Memorandum [Public Version]

TO: THOMAS CMAR, EARTHJUSTICE

FROM: DR. TOMMY VITOLO, PATRICK LUCKOW, JOSEPH DANIEL, SYNAPSE ENERGY ECONOMICS

DATE: AUGUST 21, 2013

RE: COMMENTS REGARDING THE MISSOURI 2013 IRP UPDATES OF KCP&L AND GMO

Introduction

The Kansas City Power & Light Company (KCP&L) and the KCP&L Greater Missouri Operations Company (GMO) are two distinct electric utility companies in the eyes of the Missouri Public Service Commission, though they are jointly owned by Great Plains Energy. Each have filed stand-alone updates to their respective Missouri 2012 integrated resource plans (IRPs).[1,2] Each IRP update contains an overview of the 2012 and 2013 Preferred Plans, and each IRP update highlights both changes in model inputs and changes to the model formulation itself. Furthermore, both the KCP&L 2013 IRP Update and the GMO 2013 IRP Update contain identical combined-company resource plans. Both IRP updates detail alleged deficiencies and concerns raised by intervenors in the corresponding 2012 IRP case, and both contain the company's response to the alleged deficiency or concern.

Synapse Energy Economics, Inc. (Synapse) has reviewed the 2013 IRP updates, corresponding work papers, and related documents. Our analysis has raised a number of concerns about the KCP&L and GMO 2013 IRP updates, which we detail below. Regarding model inputs, we express concern about low CO_2 prices, faulty DSM planning, the risks associated with retrofits to achieve environmental compliance, dramatically reduced revenues from off-system sales, and poor assumptions about wind cost and construction. With respect to the modeling process, we detail KCP&L and GMO's failure to model all potential least-cost plans, failure to include plans identified as least-cost within the update document itself, and KCP&L and GMO's insufficient justification for choosing a plan known to be more expensive than the least-cost plan. We also identify a flaw in the company-wide computations, which suggest the NPVRR calculations may be incorrect throughout both companies' studies. Finally, we describe how those problems impact KCP&L's and GMO's plans for specific generating units.

[1] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013.

[2] KCP&L Greater Missouri Operations Company (GMO), "Integrated Resource Plan 2013 Annual Update." June 2013.

