MISSOURI PUBLIC SERVICE COMMISSION
STAFF REPORT

UNION ELECTRIC COMPANY
d/b/a AMEREN MISSOURI

2017 ELECTRIC UTILITY RESOURCE PLANNING COMPLIANCE FILING

FILE NO. EO-2018-0038

Jefferson City, Missouri
February 28, 2018

****** Denotes Confidential Information ******

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Schedule MM-S2

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Executive Summary

On September 25, 2017,[1] Union Electric Company, d/b/a Ameren Missouri ("Ameren Missouri" or "Company"), filed its 2017 Integrated Resource Plan ("IRP") triennial compliance filing ("Filing") in File No. EO-2018-0038, as required by 4 CSR 240-22 Electric Utility Resource Planning[2] and the Missouri Public Service Commission's ("Commission") January 11, 2017 *Order Granting Waivers* in File No. EE-2017-0098.[3]

Staff provides this Report as required by Commission Rule 4 CSR 240-22.080(7):

> (7) The staff shall conduct a limited review of each triennial compliance filing required by this rule and shall file a report not later than one hundred fifty (150) days after each utility's scheduled triennial compliance filing date. The report shall identify any deficiencies[4] in the electric utility's compliance with the provisions of this chapter, any major deficiencies in the methodologies or analyses required to be performed by this chapter, and any other deficiencies and shall provide at least one (1) suggested remedy for each identified deficiency. Staff may also identify concerns[5] with the utility's triennial compliance filing, may identify concerns related to the substantive reasonableness of the preferred resource plan or resource acquisition strategy, and shall provide at least one (1) suggested remedy for each identified concern.

As a result of its limited review, and as more fully discussed throughout this report ("Report"), Staff identified two (2) deficiencies and two (2) concerns regarding Ameren Missouri's 2017 IRP. Staff recommended remedy for each deficiency and concern is contained in the body of the Report.

[1] Commission's July 22, 2015, *Order Granting Variance* in File No. EE-2015-0316, allowed Ameren Missouri to make its 2017 IRP filing on or before October 1, 2017, instead of April 1, 2017.

[2] Chapter 22 Electric Utility Resource Planning rules 4 CSR 240-22.010, .020, 030, .040, .050, .060, .070 and .080 were all revised effective May 31, 2011. Rule 4 CSR 240-22.045 Transmission and Distribution Analysis became a new rule effective May 31, 2011.

[3] Approved waivers include: 4 CSR 240-22.020(12); .040(3)(A); .045(1)(B) and (3)(C); .050(4)(D)2, (5)(B)3, and (5)(E); .060(5)(E), (5)(F), (5)(K), (5)(L) and (7); and .080(2)(C)2 and (5)(A).

[4] 4 CSR 240-22.020(9) Deficiency means deficiencies in the electric utility's compliance with the provisions of this chapter, any major deficiencies in the methodologies or analyses required to be performed by this chapter, and anything that would cause the electric utility's resource acquisition strategy to fail to meet the requirements identified in Chapter 22.

[5] 4 CSR 240-22.020(6) Concern means concerns with the electric utility's compliance with the provisions of this chapter, any major concerns with the methodologies or analyses required to be performed by this chapter, and anything that, while not rising to the level of a deficiency, may prevent the electric utility's resource acquisition strategy from effectively fulfilling the objectives of Chapter 22.

A. List of Staff's Identified Deficiencies

Deficiency 1 – Ameren Missouri provided only the 30-year PVRR for its Mid-DSM Plan and failed to comply with all other requirements of 4 CSR 240-22.070(1) concerning its Mid-DSM Plan.

Deficiency 2 - Ameren Missouri did not provide its draft of the triennial compliance filing for 4 CSR 240-22.030 at its stakeholder meeting which is required under 4 CSR 240-22.080(5)(A) and (B).[6]

B. List of Staff's Identified Concerns

Concern A – Ameren Missouri's 2017 IRP's MEEIA Cycle 3 implementation plan and Ameren Missouri's MEEIA Cycle 3 RFP to program implementers identifies a 6-year program life for all programs. This 6-year program life creates conflict with the 3-year or triennial compliance requirements of 4 CSR 240-22.050 which specifies the principles by which potential demand-side resource options shall be developed and analyzed for cost effectiveness with the goal of achieving all cost-effective demand-side savings as well as the requirement that demand-side candidate resource options be passed on to integrated resource analysis in 4 CSR 240-22.060.

Concern B – If a 6-year MEEIA Cycle 3 is approved and implemented, Staff is concerned that a 2019 DSM Potential Study may not be performed to comply with 4 CSR 240-22.050(2) including the performance of primary research for Ameren Missouri's marketplace to comply with 4 CSR 240-20.094(3)(A)2.

4 CSR 240-22.010 Policy Objectives

Staff performed its review of the Filing in the context of the Commission's Chapter 22 Rules, the Missouri Energy Efficiency Investment Act of 2009[7] ("MEEIA"), and the Commission's MEEIA Rules.[8] Staff performed its review in this way because the policy objectives of Chapter 22 and of MEEIA are inseparable for electric utilities, since Rule 4 CSR 240-22.010(2) states:

> The fundamental objective of the resource planning process at electric utilities *shall* be to provide the public with energy services that are safe, reliable, and efficient, at just and reasonable rates, in compliance with all legal mandates, and

[6] During Ameren Missouri's April 19, 2017, stakeholder workshop to comply with 4 CSR 240-22.080(5)(A) and (B), Ameren Missouri used a PowerPoint presentation to summarize its load analysis and load forecast and stated that the draft of 4 CSR 240-22.030 will be shared once it is finalized. The draft was not supplied to stakeholders until August 23, 2017, over four months later.

[7] 393.1075, RSMo, 2016.

[8] Original MEEIA rules 4 CSR 240-3.163 and 4 CSR 240-3.164 were effective from May 30, 2011 through February 27, 2018, and original MEEIA rules 4 CSR 240-20.093 and 4 CSR 240-20.094 were effective from May 30, 2011 through October 29, 2017. Original rule 4 CSR 240-20.092 became effective October 30, 2017, and revised rules 4 CSR 240-20.093 and 4 CSR 240-20.094 became effective October 30, 2017. Ameren Missouri filed its 2017 IRP thirty-six (36) days before October 30, 2017, on September 25, 2017.

in a manner that serves the public interest and is consistent with state energy and environmental policies. …
(Emphasis added)

MEEIA establishes the following state energy policy for valuing demand-side resources and supply-side resources and for the cost recovery of these resources for Missouri's electrical corporations[9] in Section 393.1075.3 and .4:

> 3. *It shall be the policy of the state to value demand-side investments equal to traditional investments in supply and delivery infrastructure and allow recovery of all reasonable and prudent costs of delivering cost-effective demand-side programs*. [Emphasis added.] In support of this policy, the commission shall:
> (1) Provide timely cost recovery for utilities;
> (2) Ensure that utility financial incentives are aligned with helping customers use energy more efficiently and in a manner that sustains or enhances utility customers' incentives to use energy more efficiently; and
> (3) Provide timely earnings opportunities associated with cost-effective measurable and verifiable efficiency savings.
>
> 4. *The commission shall permit electric corporations to implement commission-approved demand-side programs proposed pursuant to this section with a goal of achieving all cost-effective demand-side savings. . . .* [Emphasis added.]

Although electric utilities are not required to request Commission approval of demand-side programs and a demand-side programs investment mechanism ("DSIM") under MEEIA and the Commission's MEEIA rules, electric utilities are required to comply with the Commission's Chapter 22 Rules which establish that the fundamental objective of the electric utility resource planning process at each electric utility shall be to provide the public with energy services that are safe, reliable, and efficient, at just and reasonable rates, in compliance with all legal mandates, and in a manner that serves the public interest and is consistent with state energy and environmental policies. Because MEEIA establishes state energy policy, each electric utility is required – as part of its electric utility resource planning –- to develop candidate resource plans and to analyze and document DSIMs which can allow the electric utility to make reasonable progress toward a goal of all cost-effective demand-side savings.[10]

[9] 4 CSR 240-22.020(16): "Electric utility or utility mean any electrical corporation as defined in section 386.020, RSMo, which is subject to the jurisdiction of the commission."
[10] 4 CSR 240-20.094(2) Guideline to Review Progress Toward an Expectation that the Electric Utility's Demand-Side Programs Can Achieve a Goal of All Cost-Effective Demand-Side Savings, which was effective from May 30, 2011 through October 29, 2017. Similar language is contained in 4 CSR 240-20.094(2), which became effective October 30, 2017.

The MEEIA rules provide – in 4 CSR 240-3.164(2)(A)[11] – detailed requirements for conducting current market potential studies including requirements for: 1) use of primary research, 2) updating the potential study no less frequently than every four (4) years, 3) review by Staff and stakeholders of required documentation, and 4) identification and discussion of the twenty (20)-year baseline energy and demand forecasts. Chapter 22 includes specific requirements for demand-side management potential studies in 4 CSR240-22.050(2), demand-side programs potential in 4 CSR 240-22.050(3), and demand-side rates potential in 4 CSR 240-22.050(4).

Staff Expert Witness: John Rogers and Brad Fortson

4 CSR 240-22.030 Load Analysis and Forecasting

4 CSR 240-22.030, Load Analysis and Forecasting, has a stated purpose of setting the "minimum standards for the maintenance and updating of historical data, the level of detail required in analyzing loads, and the purposes to be accomplished by load analysis and by load forecast models. The load analysis discussed in this rule is intended to support both demand-side management efforts of 4 CSR 240-22.050 and the load forecast models of this rule. This rule also sets the minimum standards for the documentation of the inputs, components, and methods used to derive the load forecasts." The Load Analysis and Load Forecasting Rule allows the utility to use multiple analytical methods for performing its load analysis and develop its forecasts, leaving it to the utility's discretion to choose the methods by which it achieves the stated purpose of the rule.

According to Ameren Missouri, given the uncertainty around the former Noranda aluminum smelter which has been inactive since February 2016,[12] Ameren Missouri did not include Noranda's load in its energy and demand load forecasts.[13] Addendum A contains Ameren Missouri's historic and IRP Base annual energy forecasts, and Addendum B contains the High, Base and Low energy forecast for the IRP. Addendum C contains Ameren Missouri's

[11] Effective from May 30, 2011 through October 29, 2017. Similar "utility market potential study" requirements are contained in 4 CSR 240-20.094(3), which became effective October 30, 2017.

