BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of KCP&L Greater Missouri Operations Company's 2018 Triennial Compliance Filing Pursuant to 4 CSR 240-22	)))	**File No. EO-2018-0269**

STAFF'S REPORT ON KCP&L GREATER MISSOURI OPERATIONS COMPANY'S 2018 CHAPTER 22 TRIENNIAL COMPLIANCE FILING

COMES NOW the Staff of the Missouri Public Service Commission and, in response to KCP&L Greater Missouri Operations Company's April 2, 2018 Chapter 22 triennial compliance filing, in accord with rule 4 CSR 240-22.080(7)[1] files the attached report of its limited review of that filing. In its report, Staff identifies one (1) deficiency and one (1) concern with KCP&L Greater Missouri Operations Company's compliance filing, and suggests remedies for each.

Respectfully submitted,

/s/ Casi Aslin
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Attorney for the Staff of the
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[1] This rule requires Staff to file its report of its limited review within 150 days of when the compliance filing is made.

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing was served by electronic mail, or First Class United States Postal Mail, postage prepaid, on this 30th day of August 2018, to all counsel of record.

/s/ Casi Aslin

MISSOURI PUBLIC SERVICE COMMISSION

STAFF REPORT

KCP&L GREATER MISSOURI OPERATIONS COMPANY

ELECTRIC UTILITY RESOURCE PLANNING COMPLIANCE FILING

FILE NO. EO-2018-0269

August 30, 2018

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

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Executive Summary

On April 2, 2018, KCP&L Greater Missouri Operations Company ("GMO" or "Company"), filed its 2018 Integrated Resource Plan ("IRP") triennial compliance filing ("Filing") in File No. EO-2018-0269, as required by 4 CSR 240-22 Electric Utility Resource Planning.[1]

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 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 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 one (1) deficiency and one (1) concern regarding GMO's 2018 IRP:

List of Staff's Identified Deficiencies

> **Deficiency 1: GMO's base-case load forecast is based on a cutoff date of June 2017 for all implemented MEEIA Cycle 2 programs and does not include the load impacts of implemented demand-side programs through March 2019, the end of MEEIA Cycle 2. This is a violation of 4 CSR 22.030(7).[2]**

List of Staff's Identified Concerns

> **Concern A: Because GMO did not include any analysis required by 4 CSR 240-20.093(4)(C)4 in its 2018 IRP, the earning opportunity component of a DSIM included in the IRP and in the anticipated GMO MEEIA Cycle 3 application may not be as well informed as it should be.**

[1] 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.

[2] 4 CSR 240-22.050(7) Base-Case Load Forecast. The utility's base-case load forecast shall be based on projections of the independent variables that utility decision-makers believe to be most likely. All components of the base-case load forecast shall assume normal weather conditions. The load impacts of implemented demand-side programs and rates shall be incorporated in the base-case load forecast, but the load impacts of proposed demand-side programs and rates shall not be included in the base-case forecast.

4 CSR 240-22.010 Policy Objectives

Linkage between Chapter 22 Rules, the MEEIA and MEEIA Rules

Staff performed its review of the Filing in the context of the Commission's Chapter 22 Rules,[3] the Missouri Energy Efficiency Act of 2009[4] ("MEEIA"), and the Commission's MEEIA Rules.[5] 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 *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[6] 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. 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. Recovery for such programs shall not be permitted unless the programs are approved by the commission, result in energy or demand savings and are beneficial to all customers in the customer class in which the programs are proposed, regardless of whether the programs are utilized by all customers. The commission shall consider the total resource cost test a preferred cost-effectiveness test.

[3] 4 CSR 240-22 Electric Utility Resource Planning.
[4] 393.1075, RSMo.
[5] Amended 4 CSR 240-20.092 and revised 4 CSR 240-20.093 and 4 CSR 240-20.094 became effective September 30, 2017.
[6] 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."

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 that can allow the electric utility to make reasonable progress toward a goal of all cost-effective demand-side savings.[7]

> The MEEIA rules provide – in 4 CSR 240-20.094(3) – 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

Summary

> 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.

[7] 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 September 29, 2017. Similar language is contained in 4 CSR 240-20.094(2), which became effective September 30, 2017.

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

GMO's load analysis and load forecasting resulted in 20-year base load forecasts for energy and demand, which have compound annual grow rates of 0.9% and 0.6%, respectively. The Company's base, low, and high energy and demand load forecasts are included on pages 1 through 4 of Addendum A. Pages 5 and 6 of Addendum A contain GMO's historical and base energy and demand load forecasts from 2006 through 2018 and reflect the continuous decline in both energy and demand load forecasts over this time period.

In Staff's limited review of GMO's load analysis and energy and demand forecasts, Staff found one (1) deficiency concerning compliance with this rule and Staff has not identified any concerns.

Deficiency

Deficiency 1: GMO's base-case load forecast is based on a cutoff date of June 2017 for all implemented MEEIA Cycle 2 programs and does not include the load impacts of implemented demand-side programs through March 2019, the end of MEEIA Cycle 2. This is a violation of 4 CSR 22.030(7).[8]

To remedy this deficiency, GMO should comply with 4 CSR 22.030(7) in all future IRP compliance filings by including the load impacts of Commission-approved and implemented demand-side programs and rates in the base-case load forecast.

Staff Expert Witness: Brad Fortson

4 CSR 240-22.040 Supply-Side Resource Analysis

Summary

Rule 4 CSR 240-22.040 Supply-Side Resource Analysis requires GMO 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.

[8] 4 CSR 240-22.050(7) Base-Case Load Forecast. The utility's base-case load forecast shall be based on projections of the independent variables that utility decision-makers believe to be most likely. All components of the base-case load forecast shall assume normal weather conditions. The load impacts of implemented demand-side programs and rates shall be incorporated in the base-case load forecast, but the load impacts of proposed demand-side programs and rates shall not be included in the base-case forecast.

Resource options are to be ranked based upon their relative levelized annual costs,[9] 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 option using the utility discount rate.[10] 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.

The only potential supply-side resource options that were screened and passed on for integrated resource analysis are combustion turbine (CT) technologies. Three combustion turbine technologies were identified for the prescreening process and one of those was chosen to move into integrated resource analysis. As shown in Table 13 above, their nominal cost rankings on a dollar per MWh basis were relatively similar. The CT technologies of the LM6000 and the LMS100 were not passed on to the integrated resource planning process. The GE 7FA.05 combustion turbine technology was passed on to the integrated resource planning process.

Staff has not identified any deficiencies or concerns related to GMO's supply-side resource analysis.

Staff Expert Witness: John Rogers

4 CSR 240-22.045 Transmission and Distribution Analysis

Summary

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,

[9] 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.
[10] 4 CSR 240-22.040(2)(A).

and incorporation of advance technologies for the optimization of investment in transmission and distribution resources.