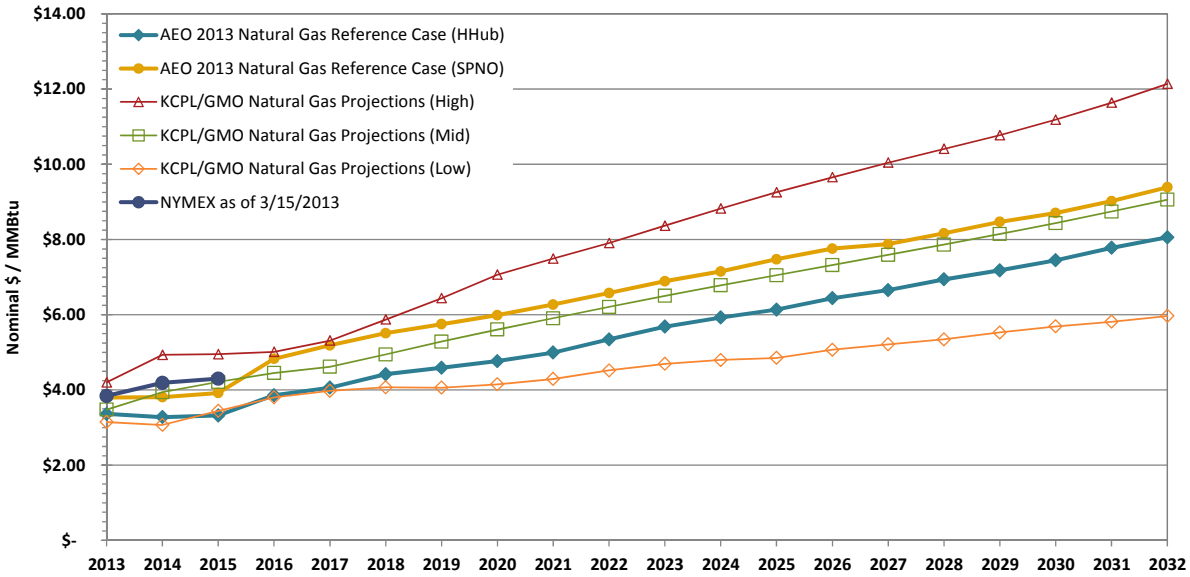
Model Inputs

Commodities Forecasts

Gas

KCP&L's and GMO's natural gas futures are based on forecasts from the Energy Information Administration (EIA), CERA/Global Insight, PIRA Energy Group, and Energy Ventures Analysis.[3] In this update, the companies did not indicate that they factored NYMEX futures prices into the forecasts. Using NYMEX futures as the primary indicator for the first few years of a study period, rather than an aggregation of independent forecasts, is a widely accepted approach for developing the short-term component of a long-term gas production price forecast. The companies' gas forecast should rely heavily on NYMEX futures for the first few years.

Figure 1: Natural Gas Projections



Source: EIA AEO 2013, data extracted from KCP&L 2013 Update pg. 20 using Dagra.

Figure 1 plots KCP&L's and GMO's high, middle, and low projections for the price of natural gas, as well as EIA's Annual Energy Outlook (AEO) 2013 price projection for natural gas at Henry Hub and for the electric utilities in the Southwest Power Pool North (SPNO) Electricity Market Module (EMM) region.[4] While the companies' middle gas price projection closely tracks NYMEX, the high forecast is considerably higher than NYMEX in the 2013-2016 timeframe, and the low projection is considerably lower. While EIA expects the Henry Hub price to decline and the SPNO price to remain steady through 2015,

[3] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013.

[4] U.S. Energy Information Administration, "Annual Energy Outlook 2013." Available at: http://www.eia.gov/oiaf/aeo/tablebrowser/#release=AEO2012&subject=8-AEO2012&table=13-AEO2012&region=0-0&cases=ref2012-d020112c.

KCP&L/GMO's projections show the company expects the price to have a relatively steady price escalation over the next two decades. After 2016, the AEO price projections and the KCP&L/GMO middle price projection follow similar trajectories. In 2032, the companies' middle projection is closer to AEO SPNO, despite KCP&L/GMO's 2013 price being closer to the 2013 AEO Henry Hub price. It appears that the KCP&L/GMO near-term forecasts have far too wide a range given the robustness of NYMEX futures.

Coal

KCP&L and GMO state that their coal price projections reflect forecasts from EIA, Energy Ventures Analysis, JD Energy, SNL Financial, and Hanou Energy Consulting.[5] Figure 2 plots all three of KCP&L/GMO's coal projections (high, middle, and low), along with the AEO price projections for the national average and SPNO.[6,7] All of KCP&L/GMO's projections remain below the national average for delivered coal prices. Only the companies' high projection for coal prices is above average delivered coal prices for the SPNO region. KCP&L/GMO's low projection for coal prices in 2013 is [redacted] percent lower than its middle projection ([redacted] versus [redacted]) while the high projection for 2013 is more than [redacted] percent higher than its middle projection ([redacted] versus [redacted]).