[12] The US Bankruptcy Court approved the sale of assets of Noranda Aluminum, Inc. on October 21, 2016. As per the order, debtor has been authorized to sell Gramercy assets and St. Ann assets to New Day Aluminum LLC, stalking-horse bidder for $24.43 million, as per the amended agreement dated October 19, 2016. ARG International AG has been designated as back-up bidder with a purchase price of $24 million.

[13] Page 27 of Chapter 3 Load Analysis and Forecasting.

historic and IRP Base annual peak demand forecasts, and Addendum D contains the High, Base and Low peak demand forecasts for the 2017 IRP.

Ameren Missouri did not request any waivers from specific provisions of this rule.

As a result of Staff's limited review of Ameren Missouri's load analysis and energy and demand forecasts, Staff found no deficiencies concerning compliance with this rule and Staff has not identified any concerns. In Staff's opinion, the Filing meets the Load Analysis and Forecasting requirements of 4 CSR 240-22.030.

Staff Expert Witness: Brad Fortson

4 CSR 240-22.040 Supply-Side Resource Analysis

Rule 4 CSR 240-22.040 Supply-Side Resource Analysis requires Ameren Missouri to review existing resources for opportunities to upgrade or retire existing resources and also review a wide variety of supply-side resource options to determine cost estimates for each type of resource.

Resource options are to be ranked based upon their relative levelized annual costs,[14] including installed capital costs, fixed and variable operation and maintenance costs, and probable environmental costs levelized over the useful life of the potential supply-side resource options using the utility discount rate.[15] Resources which do not have significant disadvantages and pass the pre-screening process are to be included in the integrated resource analysis process used to select a preferred resource plan.

Ameren Missouri selected three technologies based on supply side screening analysis[16] as final candidate resource options to represent fossil fuel resource options which include gas combined cycle, gas simple cycle combustion turbine, and ultra-super-critical pulverized coal. Ameren Missouri selected the Westinghouse AP1000 as the nuclear resource to be evaluated in integration analysis to generally represent new nuclear technology. Ameren Missouri identified wind, solar, hydro, and biomass co-firing as renewable supply side candidate resource options. Ameren Missouri selected pumped hydroelectric storage as the energy storage resource option to be included in the evaluation of alternative resource plans.

[14] 4 CSR 240-22.020(29) Levelized cost means the dollar amount of a fixed annual payment for which a stream of those payments over a specified period of time is equal to a specified present value based on a specified rate of interest.
[15] 4 CSR 240-22.040(2)(A).
[16] 4 CSR 240-22.040(2).

Ameren Missouri evaluated the levelized cost of the existing supply side resources as well as the selected candidate resources as indicated in Addendum E. Capital costs for all of the preliminary candidate supply-side options included transmission interconnection costs.[17]

Table 5.1 from Chapter 5 of the IRP filing summarizes the current environmental regulations for which Ameren Missouri must implement mitigation measures, along with expectations for compliance requirements for certain potential regulations.[18] Table 5.1 is provided as Addendum F of this report for convenience.

With respect to rule 4 CSR 240-22.040 Supply-Side Resource Analysis, Ameren Missouri requested, and the Commission granted, in File No. EE-2017-0089, one variance of the provisions required by 4 CSR 240-22.040(3)(A).[19]

Staff has not identified any deficiencies or concerns related to Ameren Missouri's Supply-Side Resource Analysis.

Staff Expert Witness: J Luebbert

4 CSR 240-22.045 Transmission and Distribution Analysis

Rule 4 CSR 240-22.045 Transmission and Distribution Analysis specifies minimum standards for the scope and level of detail required for transmission and distribution network analysis and reporting. Rule 4 CSR 240-22.045 does not prescribe how analyses are to be done, but rather allows a utility to conduct its own analysis or adopt the Regional Transmission Operator ("RTO") or Independent Transmission System Operator ("ISO") transmission plans. Rule 4 CSR 240-22.045 requires analysis and documentation of the RTO/ISO transmission projects and requires the electric utility to review transmission and distribution for the reduction of power losses, interconnection of new generation facilities, facilitation of sales and purchases, and incorporation of advance technologies for the optimization of investment in transmission and distribution resources.

Since 2004, Ameren Missouri has been a member of the Midcontinent Independent System Operator ("MISO"),[20] a RTO. MISO was approved as the nation's first ISO/RTO in 2001 and is an independent nonprofit organization that supports the delivery of wholesale electricity and operates energy and capacity markets in 15 U.S. states and the Canadian province

[17] IRP Chapter 6, page 2
[18] IRP Chapter 5, page 3
[19] Commission ordered January 11, 2017 and effective February 10, 2017
[20] Formerly the Midwest Independent Transmission System Operator.

of Manitoba. A key responsibility of the MISO is the development of the annual MISO Transmission Expansion Plan ("MTEP"). Ameren Missouri is an active participant in the MISO MTEP development process.

With respect to rule 4 CSR 240-22.045 Transmission and Distribution Analysis, Ameren Missouri requested, and the Commission granted, in File No. EE-2017-0089, variances of the provisions required by 4 CSR 240-22.045(1)(B) and 4 CSR 240-22.045(3)(C).[21]

The Staff has not identified any deficiencies or concerns related to Ameren Missouri's Transmission and Distribution Analysis.

Staff Expert Witness: J Luebbert

4 CSR 240-22.050 Demand-Side Resource Analysis

Rule 4 CSR 240-22.050, Demand-Side Resource Analysis, specifies the methods by which end-use measures and demand-side programs shall be developed and screened for cost-effectiveness. It also requires the ongoing evaluation of end-use measures and programs, and the use of program evaluation, measurement and verification ("EM&V") to improve program design and cost-effectiveness analysis.

Ameren Missouri continues to build on its demand-side management ("DSM") planning, implementation, and evaluation performance from its initial implementation of DSM programs in 2009 followed by MEEIA Cycles 1 from January 1, 2013, through December 31, 2015, and MEEIA Cycle 2, which began March 1, 2016, and is scheduled to end February 28, 2019.[22]

Ameren Missouri contracted with GDS Associates to perform its 2016 DSM Potential Study that was used to inform the Demand-Side Resource Analysis required by 4 CSR 240-22.050 for the 2017 IRP. To maximize the work done by EnerNOC for Ameren Missouri on the 2013 DSM Potential Study, GDS subcontracted with EMI Consulting to review and update the market research content provided in the 2013 DSM Potential Study. The market research task consisted of a comprehensive review and analysis of all relevant existing

[21] Commission ordered January 11, 2017 and effective February 10, 2017

[22] Commission's July 20, 2017, *Order Approving Stipulation And Agreement* in File No. EO-2015-0055, established a process for Cycle 2 long-lead energy efficiency projects' implementation and completion to extend for up to 24 months beyond the February 28, 2019 Cycle 2 end date.

data (primary and secondary[23]) without development of new data generated through primary research. From this data GDS then compiled its market and industry research into estimations of the technical, economic, and achievable levels of energy efficiency and demand response potential for the 2019-2036 timeframe.

Overall conclusions from the 2016 DSM Potential Study included: 1) continuing the trend from the 2016-2018 DSM implementation planning period, 55-60% of the program-level energy-efficiency potential is expected to come from commercial and industrial customers in the immediate future; 2) there is significant energy efficiency and demand response[24] program potential but projected program costs are significantly higher than current spending levels; and 3) the initial analysis of demand-side rates in the study indicate that inclining block rates and time-of-use rates have significant customer energy savings potential. However, Ameren Missouri conducted its own analysis of demand side rate potential which indicates significantly lower impacts.

Additionally, on page 8, Chapter 8 – Demand-Side Resources, Ameren Missouri states:

> Historically, Ameren Missouri has used the potential study results for energy efficiency and modified them where appropriate to create a cost effective portfolio design for its MEEIA implementation plan. Alternatively for its next implementation plan, Ameren Missouri has used the 2016 DSM Potential Study results as an initial basis for its targets in an RFP. The resulting proposals from implementation contractors will then be used by Ameren Missouri to initiate a collaborative dialogue with interested stakeholders to define the demand-side portfolio, budgets, and targets for its next MEEIA plan.
>
> Another notable change is that this RFP is being issued for a 6-year implementation cycle unlike the first two MEEIA cycles which offered a 3-year cycle each. Moving toward a longer program cycle enhances the structure to better enable continuity of a base set of programs and allow more time and energy to focus on new programs, new technologies, and overall improvement opportunities. In past experience, by the time a new program cycle is through the "start-up" phase, planning for the next cycle has to begin and there is little time to incorporate improvement opportunities from the current cycle into the planning process, as the first year results are still being finalized. A longer cycle will provide more opportunity to manage the programs and understand what is or is not working well, so those considerations can be better implemented in the future.

[23] Primary data is market research which is specific to a utility's service territory, while secondary data is market research which is not specific to a utility's service territory but can be adapted for use by the utility in its market potential study.

[24] Regarding demand response, the 2016 Potential Study found that while there has been volatility in the MISO capacity markets, long term value exists.

Addendum G contains charts which illustrate the following for realistic achievable potential ("RAP") portfolio, Mid DSM portfolio,[25] and maximum achievable potential ("MAP") portfolio: 1) cumulative energy savings from energy efficiency programs, 2) cumulative peak demand savings from energy efficiency programs and 3) cumulative peak demand savings from demand response programs.

With respect to rule 4 CSR 240-22.050 Demand-Side Resource Analysis, Ameren Missouri requested, and the Commission granted, in File No. EE-2017-0089, three variances of the provisions required by 4 CSR 240-22.050(4)(D)2, 4 CSR 240-22.050(5)(B)3, and 4 CSR 240-22.050(5)(E).

Based on its limited review, Staff concludes Ameren Missouri's Demand-Side Resource Analysis filing meets the requirements of rule 4 CSR 240-22.050, and there are no deficiencies.

However, Staff has two concerns in regards to Ameren Missouri's MEEIA implementation plan RFP and Ameren Missouri's next DSM Potential Study.

