipment may avoid very large incremental T&D investments. In other places and times, relatively large load reductions may have little effect on T&D investments. The location contributing to new T&D investments can vary from perhaps a dozen residential customers sharing a line transformer to thousands of customers sharing a substation or a transmission line.

Q. How do the Company's avoided T&D cost estimates compare to those of other utilities?

A. Ameren Missouri's avoided T&D costs are on the low end of avoided T&D costs. In a paper authored by Brendon Baatz for the American Council for an Energy-Efficient Economy ("ACEEE") in 2016, the author includes a chart of estimates of avoided T&D costs from 45 different organizations.[8] Of the 45 data points, six were listed at a zero value, which according to the author means that, "avoided T&D benefits were excluded from program screening."[9] The paper indicates a majority of values were between $25/kw-year and $50/kw-year, with other values up to as much as $200/kw-year. This compares to Ameren Missouri's estimate of avoided T&D costs of $23/kw-year. If anything, Ameren Missouri's estimate of avoided T&D costs due to its operation of demand-side programs is conservative. I have attached the report as Schedule MRM-S2.

[8] Utility System Benefits of Energy Efficiency: Current Experience in the U.S., Brendon Baatz, ACEEE (2016).
[9] Baatz (2016), p. 8.

Q. Did Staff express any concerns with the Company's avoided T&D cost estimates in its comments on the Company's 2017 IRP?

A. No.

Q. Has Staff expressed any concerns with the Company's avoided T&D cost estimates in any prior IRP cases?

A. No.

Q. Do you believe that Staff understands the important role of avoided T&D costs in evaluating the cost effectiveness of demand-side resources?

A. Yes. As is the case with avoided capacity and energy costs, avoided T&D costs are an important consideration in any assessment of the value of demand-side resources. Estimation of avoided T&D costs is explicitly required by the Commission's IRP rules.[10]

Q. Has any party ever challenged the Company's approach to estimation of avoided T&D costs?

A. Yes. In comments submitted on behalf of the Missouri Department of Natural Resources regarding Ameren Missouri's 2011 IRP filing, GDS Associates, Inc., ("GDS") criticized the Company's use of subjective factors that reduced the value of avoided T&D, noting that the application of these factors reduced the value of avoided transmission costs by 72%. In short, GDS criticized the Company's avoided T&D costs for underestimating the value of avoided infrastructure.

Q. Does Ameren Missouri also use its estimates of avoided T&D costs to estimate the cost of incremental T&D infrastructure costs for increases in load?

[10] 4 CSR 240-22.045(2).

A. Yes. In the Company's application in File No. ET-2018-0132, which seeks changes to the Company's line extension policy as well as approval of incentives for purposes of developing electric vehicle charging infrastructure, the Company has included incremental costs for delivery infrastructure that are consistent with the IRP-determined avoided T&D costs used in the analysis of MEEIA 3 in the economic analysis supporting that proposal.

Q. Mr. Luebbert asserts that it is inconsistent for the Company to promote demand-side programs based on the prospect of avoiding the cost of delivery infrastructure while at the same time promoting a program intended to increase load and relying on underused infrastructure. Is the Company being inconsistent in this way?

A. No. Company witness Steve Wills addresses this issue in his surrebuttal testimony.

Q. Is the Company planning to increase its investment in grid infrastructure as a result of the enactment of Senate Bill 564 earlier this year?

A. Yes. Ameren Missouri is planning to invest an additional $1 billion in grid modernization over the next five years as a result of the new law.

Q. Could implementation of proposed programs in the Company's MEEIA application result in more effective use of this incremental investment?

A. That is certainly a possibility. By continuing to enable load reductions across the grid, some grid modernization projects could realize savings. That savings could then free up capital to be deployed for additional grid modernization investments.

VI. FORGONE RENEWABLE INVESTMENT

Q. Did the Company include as part of its rationale for its requested earnings opportunity in its application in this case an estimation of the forgone earnings from renewable resource investments?

A. Yes.

Q. Please explain why the Company would lose the opportunity to invest in renewable resources as a result of implementing the proposed programs in the Company's MEEIA application.

A. Ameren Missouri and the other investor-owned utilities in the state of Missouri are subject to the requirements of the RES. The RES requires a utility to acquire renewable energy equal to a percentage of its retail sales. Any factor that results in a change in sales is accompanied by an associated change in the renewable energy required by the RES. This means that the quantity of renewable resources acquired by the company would be less than that needed if demand-side programs were not implemented and the associated load reductions were not realized.

Q. Is the Company planning to own renewable resources for which it would earn a return on its investment?

A. Yes. Ameren Missouri announced in 2017 its intent to acquire at least 700 MW of wind resources and 100 MW of solar resources. With regard to the wind resources, the Company indicated that ownership of the wind generation by Ameren Missouri would be most beneficial to customers. This has been reinforced in the Company's testimony supporting its application for a CCN to acquire a 400 MW wind farm, as I mentioned previously. This is expected to be the first of several such acquisitions.