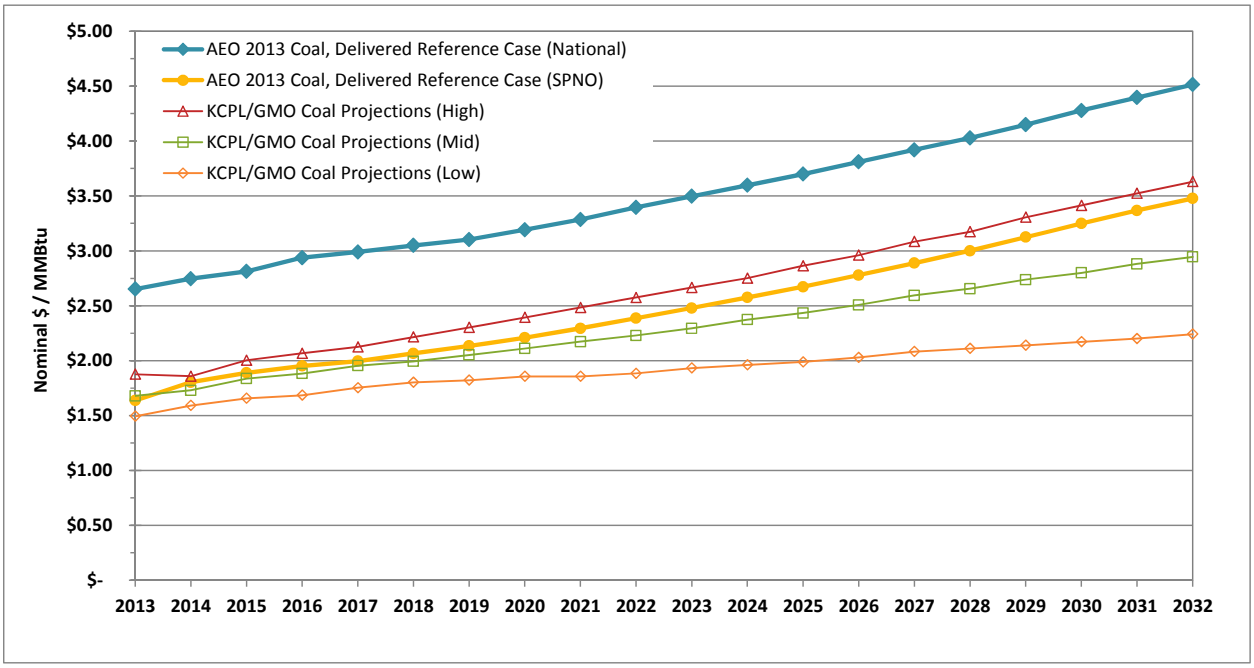
Mine mouth prices have tended to be quite stable with a slight upward trend. Spot market coal prices have exhibited some volatility, but the majority of coal for electric generation is typically acquired under long-term contracts. Given this, it is odd that KCP&L and GMO project that much uncertainty in coal prices for the year 2013 and other near-term years. In the short run, KCP&L/GMO's high price projection shows an initial price decline; it is the only coal price projection that has year-on-year price decline. Qualitatively, the AEO national delivered coal price, the AEO SPNO regional delivered coal price, and KCP&L/GMO's middle coal price projection all have similar price escalations, though the companies' is slightly lower. In conclusion, the large spread both between high and medium projections and between medium and low projections in the short term raises concerns.

[5] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013. Page 25.

[6] U.S. Energy Information Administration, "Annual Energy Outlook 2013." Available at: http://www.eia.gov/oiaf/aeo/tablebrowser/#release=AEO2013&subject=0-AEO2013&table=1-AEO2013&region=0-0&cases=ref2013-d102312a

[7] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013. Page 25.

Figure 2: Coal Price Projections



Source: EIA AEO 2013, data extracted from KCP&L/GMO 2013 Update, pg.19 using Dagra.