Concern A – Ameren Missouri's 2017 IRP's MEEIA Cycle 3 implementation plan and Ameren Missouri's MEEIA Cycle 3 RFP to program implementers identifies a 6-year program life for all programs. This 6-year program life creates conflict with the 3-year or triennial compliance requirements of 4 CSR 240-22.050 which specifies the principles by which potential demand-side resource options shall be developed and analyzed for cost effectiveness with the goal of achieving all cost-effective demand-side savings as well as the requirement that demand-side candidate resource options be passed on to integrated resource analysis in 4 CSR 240-22.060.

Concern B – If a 6-year MEEIA Cycle 3 is approved and implemented, Staff is concerned that a 2019 DSM Potential Study may not be performed to comply with 4 CSR 240-22.050(2) including the performance of primary research for Ameren Missouri's marketplace to comply with 4 CSR 240-20.094(3)(A)2.

To remedy Concerns A and B, Ameren Missouri should: 1) perform a 2019 DSM Potential Study to include primary research of its marketplace for its 2020 IRP, and 2) make an application to the Commission for new MEEIA Cycle 3 programs under 4 CSR 240.20.094(4) and/or modify its Commission-approved MEEIA Cycle 3 programs under 4 CSR 240-20.094(5), as necessary, and in accordance with its 2020 IRP's adopted preferred resource plan acquisition strategy and implementation plan.

Staff Expert Witnesses: Brad Fortson and J Luebbert

[25] The Mid DSM portfolio is designed to be a set of programs that will deliver a level of savings half-way between the RAP portfolio and the MAP portfolio.

4 CSR 240-22.060 Integrated Resource Analysis

This Integrated Resource Analysis rule requires the utility to design alternative resource plans to meet the planning objectives identified in Rule 4 CSR 240-22.010(2), and sets minimum standards for the scope and level of detail required in resource plan analysis and for the logically consistent and economically equivalent analysis of alternative resource plans. The utility is to identify the critical uncertain factors that affect the performance of alternative resource plans and comply with minimum standards for the methods used to assess the risks associated with these uncertainties.

The utility shall develop alternative resource plans for analysis that maximize reliance on energy efficiency and renewable energy resources and then develop optimal cases. The rule requires the development of alternative resource plans based on normal conditions and also to assess the robustness of each plan under more extreme conditions (high and low cases). The rule requires inclusion of performance measures of present worth of utility revenue requirements, with and without any financial performance incentives the utility is planning to request. The rule also requires analysis of financial parameters and, if required, description of any changes in legal mandates and cost recovery mechanisms necessary for the utility to maintain an investment grade credit rating and documentation of the methods, analyses, judgments, and data the utility chooses.

Ameren Missouri developed, considered, and analyzed the present worth of long-run utility costs for 18 alternative resource plans by calculating the 30-year present value of revenue requirement ("PVRR") for each plan (see Addendum H). While Ameren Missouri has selected the minimization of PVRR as the primary selection criterion for the preferred plan in accordance with 4 CSR 240-22.010(2)(B), Ameren Missouri does not use minimization of PVRR as the only selection criterion. In addition to calculating the PVRR for each plan, Ameren Missouri considered the performance of each plan when compared to four other planning objectives. These planning objectives are Environmental/Renewable/Resource Diversity, Financial/Regulatory, Customer Satisfaction, and Economic Development. The alternative resource plans (see Addendum I) include various levels of demand side programs and rates, renewable resources, new supply side resources, and coal retirements. All of the alternative resource plans include 700 MW nameplate capacity of wind additions that Ameren Missouri will

utilize to meet the requirement of the Missouri Renewable Energy Standard that no less than 15% of calendar year retail sales come from renewable energy resources beginning in 2021.

With respect to rule 4 CSR 240-22.060 Integrated Resource Analysis, Ameren Missouri requested, and the Commission granted, in File No. EE-2017-0089, variances of the provisions required by 4 CSR 240-22.060(5)(E), 4 CSR 240-22.060(5)(F), 4 CSR 240-22.060(5)(K), 4 CSR 240-22.060(5)(L), and 4 CSR 240-22.060(7).[26]

The Staff has not identified any deficiencies or concerns related to Ameren Missouri's integrated resource analysis.

Staff Expert Witness: J Luebbert

4 CSR 240-22.070 Risk Analysis and Strategy Selection

Rule 4 CSR 240-22.070, Risk Analysis and Strategy Selection, requires the utility to select a preferred resource plan, develop an implementation plan, and officially adopt a resource acquisition strategy. The rule also requires the utility to prepare contingency plans and evaluate the demand-side resources that are included in the resource acquisition strategy.

Ameren Missouri did not apply for any waivers from the requirements of this rule.

Ameren Missouri's final probability tree (see Addendum J) consists of the following dependent and independent critical uncertain factors:

Dependent critical uncertain factors

- Coal plant retirements
- CO_2 policy
- Load growth
- Natural gas prices

Independent critical uncertain factors

- DSM costs
- Coal Prices

Ameren Missouri's decision-makers chose to use a Scorecard approach[27] to evaluate its eighteen (18) candidate resource plans during their strategy selection process to adopt a resource

[26] Commission ordered January 11, 2017 and effective February 10, 2017.

acquisition strategy and a preferred resource plan for Ameren Missouri. The Scorecard is included as Addendum K.

Addendum L includes a summary of Ameren Missouri's 2017 IRP's adopted preferred resource plan, contingency resource plans, and resource acquisition strategy implementation plan for the adopted preferred resource plan. Finally, the capacity balance sheet for Ameren Missouri's adopted preferred resource plan is included as Addendum M.

Based on its limited review, Staff has identified one (1) deficiency for Ameren Missouri's Resource Acquisition Strategy Selection filing.

Deficiency 1 – Ameren Missouri provided only the 30-year PVRR for its Mid-DSM Plan and failed to comply with all other requirements of 4 CSR 240-22.070(1) concerning its Mid-DSM Plan.

To remedy Deficiency 1 concerning its Mid-DSM Plan, Ameren Missouri should comply with all requirements of 4 CSR 240-22.070(1) as soon as possible, including revisions to Figure 10.1 and to Chapter 10 – Appendix A Preferred Plan Selection Scorecard so both include a Mid-DSM Plan that complies with all of the requirements of 4 CSR 240-22.070(1) not just the 30-year PVRR facet.

Staff Expert Witness: John Rogers

4 CSR 240-22.080 Filing Schedule and Requirements

This rule specifies the requirements for electric utility filings to demonstrate compliance with the provisions of Chapter 22. The purpose of the compliance review required by Chapter 22 is not Commission approval of the substantive findings, determinations, or analyses contained in the filing. The purpose of the compliance review required by Chapter 22 is to determine whether the utility's resource acquisition strategy meets the requirements of Chapter 22. However, if the Commission determines that the filing substantially meets these requirements, the Commission may further acknowledge that the preferred resource plan or resource acquisition strategy is reasonable in whole, or in part, at the time of the finding. This rule also establishes a mechanism for the utility to solicit and receive stakeholder input to its resource planning process.

The Filing Schedule, Filing Requirements, and Stakeholder Process Rule establish a filing deadline for all electric utilities on April 1 of each year. A triennial compliance filing is due every third year with more informal annual update filings during the years between the full

triennial compliance filings. The annual updates are coupled with a stakeholder workshop to communicate changing conditions and utility plans and to seek comments and suggestions from stakeholders during the planning process. Preliminary plans are reviewed with stakeholders to receive input regarding potential concerns and deficiencies. However, once plans are filed, stakeholders again have the opportunity to identify potential concerns and deficiencies. The Commission, with input from stakeholders, will identify special contemporary issues each year for each utility to analyze during its planning process. To make the resource planning process more meaningful, the rule requires action from the utility if its business plan or acquisition strategy becomes inconsistent with the latest adopted preferred resource plan filed by the utility. The rule also requires certification that any request for action from the Commission is consistent with the utility's adopted preferred resource plan.

Ameren Missouri requested and received approval of variances from 4 CSR 240-22.080 (2)(C)2 to postpone the deadline for filing its 2017 IRP from April 1, 2017 to October 1, 2017; and from 4 CSR 240-22.080(5)(A) to allow its DSM market potential study to serve as its draft chapter for 4 CSR 240-22.050.

Staff notes that 4 CSR 240-22.080(1) and 4 CSR 240-22.080(3), require a 12-month interval between an electric utility's Chapter 22 triennial compliance filings and/or annual update filings. However, due to the variances, Ameren Missouri has experienced an 18-month interval – and not a 12-month interval – between its two most recent Chapter 22 triennial compliance filings[28] (October 1, 2014 and October 1, 2017) and its subsequent Chapter 22 annual update filings[29] (April 1, 2016 and April 1, 2019).

Beginning with its 2019 Chapter 22 annual update filing and its 2020 triennial compliance filing, Ameren Missouri should plan for the required 12-month interval between Chapter 22 filings – triennial compliance filings and/or annual update filing required under 4 CSR 240-22.080(1) and 4 CSR 240-22.080(3), respectively. Doing so may result in Ameren Missouri making its Chapter 22 filings on a date other than April 1 or October 1 in order

[28] In File Nos. EE-2013-0312 and EE-2015-0316, the Commission allowed Ameren Missouri to make its 2014 Chapter 22 triennial compliance filing and its 2017 Chapter 22 triennial compliance filing on October 1, 2014 and October 1, 2017, respectively, and not on April 1, 2014 and April 1, 2017, respectively, as required by 4 CSR 240-22.080(1)(C).

[29] In File Nos. EO-2015-0039 and EE-2018-0040, the Commission did not establish special contemporary issues for and did not require Ameren Missouri to file Chapter 22 annual updates on or about April 1, 2015 and on or about April 1, 2018, respectively, as required by 4 CSR 240-22.080(3).

to maintain a 12-month interval between Chapter 22 filings – both Chapter 22 triennial compliance filings and Chapter 22 annual update filings.

As a result of its review, Staff has identified one (1) deficiency related to 4 CSR 240-22.080 Filing Schedule, Filing Requirements, and Stakeholder Process.