Q. Are the Company's plans for wind generation based solely on the need to comply with the RES?

A. Yes. The Company has said as much in its testimony in the CCN case I just mentioned. It is important to note that the Company may separately acquire wind resources to serve customers under its recently approved Renewable Choice Program Tariff. However, any such resources would be "carved out" of the Company's portfolio and paid for by subscribers to that program, as required by the stipulation and agreement approved by the Commission in File No. ET-2018-0063.

Q. Mr. Luebbert says the Company could build additional wind resources, and therefore is not forgoing any real opportunity to earn on wind resources. How do you respond?

A. While I can't rule out the possibility that the Company may plan in the future to add more wind resources than currently planned, the Company's current plans include wind resources solely for purposes of complying with the RES. Importantly, the RES requires Ameren Missouri to acquire renewable energy equal to 15% of its retail sales starting in 2021. Equally important is the fact that to qualify for the full value of Production Tax Credits ("PTCs"), wind projects have to be placed in service by the end of 2020. Between the 700-plus MW needed for RES and up to 200 MW more to serve subscribers to the Renewable Choice Tariff, the Company is not expecting to seek additional wind investment opportunities by 2021.

Q. The Company included 100 MW of new solar resources in its IRP preferred plan. Does the Company need to add that much solar generation to comply with the solar energy requirement of the RES?

A. No. The Company's IRP analysis included approximately 36 MW of solar generation additions for compliance with the RES. The remaining 64 MW are included in recognition of the improving economics of solar resources and the potential that a business case could be made to support such additions.

Q. In the Company's 2014 IRP filing, it included in its preferred resource plan 400 MW of wind resource additions, but noted that only 242 MW of wind could be included for RES compliance. Doesn't that indicate that the Company is seeking to add wind resources in excess of the RES requirement?

A. No. As with the additional solar investments included in the 2017 IRP, the additional wind included in our 2014 IRP preferred plan reflected an expectation of continued improvements in the economics of wind. Our 2017 IRP preferred plan now includes more wind than was included in our 2014 IRP and allows us to just meet the renewable energy requirements of the RES.

Q. What amount of additional wind capacity did the Company estimate would be needed if its proposed MEEIA programs were not implemented?

A. Approximately 74 MW.

Q. Would the Company increase the amount of wind generation it acquires to meet the additional renewable energy requirement resulting from the increase in expected sales?

A. Yes. The Company has indicated it intends to acquire the wind resources needed to fully comply with the RES. If the renewable energy requirement were increased as a result of eliminating or reducing the planned load reductions associated with its

proposed MEEIA programs, the Company would seek to acquire the full amount of resources necessary.

VII. SUMMARY AND CONCLUSION

Q. Please summarize your key points.

A. Ameren Missouri has appropriately considered and included in its economic analysis avoided costs for capacity and T&D. Avoided capacity costs for Ameren Missouri are a function of the operation of the MISO market, in which any reduction in peak demand results in reductions in the cost to serve load and therefore results in savings for customers. Avoided T&D costs are estimated based on a widely used approach in the industry and are valid regardless of the nature of the Company's overall long-term load trajectory. Excluding avoided T&D costs penalizes demand-side programs by ignoring the value they create through long-term reductions in otherwise necessary grid investment.

Ameren Missouri has appropriately considered and evaluated demand-side resources and investments in supply-side resources and delivery infrastructure on an equivalent basis while recognizing important differences that affect how each can and should be implemented. Implementation of demand-side resources produces significant near-term and long-term benefits for customers while enabling the Company to mitigate significant planning risks on behalf of customers.

Finally, Ameren Missouri's investment in wind resources would need to be increased to achieve compliance with the renewable energy requirements of the RES if planned load reductions resulting from implementation of the Company's proposed MEEIA programs were not achieved. This represents a real and imminent forgone opportunity for

investment returns and should be given full consideration in the determination of the earnings opportunity afforded the Company for implementation of demand-side programs.

Q. Does this conclude your surrebuttal testimony?

A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Union Electric Company d/b/a Ameren Missouri's 3rd Filing to Implement Regulatory Changes in Furtherance of Energy Efficiency as allowed by MEEIA.	))))	File No. EO-2018-0211

AFFIDAVIT OF MATT MICHELS

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

Matt Michels, being first duly sworn on his oath, states:

1. My name is Matt Michels. I work in the City of St. Louis, Missouri, and I am employed by Union Electric Company d/b/a Ameren Missouri as Director of Corporate Analysis.

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 31 pages and Schedule(s) N/A, 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.

MATT MICHELS

Subscribed and sworn to before me this 13th day of September, 2018.

Notary Public

My commission expires:

GERI A. BEST
Notary Public - Notary Seal
State of Missouri
Commissioned for St. Louis County
My Commission Expires: February 15, 2022
Commission Number: 14839811