CO_2

Figure 3 plots KCP&L/GMO's high, middle, and low carbon price projections, along with Synapse's high, middle and low carbon price projections. Synapse's low projection has a carbon price of $16.95 starting in 2020 and escalating to $37.62 in 2032.[8] KCP&L and GMO, on the other hand, use a [redacted] per ton CO_2 for the low carbon price forecast, which the companies' Monte Carlo analysis designates having a 25 percent probability of coming to fruition.[9] This represents a prediction that there is a one-in-four chance that [redacted] (by way of tax, trading scheme, etc.) at either the state or federal level at any point between now and 2032. We believe this to be a rather poor assumption. President Obama announced his plan to cut emissions of carbon dioxide earlier this year.[10] The White House specifically noted the power sector is responsible for nearly 40 percent of carbon pollution, and the President directed the EPA to revise its proposal for carbon pollution standards for new power plants, to issue proposed standards, regulations, or guidelines addressing carbon pollution at existing

[8] KCP&L reports all dollar figures in nominal values; Synapse adjusted real dollar results to allow for comparison. EIA's AEO 2013 inflation projections were used to calculate a compounded annual growth of 1.76 percent. This is used as the annual inflation rate for 2013 through 2032.

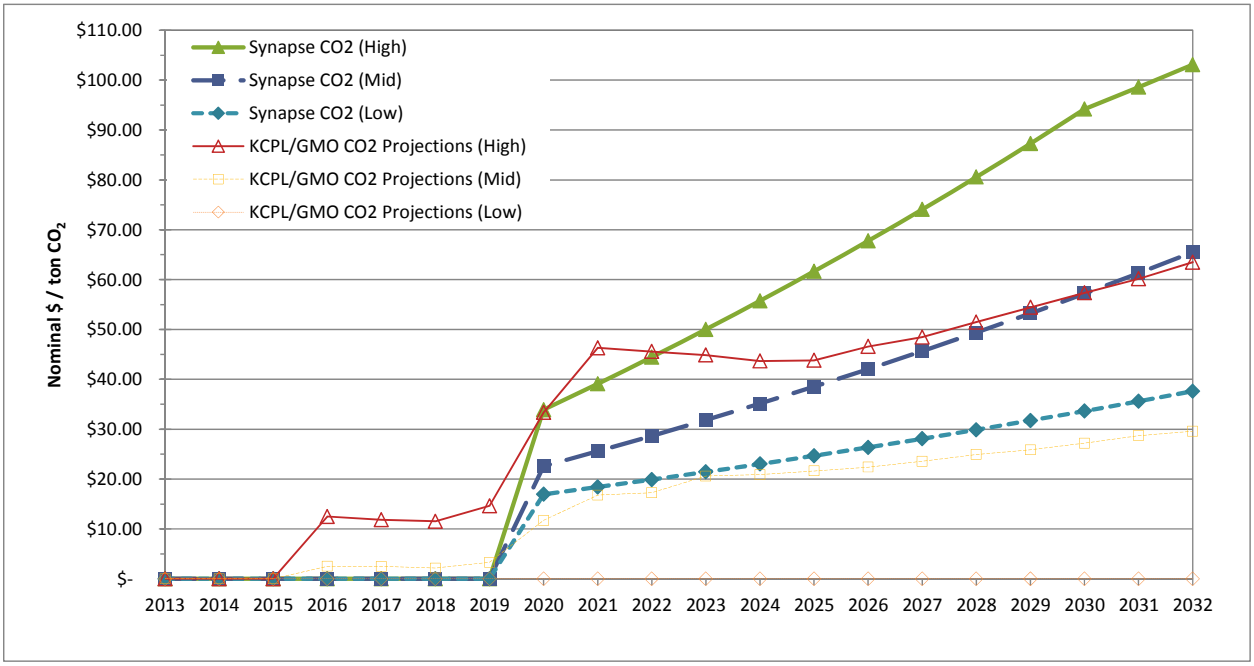
[9] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013. Page 55.

10 The White House, "Fact Sheet: President Obama's Climate Action Plan." June 25, 2013. Available at: http://www.whitehouse.gov/the-press-office/2013/06/25/fact-sheet-president-obama-s-climate-action-plan. Executive Office of the President, "The President's Climate Action Plan." June 2013. Available at: http://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf.

power plants by June 1, 2014, and to finalize those standards within a year.[11] Given this announcement, KCP&L/GMO's assumption that there is a 25 percent chance of a carbon price of [redacted] (for the low projection) over the planning horizon appears to be an improper management of risk.