Deficiency 2 - Ameren Missouri did not provide its draft of the triennial compliance filing for 4 CSR 240-22.030 at its stakeholder meeting which is required under 4 CSR 240-22.080(5)(A) and (B).[30]

To remedy Deficiency 2, Ameren Missouri should comply with all requirements of 4 CSR 240-22.080(5) in future Chapter 22 triennial compliance filings.

Staff Expert Witness: John Rogers

[30] During Ameren Missouri's April 19, 2017, stakeholder workshop to comply with 4 CSR 240-22.080(5)(A) and (B), Ameren Missouri used a PowerPoint presentation to summarize its load analysis and load forecast and stated that the draft of 4 CSR 240-22.030 will be shared once it is finalized. The draft was not supplied to stakeholders until August 23, 2017, over four months later.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Ameren Missouri's 2017 Utility Resource Filing Pursuant to 4 CSR 240 – Chapter 22	)))	**File No. EO-2018-0038**

AFFIDAVIT OF BRAD FORTSON

State of Missouri)
) ss.
County of Cole)

COMES NOW Brad Fortson and on his oath declares that he is of sound mind and lawful age; that he contributed to the attached *Staff Report*; and that the same is true and correct according to his best knowledge and belief.

Further the Affiant sayeth not.

Brad Fortson

JURAT

Subscribed and sworn before me, a duly constituted and authorized Notary Public, in and for the County of Cole, State of Missouri, at my office in Jefferson City, on this 29th day of February, 2018.

Dianna L. Vaught
NOTARY PUBLIC

DIANNA L. VAUGHT
Notary Public - Notary Seal
State of Missouri
Commissioned for Cole County
My Commission Expires: June 28, 2019
Commission Number: 15207377

Schedule MM-S2

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Ameren Missouri's 2017 Utility Resource Filing Pursuant to 4 CSR 240 – Chapter 22	)))	**File No. EO-2018-0038**

AFFIDAVIT OF J LUEBBERT

State of Missouri)
) ss.
County of Cole)

COMES NOW J Luebbert and on his oath declares that he is of sound mind and lawful age; that he contributed to the attached *Staff Report*; and that the same is true and correct according to his best knowledge and belief.

Further the Affiant sayeth not.

J Luebbert

JURAT

Subscribed and sworn before me, a duly constituted and authorized Notary Public, in and for the County of Cole, State of Missouri, at my office in Jefferson City, on this 28th day of February, 2018.

NOTARY PUBLIC

DIANNA L. VAUGHT
Notary Public - Notary Seal
State of Missouri
Commissioned for Cole County
My Commission Expires: June 28, 2019
Commission Number: 15207377

Schedule MM-S2

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Ameren Missouri's 2017 Utility Resource Filing Pursuant to 4 CSR 240 – Chapter 22	)))	**File No. EO-2018-0038**

AFFIDAVIT OF JOHN A. ROGERS

State of Missouri)
) ss.
County of Cole)

COMES NOW John A. Rogers and on his oath declares that he is of sound mind and lawful age; that he contributed to the attached *Staff Report*; and that the same is true and correct according to his best knowledge and belief.

Further the Affiant sayeth not.

John A Rogers
John A. Rogers

JURAT

Subscribed and sworn before me, a duly constituted and authorized Notary Public, in and for the County of Cole, State of Missouri, at my office in Jefferson City, on this 28th day of February, 2018.

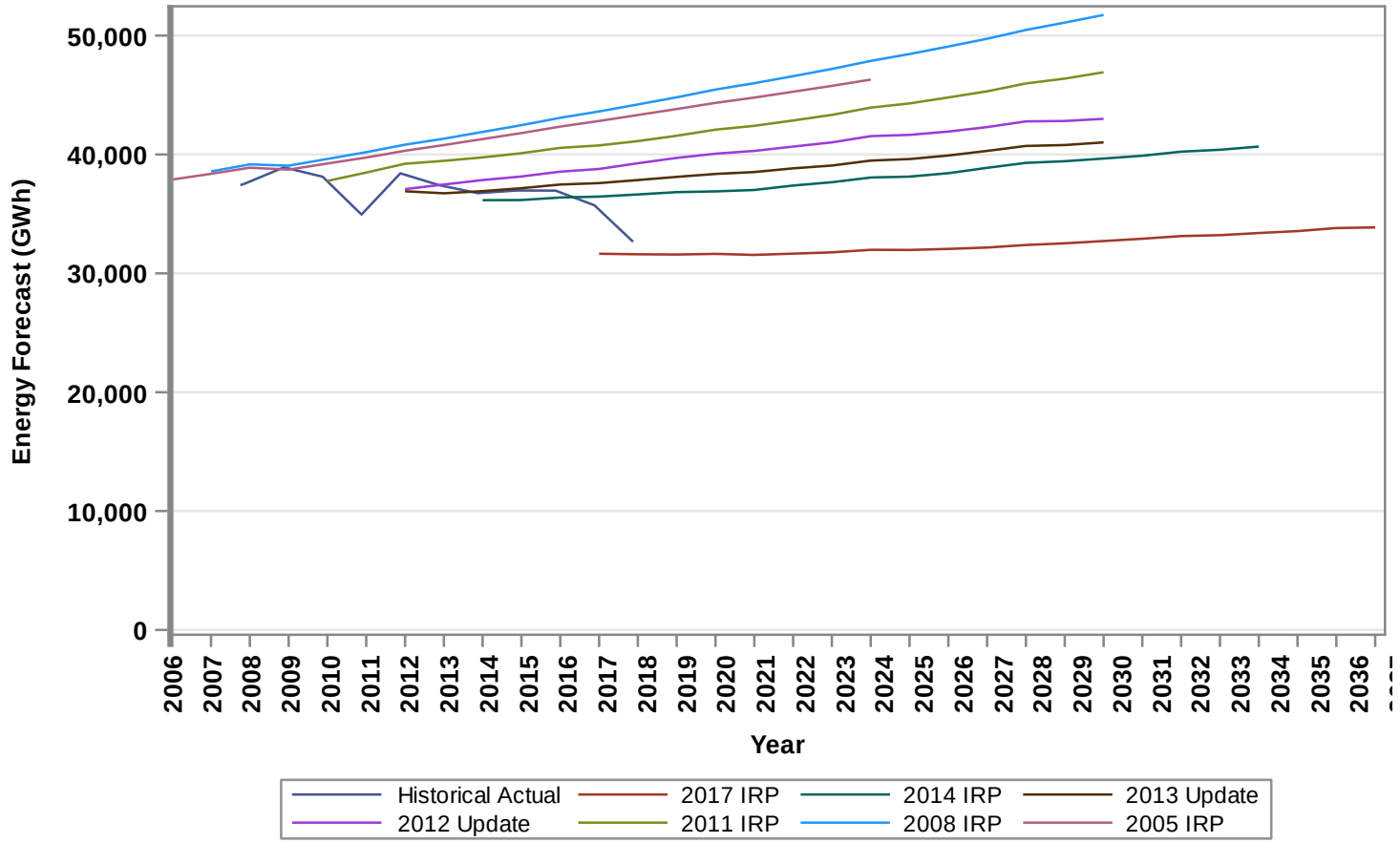
Dianna L. Vaught
NOTARY PUBLIC

DIANNA L. VAUGHT
Notary Public - Notary Seal
State of Missouri
Commissioned for Cole County
My Commission Expires: June 28, 2019
Commission Number: 15207377

Schedule MM-S2

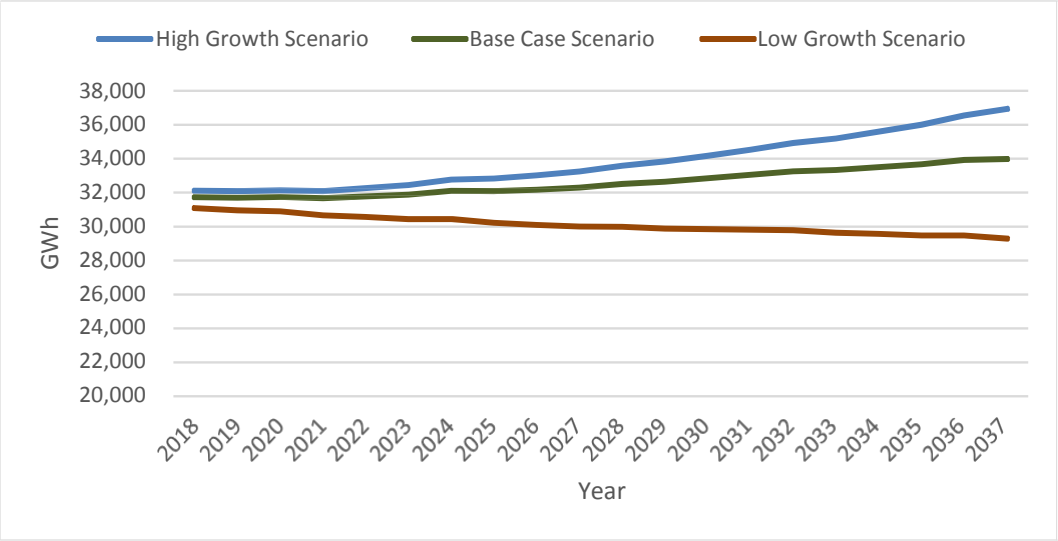
Archive of Previous Energy and Peak Demand Forecasts[13]

Previous IRP Energy Forecasts and Actual Historical Energy Usage (GWh)