The Staff has not identified any deficiencies or concerns related to GMO's transmission and distribution analysis.

Staff Expert Witness: John Rogers

4 CSR 240-22.050 Demand-Side Resource Analysis

Summary

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.

GMO continues to build on its DSM planning, implementation, and evaluation performance from its initial implementation of DSM programs in 2008 followed by MEEIA Cycle 1 from January 26, 2013, through December 31, 2015, and MEEIA Cycle 2, which began April 1, 2016, and is scheduled to end March 31, 2019.

Great Plains Energy engaged Applied Energy Group (AEG) to conduct a 2016 Demand-Side Management (DSM) Potential Study in November 2015. The DSM potential study encompassed the KCP&L-MO, KCP&L-KS, and KCP&L-Greater Missouri Operations (GMO) service territories and was delivered to GPE in April 2017 and included both a realistic achievable potential[11] ("RAP") and a maximum achievable potential[12] ("MAP") level

[11] 4 CSR 240-20.092((00) Realistic achievable potential means energy savings and demand savings relative to a utility's baseline energy forecast and baseline demand forecast, respectively, resulting from expected program participation and realistic implementation conditions. Realistic achievable potential establishes a realistic target for demand-side savings that a utility can expect to achieve through its demand-side programs and involves incentives that represent a moderate portion of total program costs and longer customer payback periods when compared to those associated with maximum achievable potential;

[12] 4 CSR 240-20.092(1)(EE) Maximum achievable potential means energy savings and demand savings relative to a utility's baseline energy forecast and baseline demand forecast, respectively, resulting from expected program participation and ideal implementation conditions. Maximum achievable potential establishes a maximum target for demand-side savings that a utility can expect to achieve through its demand-side programs and involves incentives that represent a very high portion of total programs costs and very short customer payback periods. Maximum achievable potential is considered the hypothetical upper-boundary of achievable demand-side savings potential, because it presumes conditions that are ideal and not typically observed;

of DSM, as defined in the IRP Rules. This Potential Study was used as the basis for the scenarios evaluated in this integrated analysis.

Subsequent to this filing, GMO will develop and prepare its next filing for MEEIA Cycle 3, which is planned to begin April 1, 2019. GMO will use the DSM levels in the preferred plan as the basis for the Cycle 3 planning, however, the final Commission approved programs could vary from the preferred plan. In addition, the MEEIA stakeholders will have an opportunity to provide input and recommendations on budgets, energy savings targets, and peak demand reduction targets when GMO makes its next application for MEEIA Cycle 3.

As a result of its limited review of GMO's demand-side resource analysis, Staff has identified no deficiencies or concerns.

Staff Expert Witnesses: Brad Fortson

4 CSR 240-22.060 Integrated Resource Plan and Risk Analysis

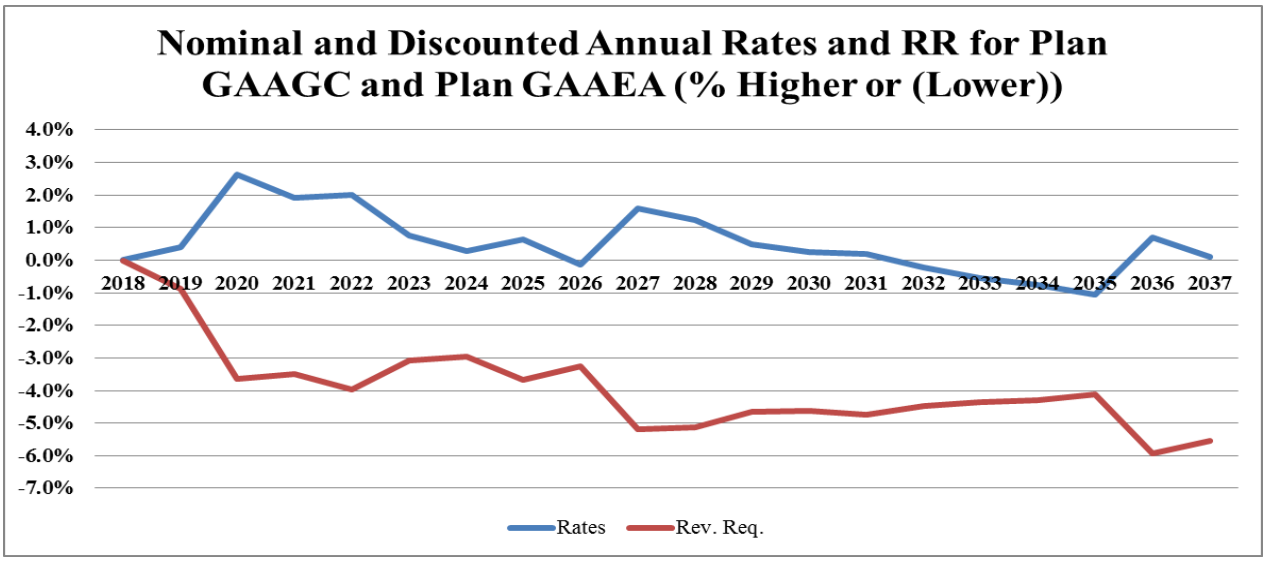
Summary

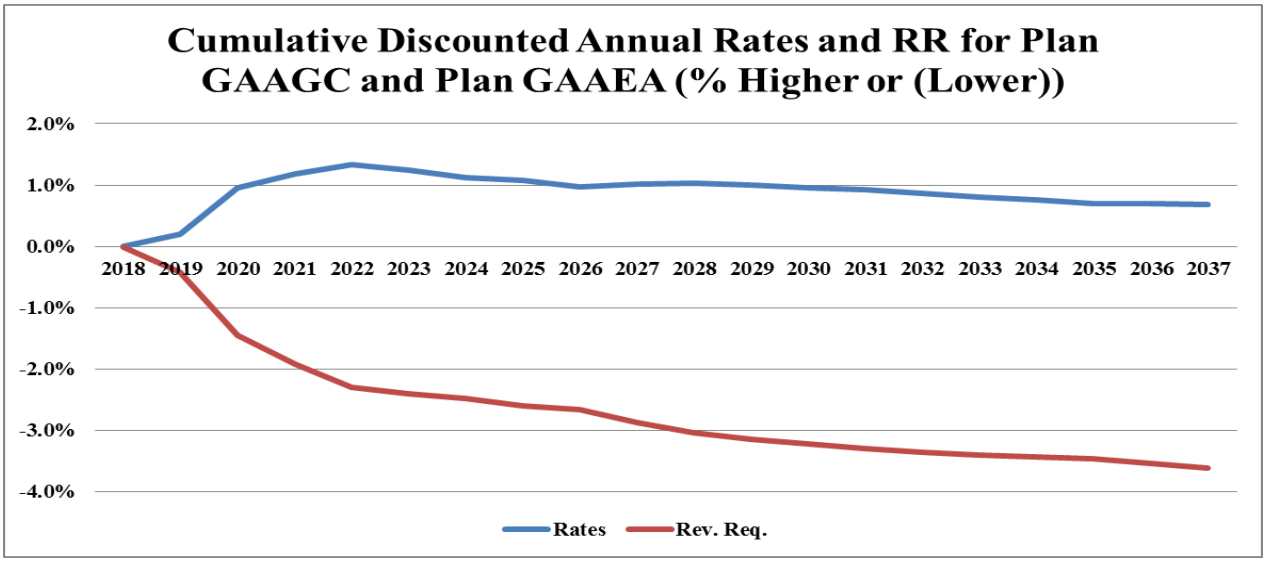
This rule requires the utility to design alternative resource plans to meet the planning objectives identified in Rule 4 CSR 240-22.010(2), and sets minimum standards for the scope and level of detail required in resource plan analysis and for the logically consistent and economically equivalent analysis of alternative resource plans. The utility is to identify the critical uncertain factors that affect the performance of alternative resource plans and establishes 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.