KCP&L/GMO's middle projection closely follows Synapse's low projection, though by 2032—the end of the study period—the companies' middle projection has a lower CO_2 price than Synapse's low projection of $37.62. An unusual property of KCP&L/GMO's CO_2 projection is that it has consecutive years with a declining carbon price when reported in nominal dollars. This happens within two blocks of time for KCP&L/GMO's high projection, and for one block of time for the companies' middle projection.

Figure 3: CO_2 Price Projections



KCP&L/GMO's results for carbon pricing call into question the methodology that was used to generate its forecasts. KCP&L and GMO state that their carbon price projections reflect forecasts from CERA/Global Insight, PIRA, Energy Ventures Analysis, Wood Mac (sic), JD Energy, and Synapse, but the companies have not provided any documentation or explanation of how its forecast was derived.[12] Moreover, the companies' assumption in their middle price forecast of a falling nominal price in some multi-year periods does not align with the dozens of proposals that have been suggested by utility owners or policymakers, nor does assigning a 25 percent chance of [redacted] carbon price at any time in the next 20 years. Given President Obama's direction to the EPA to complete regulations

[11] The White House, "Presidential Memorandum – Power Sector Carbon Pollution Standards." June 25, 2013. Available at: http://www.whitehouse.gov/the-press-office/2013/06/25/presidential-memorandum-power-sector-carbon-pollution-standards.

[12] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013. Page 25.

of carbon dioxide emissions during his term in office, it would be wise and prudent for KCP&L and GMO to reconsider their high, middle, and low CO_2 forecasts.

Demand-Side Management

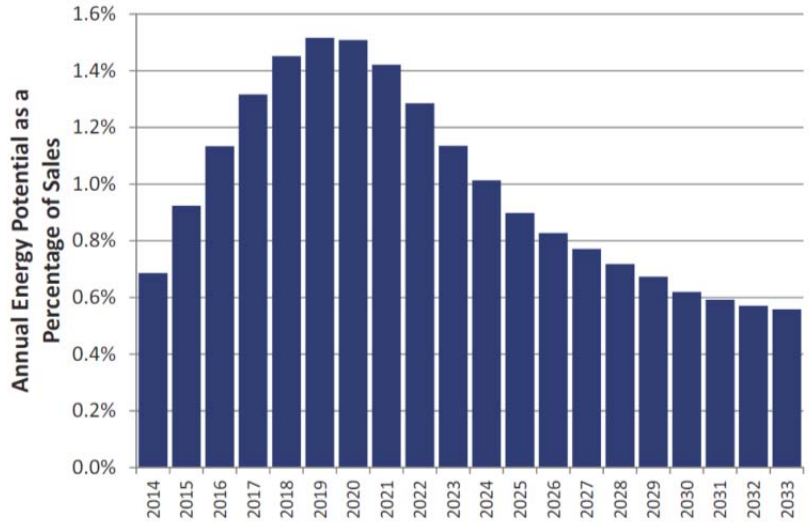
In developing demand-side management (DSM) forecasts for KCP&L and GMO, Navigant calculated the Realistic Achievable Potential (RAP) and Maximum Achievable Potential (MAP) in its Demand-Side Resource Potential Study Report.[13] The key difference between these scenarios is the incentive level. MAP assumes incentives are set at 100 percent of the incremental cost for all measures. According to Navigant, this scenario will result in the most savings, but at a cost far exceeding most existing energy efficiency programs. The RAP scenario is more measure-specific and includes more realistic incentive level assumptions. Below a threshold of $0.015 per kWh, incentives equal 100 percent of the incremental cost. Incentive levels decrease as costs increase beyond this threshold level. As a result, the RAP plan achieves savings at a much lower cost than MAP, and is the focus of this analysis. As a percent of baseline energy sales for GMO, MAP averages 1.65 percent per year over the first ten years, while RAP averages 1.3 percent per year over the first ten years. For KCP&L, MAP averages 1.6 percent per year over the first ten years, while RAP averages 1.19 percent per year over the first ten years. GMO has a somewhat more achievable savings potential as a result of its higher customer growth forecast.