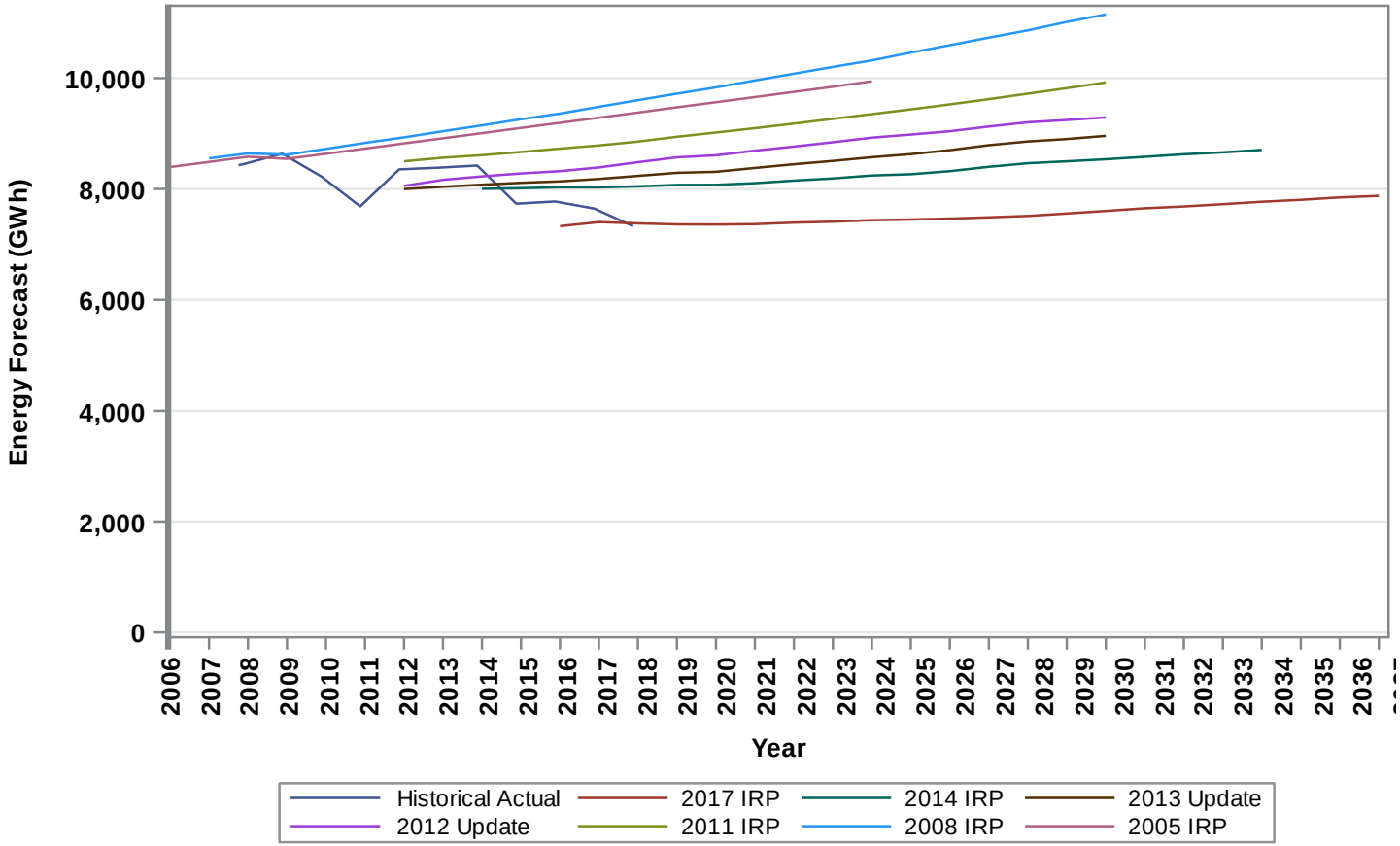


[13] 4 CSR 240-22.030(6)(C)4

Figure 3.10: Total Energy Sales Forecast by Scenario

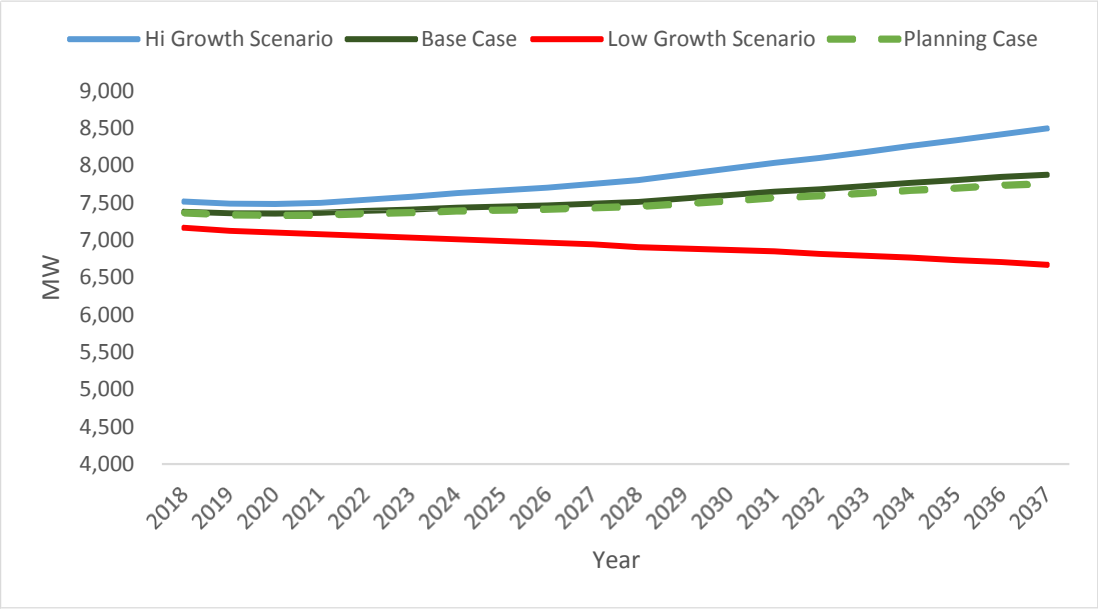


Previous IRP Peak Demand Forecasts and Actual Historical Peaks (MW)



Addendum
Schedule MM-S2

Figure 3.27: IRP Annual Peak Forecast—Planning Case and Scenarios



Levelized Cost of Energy Component Analysis for Existing Resources[1]

Existing Resources	Levelized Cost of Energy (¢/kWh)										
	Non-Environmental Costs					Probable Environmental Costs					Total Cost
	Non-Env Capital	Fixed and Variable O&M	Fuel	Decommission	Pump MWh	Env Capital	Env O&M	CO2	SO2	NOx	
Labadie	0.55	0.30	2.15	--	--	0.16	0.04	0.27	0.00	0.03	**3.49**
Rush Island	0.54	0.40	2.35	--	--	0.20	0.03	0.38	0.00	0.00	**3.92**
Meramec	0.67	2.31	2.37	--	--	1.49	0.04	0.00	0.00	0.01	**6.88**
Sioux	0.67	0.65	2.23	--	--	0.35	0.04	0.17	0.01	0.01	**4.12**
Audrain	0.50	0.29	5.65	--	--	--	0.00	0.17	0.00	0.00	**6.61**
Goose Creek	1.47	0.52	5.38	--	--	--	0.00	0.16	0.00	0.00	**7.54**
Kirksville	0.10	0.04	7.87	--	--	--	--	0.00	0.00	0.00	**8.01**
Pinckneyville	0.77	1.46	4.53	--	--	--	--	0.14	0.00	0.00	**6.89**
Raccoon Creek	0.23	0.74	5.63	--	--	--	--	0.17	0.00	0.00	**6.77**
Kinmundy	0.89	1.19	5.10	--	--	--	--	0.15	0.00	0.00	**7.33**
Meramec CTG	2.52	0.17	5.60	--	--	--	--	0.00	0.00	0.00	**8.30**
Peno Creek	0.86	1.66	4.91	--	--	--	--	0.15	0.00	0.00	**7.57**
Venice	0.57	0.85	4.91	--	--	--	--	0.15	0.00	0.00	**6.48**
Fairgrounds	0.04	0.24	7.87	--	--	--	--	0.00	0.00	0.00	**8.15**
Mexico	0.06	0.42	8.03	--	--	--	--	0.00	0.00	0.00	**8.51**
Moberly	0.06	0.39	5.33	--	--	--	--	0.00	0.00	0.00	**5.79**
Moreau	0.04	0.28	8.79	--	--	--	--	0.00	0.00	0.00	**9.12**
Callaway	1.32	1.81	0.79	0.07	--	--	--	0.00	0.00	0.00	**4.00**
Keokuk	1.91	0.50	0.00	--	--	--	--	0.00	0.00	0.00	**2.40**
Osage	4.65	1.20	0.00	--	--	--	--	0.00	0.00	0.00	**5.85**
Taum Sauk	3.29	1.66	0.00	--	4.78	--	--	0.00	0.00	0.00	**9.73**
Maryland Heights CTG	1.14	3.05	8.05	--	--	--	0.00	0.00	0.00	0.00	**12.24**
O'Fallon (Solar)	0.00	0.41	0.00	--	--	--	0.00	0.00	0.00	0.00	**0.41**