GMO developed, considered, and analyzed the present worth of long-run utility costs for 14 alternative resource plans by calculating the PVRR for each plan (see Addendum B). While the GE 7FA.05 combustion turbine technology was passed on to the integrated resource analysis as a result of screening analysis in 4 CSR 240-22.040, the GE 7FA.05 combustion turbine technology was not included in any alternative resource plans because GMO does not need additional non-renewable supply-side capacity during the entire 20-year planning horizon.

Addendum C contains the confidential capacity balance sheets for the adopted preferred resource plan, Plan GAAGC (RAP + DSR), and Plan GAAEA (No DSM). With the demand-side resources in Plan GAAGC, GMO is able to avoid adding four separate new 207 MW combustion turbines in years 2019, 2020, 2028, and 2036. However, Plan GAAGC still requires that GMO use purchase power agreements ("PPA") annually to meet all capacity requires including SPP's reserve margin requirement of 13%. The amount of annual PPAs necessary to meet minimum reserve margin requirements varies annually over the 20-year planning horizon but is in the range of a low of 263 MW (in 2027) to a high of 460 MW (in 2037).

Staff analyzed the relative difference in the annual revenue requirements and the annual rates for Plan GAAGC (RAP + DSR) relative to Plan GAAEA (No DSM).





These charts illustrate that with multiple RAP MEEIA cycles:

- There are immediate benefits for all customers primarily due to the deferral of four separate new 207 MW combustion turbines in years 2019, 2020, 2028, and 2036;
- By 2037, there is a 3.6% cumulative reduction in discounted revenue requirements due to the adopted preferred resource plan, Plan GAAGC (RAP + DSR), relative to Plan GAAEA (No DSM); and
- Because Plan GAAGC (RAP + DSR) defers four separate new 207 MW combustion turbines in years 2019, 2020, 2028, and 2036 to sometime after the 20-year planning horizon, annual rates increases are modestly higher (and only 0.7% higher in 2037) based on a cumulative discounted annual basis.

Based on its limited review, Staff has identified one (1) concern regarding GMO's integrated resource plan and risk analysis.

Concern

Concern A: Because GMO did not include any analysis required by 4 CSR 240-20.093(4)(C)4 in its 2018 IRP, the earning opportunity component of a DSIM included in the IRP and in the anticipated GMO MEEIA Cycle 3 application may not be as well informed as it should be.

To remedy this concern, GMO should comply with 4 CSR 240-20.093(4)(C)4 in its future IRP and MEEIA filings.

Staff Expert Witness: John Rogers

4 CSR 240-22.070 Resource Acquisition Strategy Selection

Summary

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.

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

GMO's probability tree (see Addendum D) consists of the following dependent three critical dependent uncertain factors:

- Load growth
- Natural gas prices
- CO_2 policy

There are no dependent critical uncertain factors included in the analysis.

The decision tree for the decision analysis contained eighteen (18) end points ("EP"). GAAGC emerges as the lowest cost in all but four scenarios. In EP 18 - representing low load growth, low gas price, no CO2 tax, the overall second ranked plan (KAALA) has a $0.171 Million lower revenue requirement than Preferred Plan GAAGC. In three endpoints - EPs 5, 11 and 17- plan KBBDA is the lowest cost plan. KBBDA has LaCygne 1 retiring in 2025, and represents the low natural gas prices combined with CO2 restrictions at all load growth scenarios (High, Mid, and Low).

GMO's decision-makers selected Plan GAAGC (RAP + DSR) as GMO's adopted preferred resource plan even though Plan GAAFC had a lower PVRR.

> The Preferred Plan was not the lowest cost plan from a Net Present Value of Revenue Requirement (NPVRR) perspective. The lowest cost Alternative Resource Plan (ARP) was $4 Million lower over the twenty-year planning period. The single difference between the Preferred Plan and the lowest cost ARP was due to the difference in DSM assumptions between the plans. The Preferred Plan maintains the current level of DSM programs at a slight cost above the lowest cost plan evaluated. To reduce certain programs at this time would cause a disruption to some currently participating customers. GMO continually strives to minimize the cost of the DSM programs to maximize cost effectiveness. In addition, the MEEIA stakeholders will have an opportunity to provide input and recommendations on budgets, energy savings targets, and peak demand reduction

targets when GMO makes its next application for MEEIA Cycle 3 later this year.[13]

Based on its limited review, Staff has identified no deficiencies or concerns for GMO's resource acquisition strategy selection.

Staff Expert Witnesses: John Rogers

4 CSR 240-22.080 Filing Schedule and Requirements

Summary

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

[13] Page 4 of Volume 7.

strategy becomes inconsistent with the latest adopted preferred resource plan filed by the utility. The rule also requires certification that any request of action from the Commission is consistent with the utility's adopted preferred resource plan.

As a result of its review, Staff identified no deficiencies or concerns related to filing schedule, filing requirements, and stakeholder process.

Staff Expert Witnesses: John Rogers

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of KCP&L Greater Missouri Operations Company's 2018 Triennial Compliance Filing Pursuant to 4 CSR 240-22	)))	**File No. EO-2018-0269**

AFFIDAVIT OF BRAD J. FORTSON

State of Missouri)
) ss.
County of Cole)

COMES NOW Brad J. 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 J. 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 August, 2017.

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

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of KCP&L Greater Missouri Operations Company's 2018 Triennial Compliance Filing Pursuant to 4 CSR 240-22	)))	**File No. EO-2018-0269**

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 22th day of August, 2017.

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

2. The historical period shall include both actual and weather-normalized values. The forecast period shall include the base-case, low-case, and high-case forecasts.

The figures below represent Net System Input (energy) for summer, non-summer, and the whole year for the base, low and high scenario forecasts. Corresponding tables can be found in *Appendix 3D* and the file *IRP_8C_GMO_NSI_Peak.xls*.