Figure 4 reproduces the Navigant study's annual DSM energy potential for KCP&L's Missouri operations. Per the study, "potential ramps up over the first several years, peaks in about 2020, and tails off in the later years as the market for energy savings saturates and approaches its equilibrium value."[14] According to Navigant, this tail remains positive for several reasons, including the addition of building stock and the rise of avoided costs, which make more measures economic. While the annual energy savings potential peaks and declines, the cumulative potential will continue to grow throughout the study period, provided that energy efficiency measures are replaced at the end of their useful life. The Navigant study's annual DSM energy potential for GMO reaches similar conclusions.

[13] Navigant Consulting, Inc. "Demand-Side Resource Potential Study Report – Demand Response." Prepared for Kansas City Power and Light. Draft date: March 2013.

[14] Ibid., page 46.

Figure 4: Annual RAP DSM potential for KCP&L, reproduced from Navigant DSM Study, page 50



In its Preferred Plan, KCP&L did not select the plan with the lowest NPVRR. Instead, it chose to use a modified energy efficiency plan based on reduced levels of DSM spending to reduce near-term rate impacts. The modified energy efficiency plan is referred to as MEEIA-RAP. In weighing the costs and benefits of MEEIA-RAP and RAP, KCP&L completed a rate impact analysis, provided in Appendix C of 2013 Annual Update Summary Report. This analysis factors in the addition program cost of the RAP plan, as well as reduced energy sales, concluding that RAP will result in an 8.3% rate increase, and MEEIA-RAP a 6.3% rate increase, this analysis ignores any difference in non-DSM related capital investment over the same period, such as the company's plan to install air pollution controls at its Montrose plant under the MEEIA-RAP scenario but not the RAP scenario.[15] This unsophisticated method allows for an easy to follow comparison, but misses factors that a more detailed dispatch model might convey. Fortunately, KCP&L conducted modeling to this effect, and provided detailed results. In Table 1, we compare the modeled rate impacts associated with plan ADBKA (RAP DSM, Montrose 1,2 3 retire in 2016) to plan FDBKA (MEEIA-RAP DSM, Montrose 1,2,3 retire 2016).[16] These values show the rate impacts directly associated with the DSM program alone, the only difference between these two plans. The rate impact is reduced from 2.00% to 0.48% when more detailed modeling is used. One factor contributing to this decrease in rate impact may be that with more DSM, KCP&L has more resources available to make wholesale sales after meeting their resale obligations.

[15] Annual rates presented in Table 1 account for both changes in DSM and additional capital investments.

[16] No modeling analyses was provided with RAP DSM and Montrose 1 retiring in 2016 and Montrose 2,3 retiring in 2021 (as in the preferred plan). This is the reason we completed the above analysis with M1,2,3 retiring in 2016.

Table 1: Rate increases for comparable RAP and MEEIA-RAP DSM plans, based on KCP&L modeling results

	FDBKA	ADBKA	*delta*
DSM Level	MEEIA-RAP	RAP	
2014	[redacted]	0.91%	[redacted]
2015	[redacted]	16.54%	[redacted]
2016	[redacted]	-3.51%	[redacted]
2017	[redacted]	1.95%	[redacted]
2018	[redacted]	1.57%	[redacted]
2019	[redacted]	3.06%	[redacted]
2020	[redacted]	8.82%	[redacted]