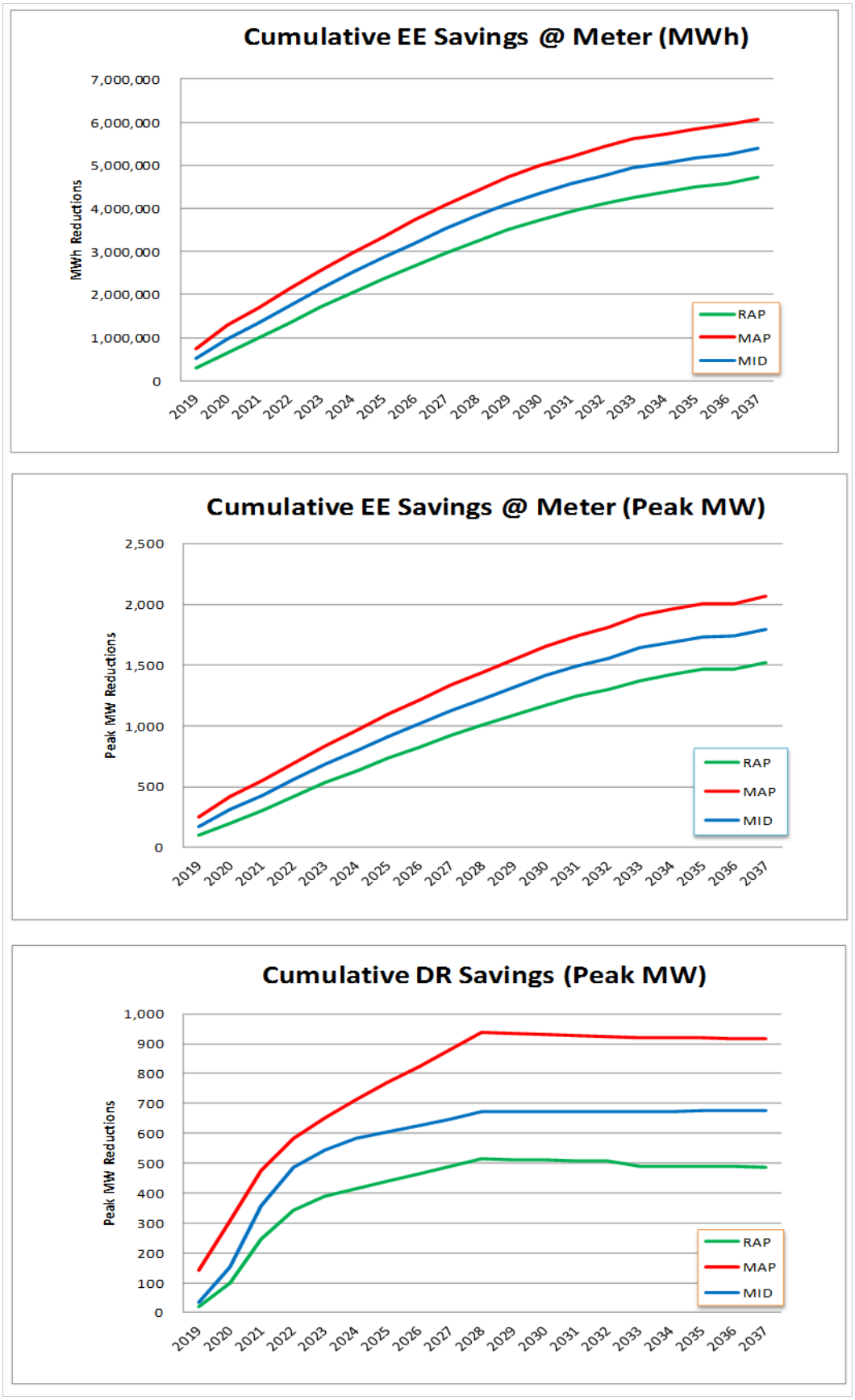
Levelized Cost of Energy Component Analysis

Resource	Levelized Cost of Energy (¢/kWh)									
	Capital	Fixed O&M	Variable O&M	Fuel	Pump Cost	Decommission	CO_2	SO_2	NO_X	Total Cost
New Resources										
Regional Wind	4.35	0.83	0.00	--	--	--	--	--	--	5.18
MO Wind	4.87	0.94	0.00	--	--	--	--	--	--	5.80
Combined Cycle	3.46	0.26	0.52	3.26	--	--	0.14	0.00	0.00	7.64
Hydro: Pomme de Terre	7.56	0.65	--	--	--	--	--	--	--	8.21
Hydro: Mississippi L&D 21	9.67	0.63	--	--	--	--	--	--	--	10.31
Storage: Pumped Hydro	7.17	0.21	0.48	--	4.17	--	--	--	--	12.02
Nuclear	8.68	2.36	0.30	0.84	--	0.17	--	--	--	12.36
Landfill Gas	5.95	1.75	1.44	3.80	--	--	--	0.00	0.00	12.94
Solar	10.14	1.20	--	--	--	--	--	--	--	11.34
Hydro: Clearwater	12.00	0.98	--	--	--	--	--	--	--	12.98
Coal (USCPC with CCS)	9.08	0.63	2.56	2.97	--	--	0.06	0.00		15.30
Biomass	10.50	2.67	1.40	4.84	--	--	--	0.00	0.01	19.42
Simple Cycle	17.50	2.25	0.98	3.99	--	--	0.17	0.00	0.00	24.89

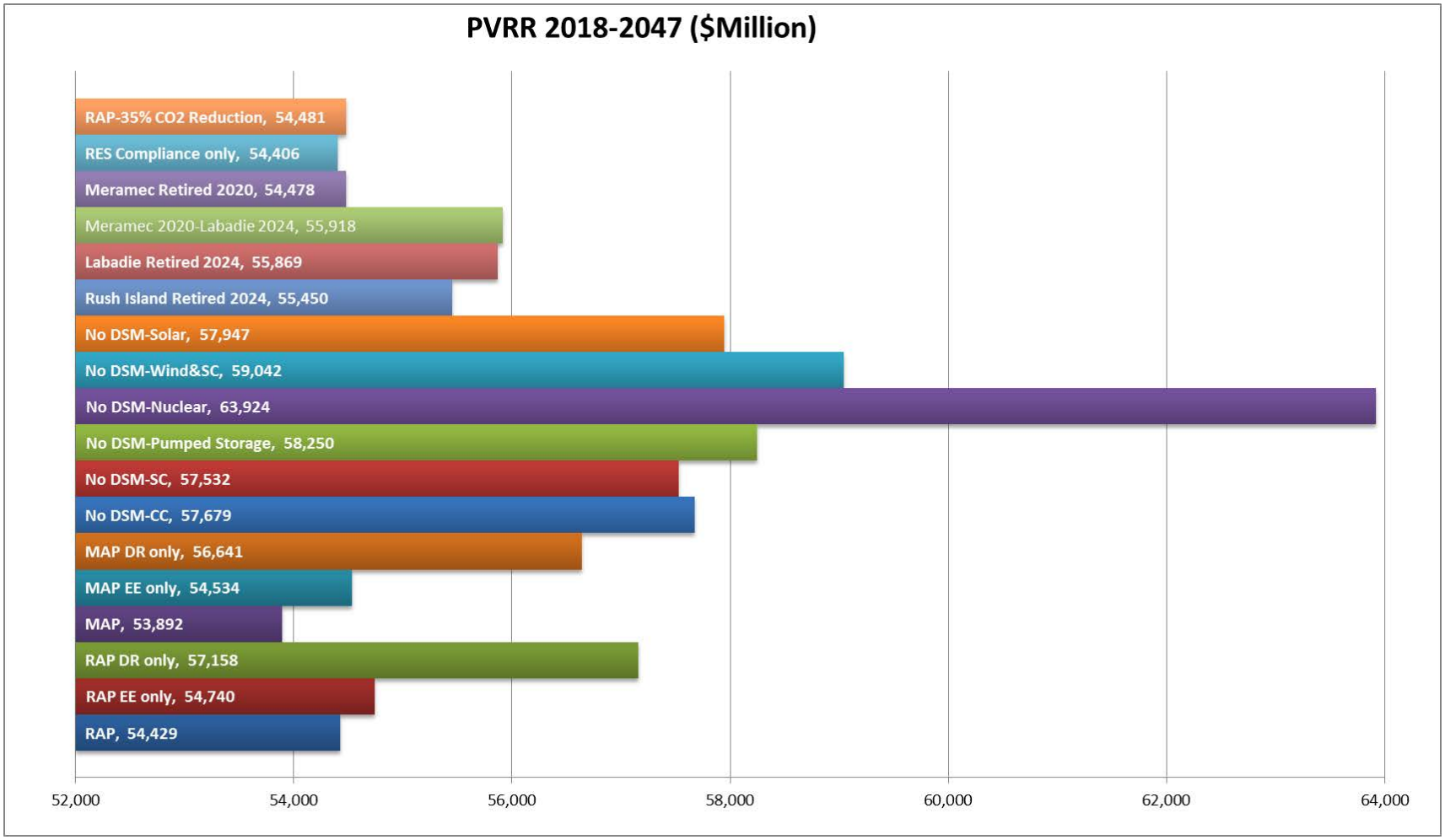
[1] IRP Chapter 4,Table 4.2

Table 5.1 Current & Pending Environmental Regulations

Regulatory Driver	Summary Requirements	Regulation Status	Compliance Timing
Cross-State Air Pollution Rule (CSAPR)	Reduction in NOx and SO2 allowances vs. CAIR; New allowances for trading program (state level caps)	EPA implemented Phase 1 starting on 1/1/2015. On September 7, 2016 EPA finalized an update effective December 27, 2016 to lower the seasonal NOx (May-Sept) allocations beginning with the 2017 ozone season.	Phase 1: 1/1/2015 Phase 2: 1/1/2017
Revisions to National Ambient Air Quality Standards (NAAQS)	Lower PM, NOx and SO2 limits; Expansion of non-attainment areas	SO2 final rule June, 2010; EPA issued a final designation of "unclassifiable" for area around Labadie; final designations for all areas 2016-2020.	SO2: 2017 - 2020
		Fine particulate (PM2.5) lowered 1/15/2013; Attainment designations 03/2015; State Implementation Plans 2018.	PM 2.5: 2020 - 2025
		Ozone standard lowered, final rule 12/2015; Attainment designations 2017; State Implementation Plans 2020	Ozone: 2020+
Mercury and Air Toxics Standards (MATS)	Reduction in emissions of Mercury, HCl (proxy for acid gases) and particulate emissions (proxy for non-mercury metals)	Final rule effective April 16, 2012. Compliance required by April 16, 2015.	Rush Island and Sioux Energy Centers compliant on April 16, 2015; Labadie and Meramec (units 3 & 4) Energy Centers received MDNR approved 1-yr extensions and compliant on April16, 2016.
Clean Air Visibility Rule (CAVR)/Regional Haze Rule	Application of Best Available Retrofit Technology (BART); Targets reduction in transported SO2 and NOx; status of CSAPR may require state to change approach.	Final rule issued by EPA in 1999; States submitted progress reports in 2013; CSAPR resolution may require changes to state rule.	EPA finalized a rule that will move the next deadline from July 31, 2018 to July 31, 2021.
Clean Water Act Section 316(a) Thermal Standards	Implementation through NPDES permit conditions	Evaluation covered by NPDES permits	2015 - 2020
Clean Water Act Section 316(b) Protection of Aquatic Life	Case-by-case determination of controls required to meet entrainment standards; national standard for impingement	Final rule from EPA effective October 2014	Study plans 2014; Studies 2015 - 2017; Compliance 2022 - 2024
Waters of The United States (WOTUS)	Protection of additional streams and tributaries	Final rule issued June 2015; Rule was stayed nation-wide on 10/09/15 by the U.S. Court of Appeals for the 6th Circuit. The EPA and Corps of Engineers has proposed revisions to the definition.	Unknown
Revisions to Steam Electric Effluent Limitations Guidelines (ELG)	Lower effluent emissions for existing parameters; Installation of wastewater treatment facilities; Implemented through NPDES permit conditions	EPA proposal April 19, 2013; final rule Sept 30, 2015; linked to CCR rule; revised rulemaking for steam electric power plant discharges effective January 4, 2016. The EPA has stayed compliance deadlines pending review of the final rule.	2018 - 2023
Coal Combustion Residuals (CCR)	Conversion to dry bottom ash and fly ash; Closure of existing ash ponds; Dry disposal in landfill	Final determination from EPA on haz/non-haz Dec 2014; final rule April 2015, effective October 19, 2015. Fedral legislation (WINN Act) to revise rule signed December 16, 2016.	2018 - 2023
Clean Air Act Regulation of Greenhouse Gases (GHG)/Clean Power Plan (CPP)	Output-based emission limit for new, modified, reconstructed units	New unit NSPS re-proposed Jan 2014; final rule effective 12/22/2015. Challenge filed in DC Circuit Court; oral argument is April 17, 2017.	New unit NSPS applies 1/8/2014
		Proposed rule for modified and reconstructed NSPS June 2014; final effective 12/22/2015. Challenge filed in DC Circuit Court.	Modified/reconstructed applies 6/18/2014
	State emission limits for existing sources	Proposed NSPS for existing units June 2014; final effective 12/22/2015; Rule stayed by Supreme Court 2/9/2016; oral arguments September 2016; DC Circuit Court holding case in abeyance pending EPA review of final rule.	Existing source interim rates 2022 - 2029; final rates 2030+ Compliance dates are suspended due to Supreme Court stay