Figure 58: GMO Base-Case, Low-Case, and High-Case Summer Energy Plots

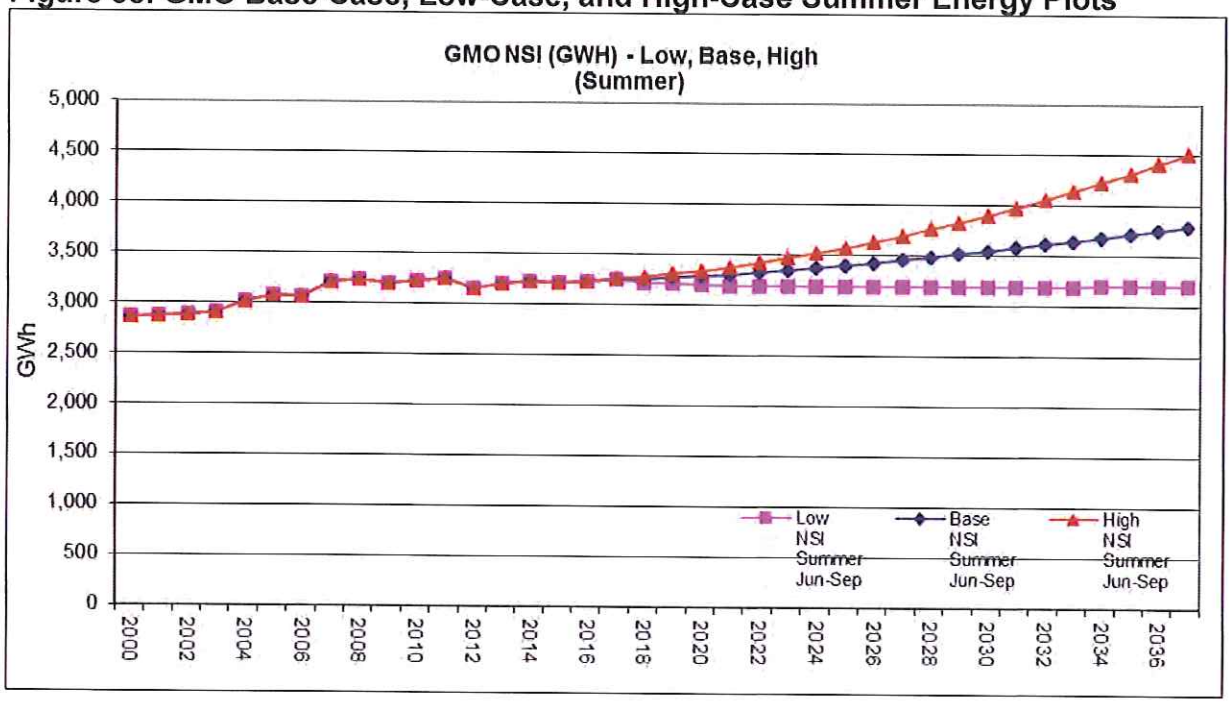


Figure 59: GMO Base-Case, Low-Case, and High-Case Non-Summer Energy Plots

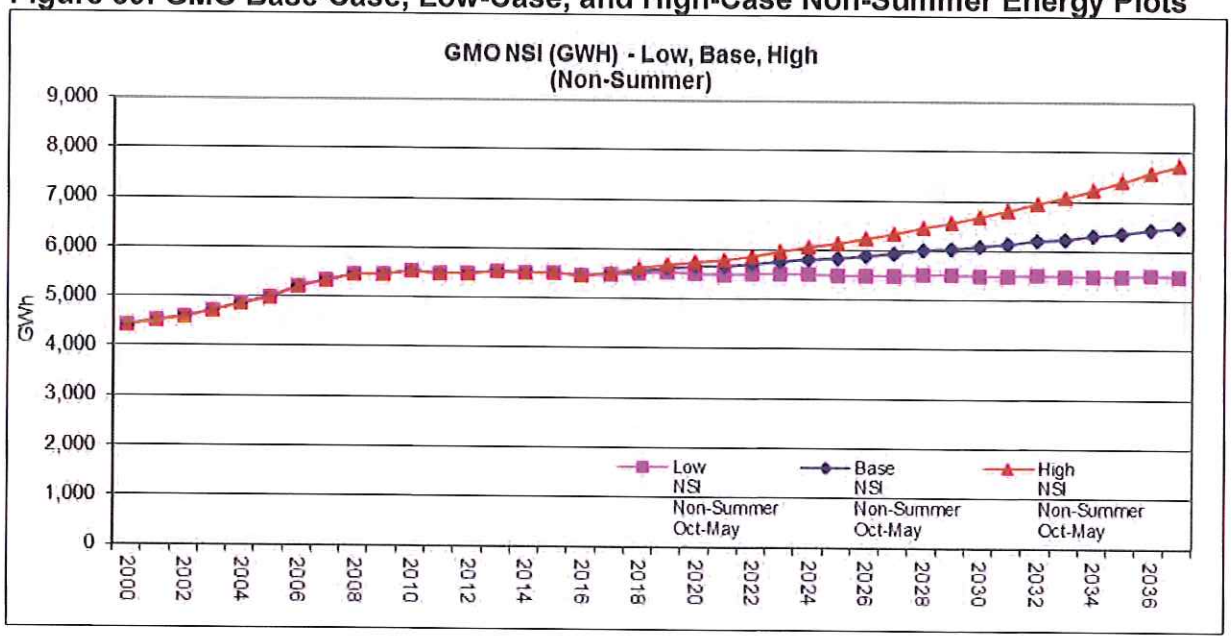
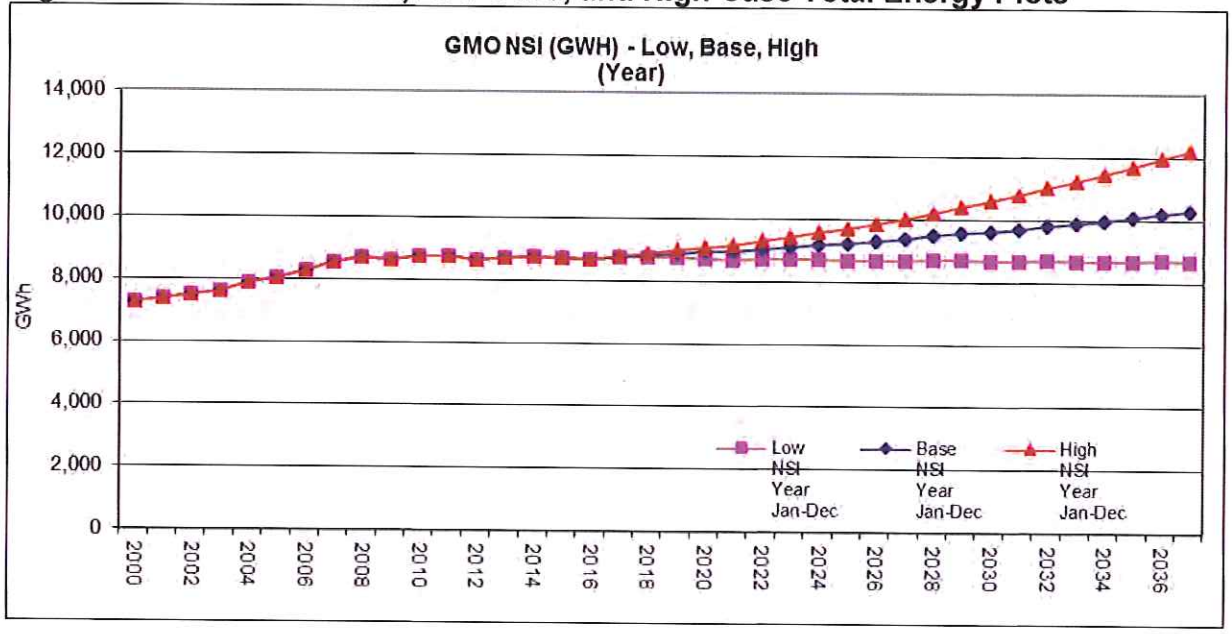


Figure 60: GMO Base-Case, Low-Case, and High-Case Total Energy Plots



The figures below represent peak demand for summer and non-summer for the base, low, and high scenario forecasts. Annual demand charts are not shown, since they are the same as summer demand charts. Corresponding tables can be found in *Appendix 3D* and in the file *IRP_8C_GMO_NSI_Peak.xls*.

Figure 61: GMO Base-Case, Low-Case, and High-Case Summer Peak Demand Plots

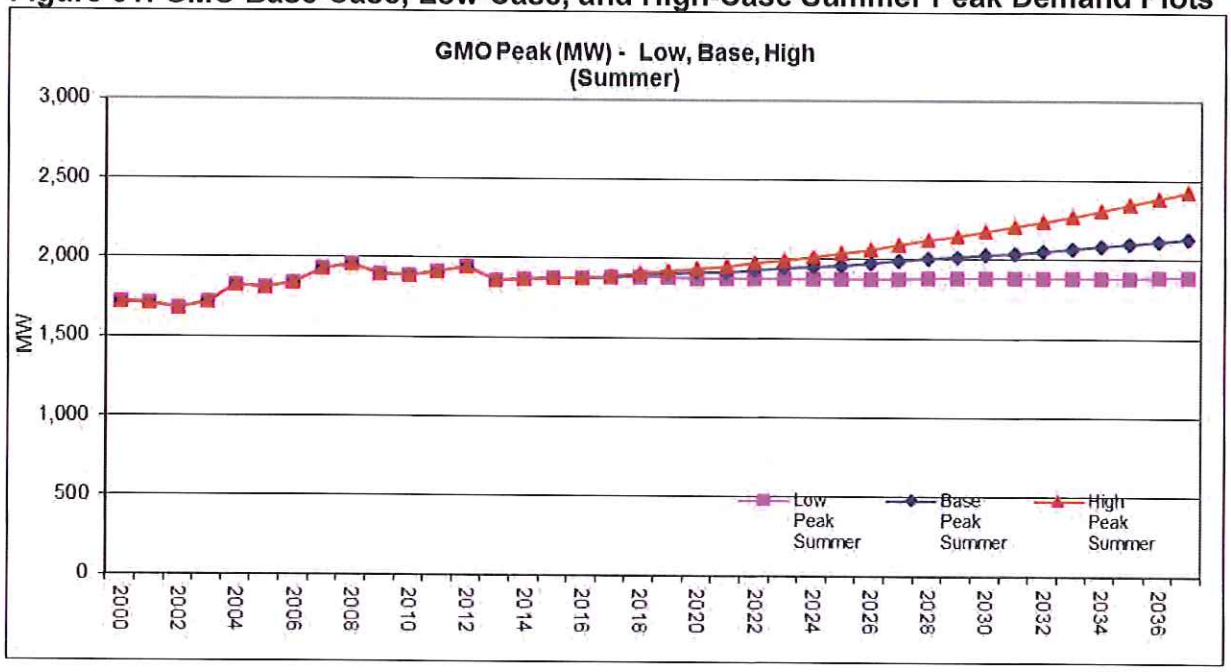


Figure 62: GMO Base-Case, Low-Case, and High-Case Winter Peak Demand Plots

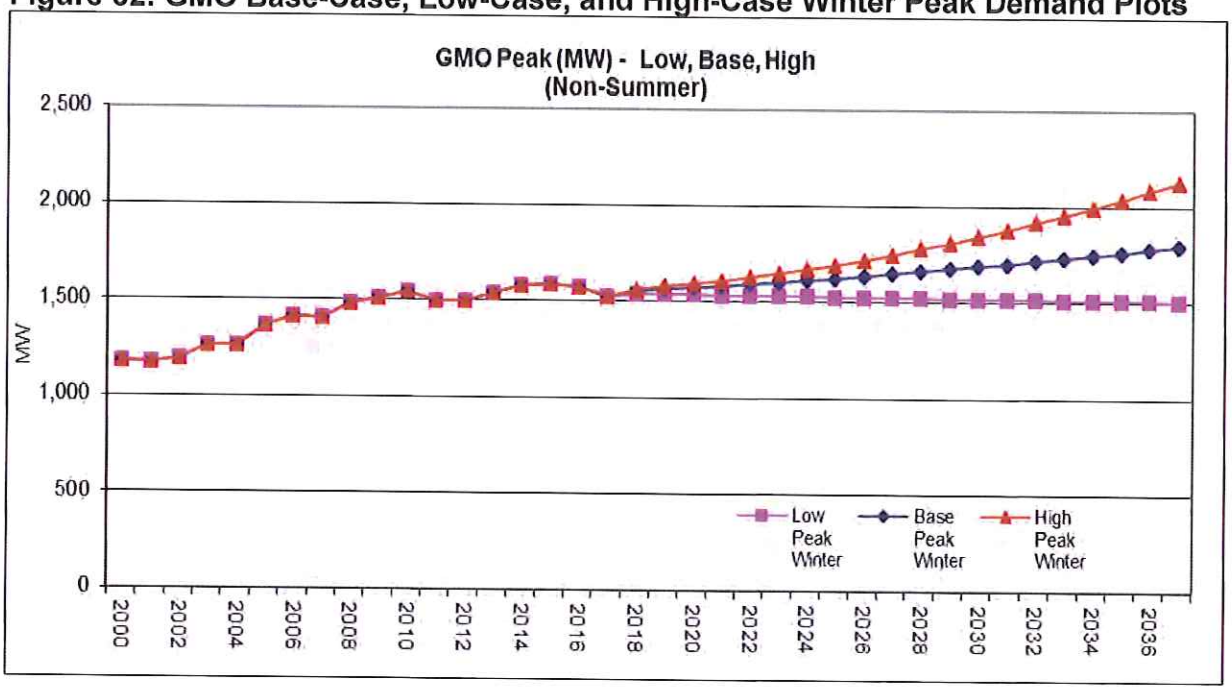
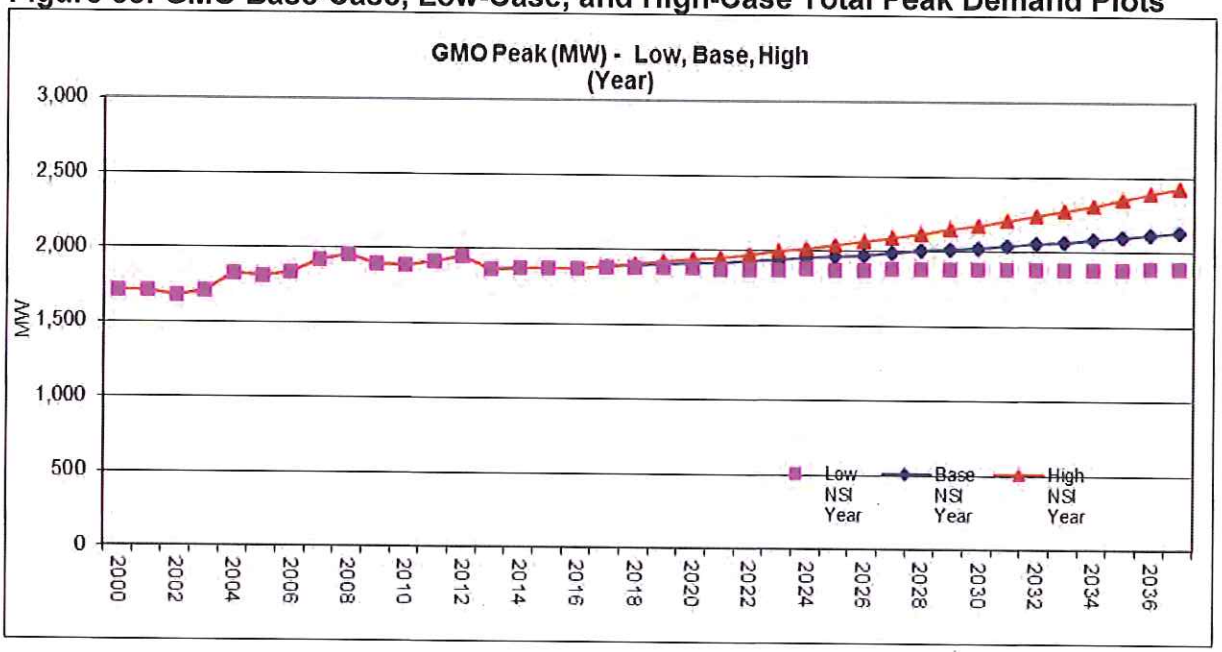


Figure 63: GMO Base-Case, Low-Case, and High-Case Total Peak Demand Plots



4. Archive all previous forecasts of energy and peak demand, including the final data sets used to develop the forecasts, made in at least the past ten (10) years. Provide a comparison of the historical final forecasts to the actual historical energy and peak demands and to the current forecasts in the current triennial compliance filing.

GMO maintains an archive of the electronic files associated with our previous forecasts of energy use and peak demand for at least the last ten years. The graphs below compare our previous long-run forecasts of NSI and peak demand. The most recent forecast reflects a significant slowdown in economic growth that in 2008, expectations for modest economic growth, the impact of currently enforced energy efficiency standards and the anticipated impact of recently enacted energy efficiency standards.