Cumulative EE Savings @ Meter (MWh)
MWh Reductions
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
RAP
MAP
MID
Cumulative EE Savings @ Meter (Peak MW)
Peak MW Reductions
2,500
2,000
1,500
1,000
500
0
2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
RAP
MAP
MID
Cumulative DR Savings (Peak MW)
Peak MW Reductions
1,000
900
800
700
600
500
400
300
200
100
0
2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
RAP
MAP
MID

Integration PVRR Results

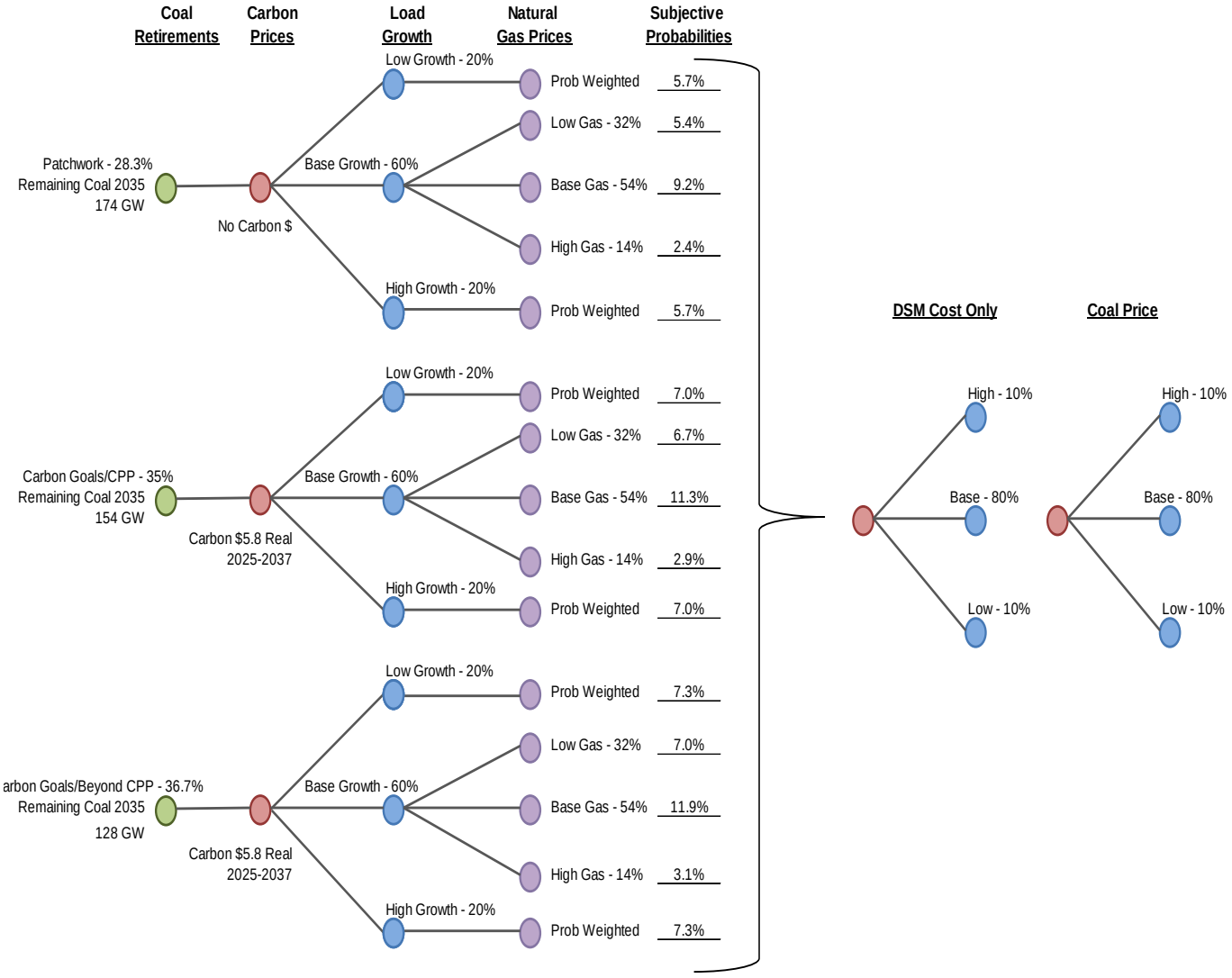


Alternative Resource Plans[1]

Plan Name	Energy Efficiency	Demand Response	Renewables	New Supply Side	Coal Retirements
A-RAP	RAP	RAP	RES Plus	-	Base
B-RAP EE only	RAP	-	RES Plus	-	Base
C-RAP DR only	-	RAP	RES Plus	2 CCs in 2037	Base
D-MAP	MAP	MAP	RES Plus	-	Base
E-MAP EE only	MAP	-	RES Plus	-	Base
F-MAP DR only	-	MAP	RES Plus	CC in 2037	Base
G-No DSM-CC	-	-	RES Plus	CC in 2034 2 CCs in 2037	Base
H-No DSM-SC	-	-	RES Plus	2 SCs in 2034 2 CCs in 2037	Base
I-No DSM-Pumped Storage	-	-	RES Plus	Pumped Hydro in 2034 2 CCs in 2037	Base
J-No DSM-Nuclear	-	-	RES Plus	Nuclear in 2034 CC in 2037	Base
K-No DSM-Wind&SC	-	-	RES Plus	Wind in 2031-2034 (2000 MW total) SC in 2034 2 CCs in 2037	Base
L-No DSM-Solar	-	-	RES Plus	Solar in 2031-2037 (4000 MW total)	Base
M-Rush Island Retired 2024	RAP	RAP	RES Plus	CC in 2037	Rush Island 12/31/2024
N-Labadie Retired 2024	RAP	RAP	RES Plus	CC in 2034	Labadie 12/31/2024
O-Meramec 2020-Labadie 2024	RAP	RAP	RES Plus	CC in 2034	Meramec 12/31/2020 Labadie 12/31/2024
P-Meramec Retired 2020	RAP	RAP	RES Plus	-	Meramec 12/31/2020
Q-RES Compliance only	RAP	RAP	RES	-	Base
R-RAP-35% CO2 Reduction	RAP	RAP	RES Plus	-	Base

[1] IRP Chapter 9, Page 10

Probability Tree



Addendum J

Schedule MM-S2

Ameren Missouri 2017 IRP

Preferred Plan Selection Scorecard

Planning Objectives, Weights and Measures							
	Category	Environmental/ Renewable/ Resource Diversity	Financial/ Regulatory	Customer Satisfaction	Economic Development	Cost	Overall Assessment
	Category Weight	20%	20%	20%	10%	30%	100%
Plan	Description	Resource Diversity	PV Free Cash Flow	Rate Increases	Net Job Growth (FTE-years)	PVRR	
R	RAP-35% CO2 Reduction	2	5	5	4	5	**4.30**
A	RAP	1	5	4	4	5	**3.90**
P	Meramec Retired 2020	1	5	4	4	5	**3.90**
Q	RES Compliance only	1	5	4	4	5	**3.90**
B	RAP EE only	1	5	3	3	5	**3.60**
M	Rush Island Retired 2024	3	4	3	4	4	**3.60**
N	Labadie Retired 2024	4	3	3	4	4	**3.60**
O	Meramec 2020-Labadie 2024	4	3	3	4	4	**3.60**
D	MAP	1	4	2	5	5	**3.40**
E	MAP EE only	1	4	1	3	5	**3.00**
F	MAP DR only	1	5	4	1	3	**3.00**
C	RAP DR only	1	5	4	1	2	**2.70**
L	No DSM-Solar	1	4	4	1	2	**2.50**
K	No DSM-Wind&SC	2	3	3	2	2	**2.40**
G	No DSM-CC	2	3	3	1	2	**2.30**
I	No DSM-Pumped Storage	2	3	3	1	2	**2.30**
H	No DSM-SC	1	3	3	1	2	**2.10**
J	No DSM-Nuclear	2	1	1	3	1	**1.40**