Figure 21: GMO Net System Input (NSI) Historical and Forecasts

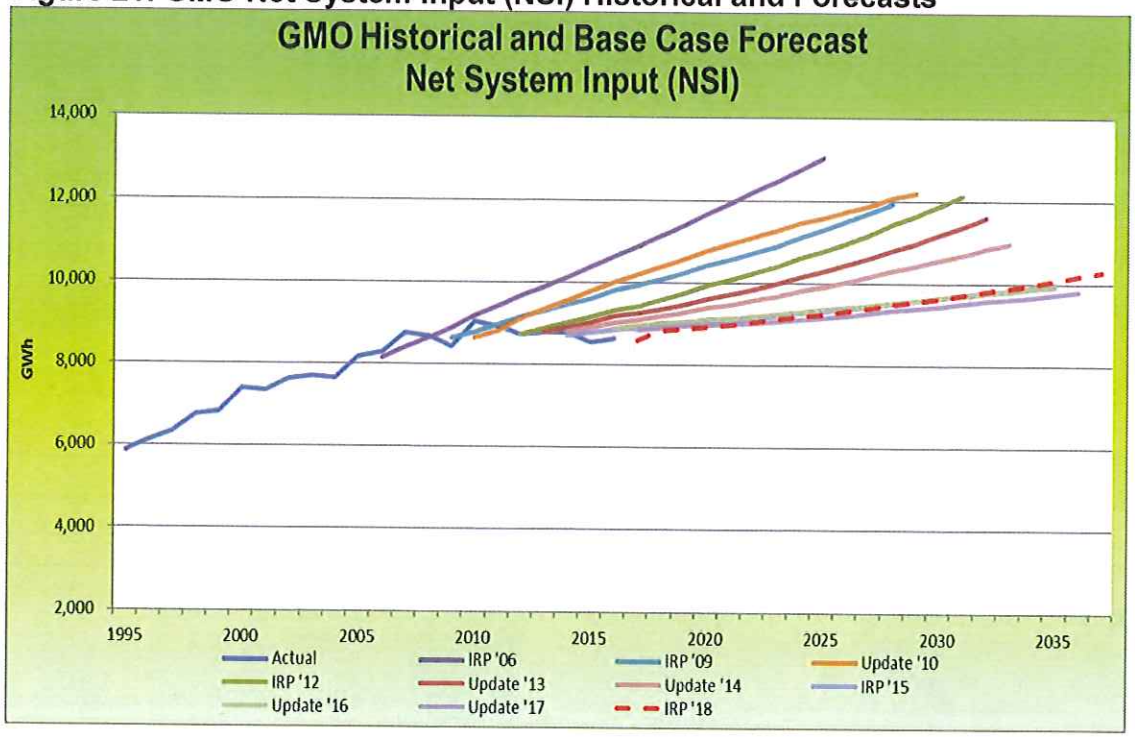


Figure 22: GMO Peak Demand Historical and Forecasts

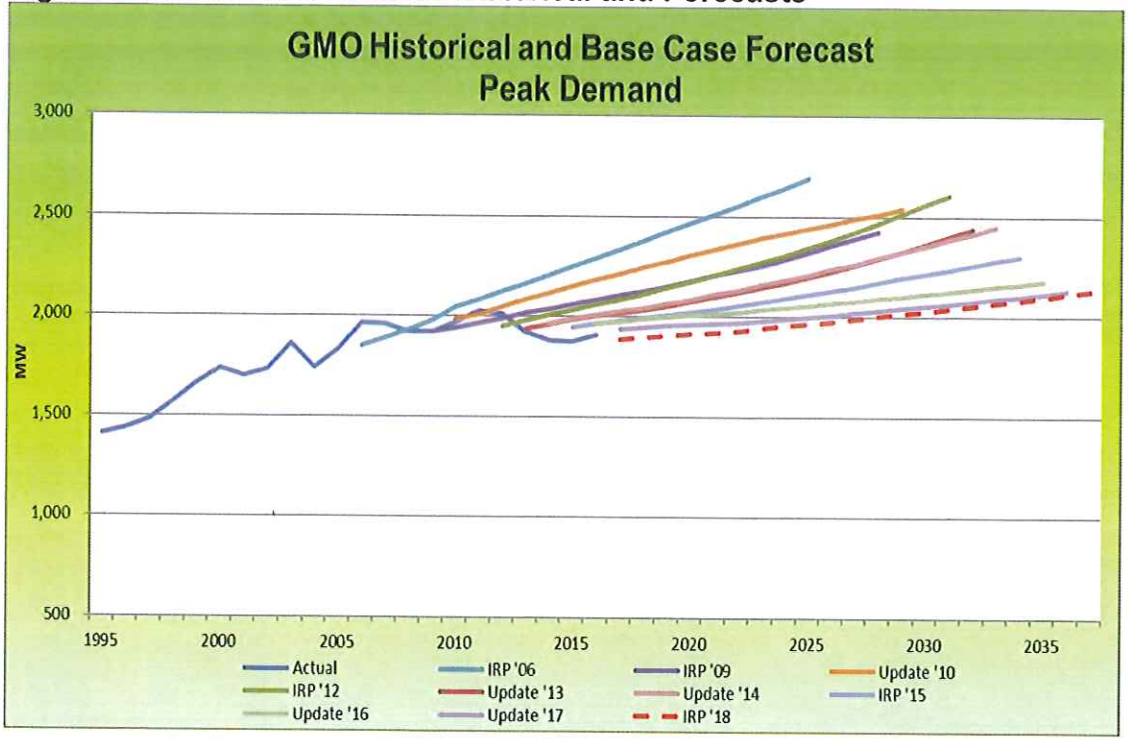
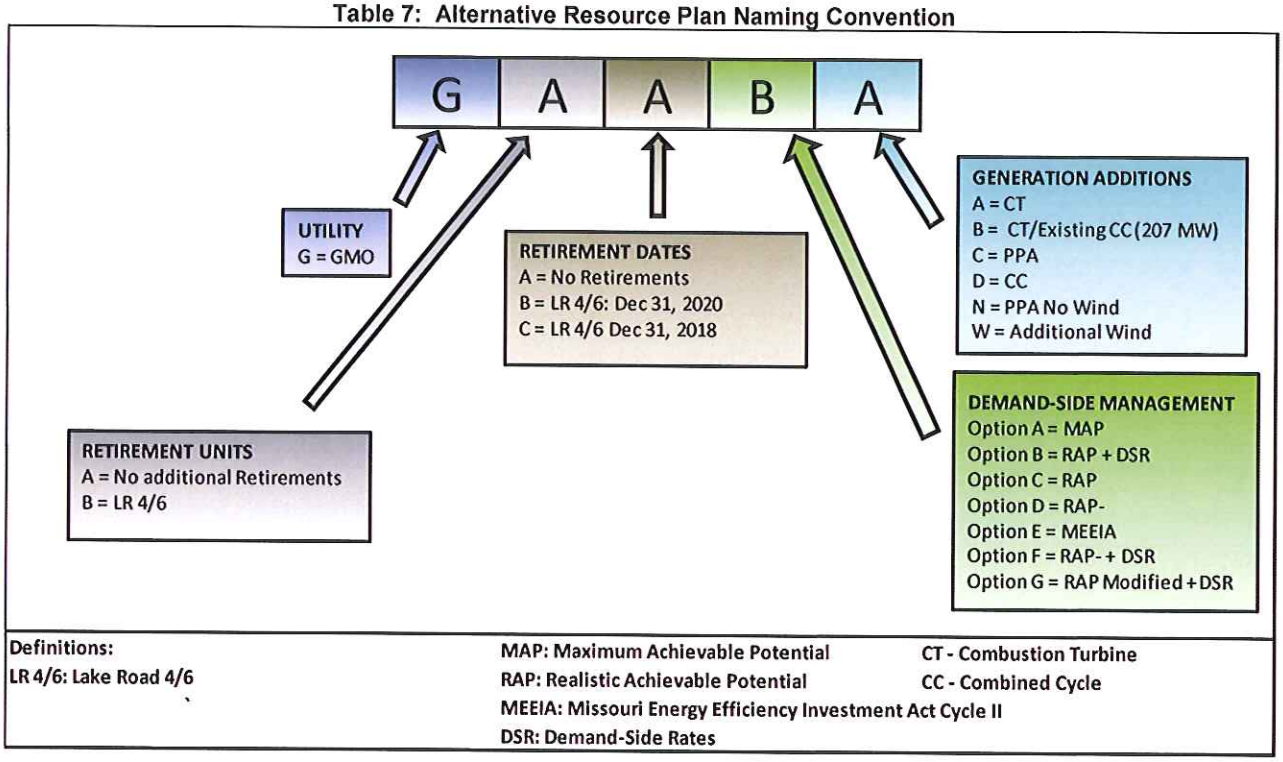


Table 7: Alternative Resource Plan Naming Convention



Definitions:
LR 4/6: Lake Road 4/6

MAP: Maximum Achievable Potential
RAP: Realistic Achievable Potential
MEEIA: Missouri Energy Efficiency Investment Act Cycle II
DSR: Demand-Side Rates

CT - Combustion Turbine
CC - Combined Cycle

Table 8: Overview of Alternative Resource Plans

Plan Name	DSM Level	Retire	Renewable Additions		Generation Additions (if needed)
GAAAA	MAP	Sibley-2: Dec 31, 2018 Sibley-3: Dec 31, 2018 Lake Road 4/6: Oct 1, 2019	Solar: 2028 - 10 MW	Wind: 2018 - 146 MW 2019 - 120 MW	414 MW of CT in 2020
GAABA	RAP+DSR	Sibley-2: Dec 31, 2018 Sibley-3: Dec 31, 2018 Lake Road 4/6: Oct 1, 2019	Solar: 2028 - 10 MW	Wind: 2018 - 146 MW 2019 - 120 MW	414 MW of CT in 2020
GAABB	RAP+DSR	Sibley-2: Dec 31, 2018 Sibley-3: Dec 31, 2018 Lake Road 4/6: Oct 1, 2019	Solar: 2028 - 10 MW	Wind: 2018 - 146 MW 2019 - 120 MW	200 MW of Exisitng CC in 2019 207 MW of CT in 2033
GAABC	RAP+DSR	Sibley-2: Dec 31, 2018 Sibley-3: Dec 31, 2018 Lake Road 4/6: Oct 1, 2019	Solar: 2028 - 10 MW	Wind: 2018 - 146 MW 2019 - 120 MW	PPA
GAABD	RAP+DSR	Sibley-2: Dec 31, 2018 Sibley-3: Dec 31, 2018 Lake Road 4/6: Oct 1, 2019	Solar: 2028 - 10 MW	Wind: 2018 - 146 MW 2019 - 120 MW	400 MW of CC in 2020
GAABW	RAP+DSR	Sibley-2: Dec 31, 2018 Sibley-3: Dec 31, 2018 Lake Road 4/6: Oct 1, 2019	Solar: 2028 - 10 MW	Wind: 2018 - 146 MW 2019 - 120 MW 2020 - 200 MW	200 MW of Add'l Wind in 2020 414 MW of CT in 2020
GAACA	RAP	Sibley-2: Dec 31, 2018 Sibley-3: Dec 31, 2018 Lake Road 4/6: Oct 1, 2019	Solar: 2028 - 10 MW	Wind: 2018 - 146 MW 2019 - 120 MW	414 MW of CT in 2020

Table 9: Overview of Alternative Resource Plans (continued)

Plan Name	DSM Level	Retire	Renewable Additions		Generation Additions (if needed)
GAADA	RAP-	Sibley-2: Dec 31, 2018 Sibley-3: Dec 31, 2018 Lake Road 4/6: Oct 1, 2019	Solar: 2028 - 10 MW	Wind: 2018 - 146 MW 2019 - 120 MW	414 MW of CT in 2020
GAAEA	MEEIA	Sibley-2: Dec 31, 2018 Sibley-3: Dec 31, 2018 Lake Road 4/6: Oct 1, 2019	Solar: 2028 - 10 MW	Wind: 2018 - 146 MW 2019 - 120 MW	207 MW of CT in 2019 207 MW of CT in 2020 207 MW of CT in 2028 207 MW of CT in 2036
GAAFA	RAP- +DSR	Sibley-2: Dec 31, 2018 Sibley-3: Dec 31, 2018 Lake Road 4/6: Oct 1, 2019	Solar: 2028 - 10 MW	Wind: 2018 - 146 MW 2019 - 120 MW	414 MW of CT in 2020
GAAFC	RAP- +DSR	Sibley-2: Dec 31, 2018 Sibley-3: Dec 31, 2018 Lake Road 4/6: Oct 1, 2019	Solar: 2028 - 10 MW	Wind: 2018 - 146 MW 2019 - 120 MW	PPA
GAAFN	RAP- +DSR	Sibley-2: Dec 31, 2018 Sibley-3: Dec 31, 2018 Lake Road 4/6: Oct 1, 2019	Solar: 2028 - 10 MW	No New Wind	PPA 207 MW of CT in 2033 207 MW of CT in 2036
GAAGC	RAP Modified +DSR	Sibley-2: Dec 31, 2018 Sibley-3: Dec 31, 2018 Lake Road 4/6: Oct 1, 2019	Solar: 2028 - 10 MW	Wind: 2018 - 146 MW 2019 - 120 MW	PPA
GBCBC	RAP+DSR	Sibley-2: Dec 31, 2018 Sibley-3: Dec 31, 2018 Lake Road 4/6: Oct 1, 2018	Solar: 2028 - 10 MW	Wind: 2018 - 146 MW 2019 - 120 MW	PPA

Table 24: Expected Value of Performance Measures

Plan	NPVRR ($MM)	Probable Environmental Costs ($MM)	DSM Performance Incentive Costs ($MM)	Levelized Annual Rates ($/KW-hr)	Maximum Rate Increase	Times Interest Earned	Total Debt to Capital	Internal Cash to Construction Expense
GAAFC	9,594	72	19.70	0.108	6.08%	2.86	47.70	1.11
GAAGC	9,598	72	20.35	0.108	6.00%	2.86	47.70	1.12
GBCBC	9,608	72	22.55	0.109	6.17%	2.86	47.70	1.17
GAABC	9,609	72	22.55	0.109	6.17%	2.86	47.70	1.17
GAAFA	9,824	72	19.70	0.110	7.65%	2.87	47.70	1.14
GAABA	9,849	72	22.55	0.112	7.72%	2.88	47.70	1.19
GAADA	9,854	72	17.50	0.110	7.57%	2.87	47.70	1.14
GAACA	9,873	72	20.47	0.111	7.65%	2.88	47.70	1.19
GAABD	9,898	72	22.55	0.112	6.54%	2.88	47.70	1.17
GAABB	9,939	72	22.55	0.113	5.63%	2.89	47.70	1.16
GAAAA	9,954	72	23.76	0.114	7.73%	2.88	47.70	1.30
GAABW	9,955	72	22.55	0.112	5.67%	2.88	47.70	1.27
GAAEA	9,957	72	8.09	0.109	5.20%	2.87	47.70	0.98
GAAFN	10,128	72	19.70	0.114	5.88%	2.88	47.70	1.12

ADDENDUM C

HAS BEEN DEEMED

CONFIDENTIAL

IN ITS ENTIRETY

The lowest ranked plan based on NPVRR by scenario/endpoint is shown in Table 7 below.

Table 7: Lowest NPVRR Alternative Resource Plan By Endpoint

EP	Plan	NPVRR	Load Growth	CO_2	Endpoint Probability
1	GAAFC	10,216	High	Yes	2.5%
2	GAAFC	9,891	High	No	3.8%
3	GAAFC	10,047	High	Yes	5.0%
4	GAAFC	9,708	High	No	7.5%
5	GAAFC	9,893	High	Yes	2.5%
6	GAAFC	9,550	High	No	3.8%
7	GAAFC	9,921	Mid	Yes	5.0%
8	GAAFC	9,616	Mid	No	7.5%
9	GAAFC	9,777	Mid	Yes	10.0%
10	GAAFC	9,463	Mid	No	15.0%
11	GAAFC	9,649	Mid	Yes	5.0%
12	GAAFC	9,332	Mid	No	7.5%
13	GAAFC	9,628	Low	Yes	2.5%
14	GAAFC	9,344	Low	No	3.8%
15	GAAFC	9,511	Low	Yes	5.0%
16	GAAFC	9,220	Low	No	7.5%
17	GAAFC	11,018	Low	Yes	2.5%
18	GAAFC	9,117	Low	No	3.8%

The tables following here represent the sensitivities for the uncertain factors by scenario/endpoint.