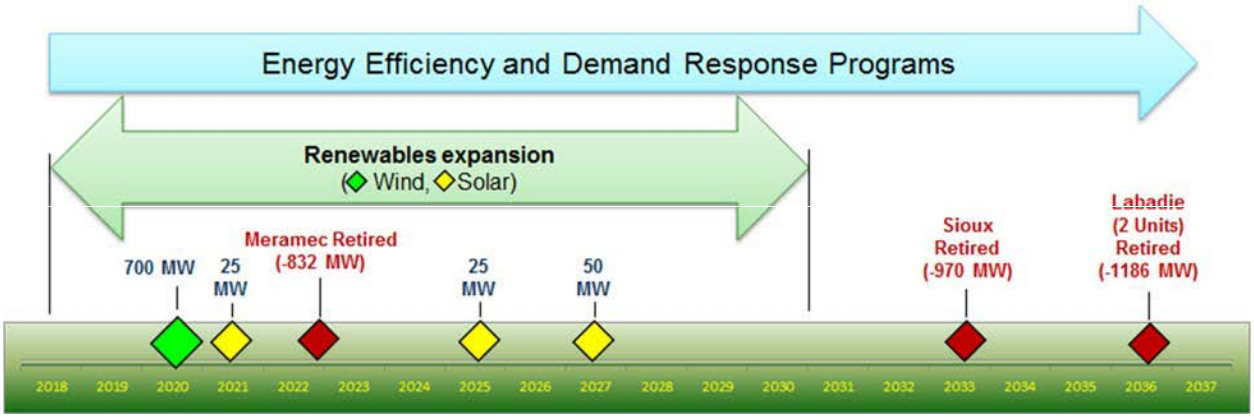
Scoring Guide	
Significant Advantage	5
Moderate Advantage	4
No Advantage or Disadvantage	3
Moderate Disadvantage	2
Significant Disadvantage	1

Overall Assessment Guide	
Top-tier Plan	
Mid-tier Plan	
Bottom-tier Plan	

Notes on Scores by Policy Objective	
Environmental/Diversity	Inclusion of MAP or RAP energy efficiency; new nuclear; combined cycle; significant early coal retirement; additional wind, solar or pumped hydro were viewed as advantageous.
Financial Regulatory	Financial and regulatory risks associated with new nuclear; significant early coal retirement; cessation of energy efficiency programs; and/or implementation of overly aggressive energy efficiency programs were viewed as disadvantageous, as were large negative impacts on cash flow.
Customer Satisfaction	Lower levelized annual rate increases, inclusion of energy efficiency and demand response, inclusion of additional new zero carbon resources, and reductions in coal-fired emissions were viewed as advantageous.
Economic Development	Plans were rated on a relative scale based on direct jobs (FTE-years) including both construction and operation.
Cost (PVRR)	Plans were rated on a relative scale based on present value of revenue requirements (PVRR).

Key to Abbreviations

EE Only = Energy Efficiency Only, No Demand Response
RAP = Realistic Achievable Potential DSM Portfolio
CC = Combined Cycle Gas Turbine Generator
MAP = Maximum Achievable Potential DSM Portfolio
RES = Renewable Energy Standard
DR Only = Demand Response Only, No Energy Efficiency
MEEIA = Missouri Energy Efficiency Investment Act Cycle 1
SC = Simple Cycle Gas Turbine Generator



Addendum L

Schedule MM-S2

Forecast of Capacity Balance (MW) Confidential

Ameren Missouri 2017 IRP Adopted Preferred Resource Plan
Plan A

			2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
A.	**System Generation Capacity**																						
	Existing Generation Capacity																						
	Callaway	Nuclear	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190
	Keokuk	Hydro	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145
	Labadie Unit 1	Coal	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	0
	Labadie Unit 2	Coal	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	0
	Labadie Unit 3	Coal	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593
	Labadie Unit 4	Coal	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593	593
	Rush Island Unit 1	Coal	589	589	589	589	589	589	589	589	589	589	589	589	589	589	589	589	589	589	589	589	589
	Rush Island Unit 2	Coal	589	589	589	589	589	589	589	589	589	589	589	589	589	589	589	589	589	589	589	589	589
	Sioux Unit 1	Coal	485	485	485	485	485	485	485	485	485	485	485	485	485	485	485	485	485	0	0	0	0
	Sioux Unit 2	Coal	485	485	485	485	485	485	485	485	485	485	485	485	485	485	485	485	485	0	0	0	0
	Meramec Unit 3	Coal	260	260	260	260	260	260	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Meramec Unit 4	Coal	334	334	334	334	334	334	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Maryland Heights	LFG	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	O'Fallon	SOLAR	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Base Capacity		**6459**	**6459**	**6459**	**6459**	**6459**	**6459**	**5865**	**5865**	**5865**	**5865**	**5865**	**5865**	**5865**	**5865**	**5865**	**5865**	**5865**	**4895**	**4895**	**4895**	**3709**
	Osage	Hydro	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
	Taum Sauk Unit 1	Hydro	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	Taum Sauk Unit 2	Hydro	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	Meramec Unit 1	Gas	119	119	119	119	119	119	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Meramec Unit 2	Gas	119	119	119	119	119	119	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Audrain 1	Gas	71	71	71	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
	Audrain 2	Gas	71	71	71	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
	Audrain 3	Gas	71	71	71	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
	Audrain 4	Gas	71	71	71	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
	Audrain 5	Gas	71	71	71	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
	Audrain 6	Gas	71	71	71	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
	Audrain 7	Gas	71	71	71	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
	Audrain 8	Gas	71	71	71	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
	Fairgrounds	Oil	54	54	54	54	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Goose Creek 1	Gas	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72
	Goose Creek 2	Gas	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72
	Goose Creek 3	Gas	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72
	Goose Creek 4	Gas	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72
	Goose Creek 5	Gas	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72
	Goose Creek 6	Gas	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72
	Howard Bend	Oil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Kinmundy CTG-1	Gas	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103
	Kinmundy CTG-2	Gas	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103
	Kirksville	Gas	13	13	13	13	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Meramec CTG-1	Oil/Gas	54	54	54	54	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Meramec CTG-2	Oil/Gas	44	44	44	44	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mexico	Oil	53	53	53	53	53	53	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Moberly	Oil	53	53	53	53	53	53	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Moreau	Oil	53	53	53	53	53	53	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Peno Creek CTG-1	Gas/Oil	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
	Peno Creek CTG-2	Gas/Oil	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
	Peno Creek CTG-3	Gas/Oil	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
	Peno Creek CTG-4	Gas/Oil	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
	Pinckneyville CTG-1	Gas	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
	Pinckneyville CTG-2	Gas	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
	Pinckneyville CTG-3	Gas	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
	Pinckneyville CTG-4	Gas	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
	Pinckneyville CTG-5	Gas	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
	Pinckneyville CTG-6	Gas	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
	Pinckneyville CTG-7	Gas	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
	Pinckneyville CTG-8	Gas	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
	Racoon Creek 1	Gas	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
	Racoon Creek 2	Gas	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
	Racoon Creek 3	Gas	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
	Racoon Creek 4	Gas	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
	Venice CTG-2	Gas	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
	Venice CTG-3	Gas	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168
	Venice CTG-4	Gas	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168
	Venice CTG-5	Gas	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103
	Total Intermediate/Peaking Capacity		**3741**	**3741**	**3741**	**3771**	**3771**	**3606**	**3368**	**3209**	**3209**	**3209**	**3209**	**3209**	**3209**	**3209**	**3209**	**3209**	**3209**	**3209**	**3209**	**3209**	**3209**
	Total Generation Capacity (TGC)		**10200**	**10200**	**10200**	**10230**	**10230**	**10065**	**9233**	**9074**	**9074**	**9074**	**9074**	**9074**	**9074**	**9074**	**9074**	**9074**	**9074**	**8104**	**8104**	**8104**	**6918**
B.	**Capacity Transactions**		**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
	Purchases																						
	102.3 Pioneer Prairie Wind		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total Purchases = P		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Existing sales		212	47	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total Sales = S		212	47	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Net Transactions = NT = P - S		-212	-47	-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total System Capacity = TSC = TGC + NT		**9988**	**10153**	**10173**	**10230**	**10230**	**10065**	**9233**	**9074**	**9074**	**9074**	**9074**	**9074**	**9074**	**9074**	**9074**	**9074**	**9074**	**8104**	**8104**	**8104**	**6918**
C.	**System Peaks & Reserves**		**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
	Peak Demands																						
	Ameren Missouri Forecasted Peak		7365	7365	7340	7333	7337	7358	7371	7393	7402	7415	7434	7451	7489	7528	7569	7595	7630	7669	7698	7735	7760
	Voltage Reduction		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Full/Partical Requirements Contracts		3	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	DSM - EE RAP		**0**	**0**	**-106**	**-210**	**-329**	**-444**	**-570**	**-677**	**-788**	**-887**	**-985**	**-1080**	**-1168**	**-1258**	**-1334**	**-1399**	**-1475**	**-1529**	**-1573**	**-1622**	**-1682**
	DSM - DR RAP		**0**	**0**	**-22**	**-107**	**-263**	**-368**	**-419**	**-447**	**-474**	**-500**	**-527**	**-553**	**-551**	**-549**	**-547**	**-545**	**-528**	**-526**	**-526**	**-525**	**-524**
	Peak Forecast less DSM = PF		**7368**	**7367**	**7214**	**7016**	**6744**	**6546**	**6381**	**6269**	**6140**	**6027**	**5922**	**5818**	**5770**	**5721**	**5687**	**5650**	**5628**	**5614**	**5599**	**5588**	**5554**
	Capacity Reserves = CR = TSC - PF		2620	2786	2959	3214	3487	3520	2852	2805	2934	3047	3152	3257	3304	3354	3387	3424	3447	2491	2505	2517	1365
D.	**Capacity Needs**		**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
	% Reserve Margin = RM		15.8%	15.6%	15.3%	15.4%	15.5%	15.5%	15.6%	15.6%	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%
	% Capacity Margin = CM = RM/(1+RM)		13.6%	13.5%	13.3%	13.3%	13.4%	13.4%	13.5%	13.5%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%	13.6%
	Required Capacity = RC = PF/(1-CM)		**8533**	**8517**	**8318**	**8097**	**7789**	**7560**	**7377**	**7247**	**7104**	**6974**	**6852**	**6731**	**6676**	**6619**	**6580**	**6538**	**6511**	**6495**	**6478**	**6465**	**6426**
	Capacity Balance = TSC - RC		**1456**	**1637**	**1856**	**2134**	**2441**	**2505**	**1857**	**1827**	**1970**	**2101**	**2222**	**2343**	**2398**	**2455**	**2494**	**2537**	**2563**	**1610**	**1626**	**1639**	**493**