Thorough analysis makes it clear that the rate impact of DSM is not as dire as KCP&L has led implied in the IRP report. While near-term rate impacts are a relevant metric, the major figure of merit is NPVRR of each of the plans. Under the RAP DSM plan, total revenue requirements decrease $75 million from the Preferred plan, $20,797 million to $20,722 million.[17] The company is foregoing $75 million in long-term savings in exchange for an additional $13 million in near-term savings. While KCP&L does acknowledge in the IRP update that the Preferred Plan is not the lowest-cost plan, the company justifies the choice of MEEIA-RAP as the preferred DSM alternative purely on the basis that it reduces the rate impact over the next three years. No analysis is presented on the resulting rate impact over a longer period. In fact, by 2017 the cumulative rate impact is [redacted] for both plans. In 2020, the RAP plan has levelized annual rates of [redacted] per kWh, compared to [redacted] per kWh for the MEEIA-RAP plan—a savings of [redacted] percent over the Preferred Plan. [18] It appears that investing in DSM now will indeed have a rate impact, but will be smaller than KCP&L's calculation in the IRP Summary Report, and mitigate the need for larger rate impacts down the road. These values are presented for the 2014 to 2020 period in Table 1 below.

[17] This compares plan ADBKA (RAP DSM) to plan FDHKA (MEEIA-RAP DSM).

[18] Annual rates presented in Table 1 account for both changes in DSM and additional capital investments

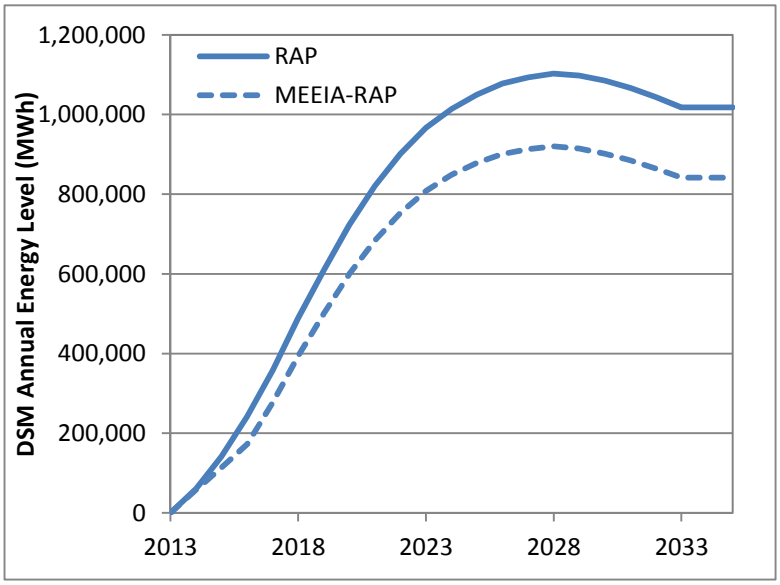
Table 1: Levelized annual rates ($/kw-hr) for lowest-cost plans associated with MEEIA-RAP and RAP DSM levels

	FDHKA	ADBKA
DSM Level	MEEIA-RAP	RAP
2014	[redacted]	$0.096
2015	[redacted]	$0.112
2016	[redacted]	$0.108
2017	[redacted]	$0.110
2018	[redacted]	$0.112
2019	[redacted]	$0.115
2020	[redacted]	$0.125

In addition to rate impacts, another relevant metric when considering DSM programs is bill impacts. While commonly known as "ratepayers," the customers are, in fact, *billpayers.* Has the company studied the impacts of various DSM levels on customer bills? While rates go up in both the MEEIA-RAP and RAP scenarios, the bill impact is likely to be less as a result of lower energy consumption.

KCP&L's adjusted MEEIA-RAP forecast is compared to RAP in Figure 5. The reduced spending over a few early years cascades forward, resulting in substantially less cumulative DSM energy savings over the study period. This difference results in the substantial difference in costs and rates of the two plans discussed above.

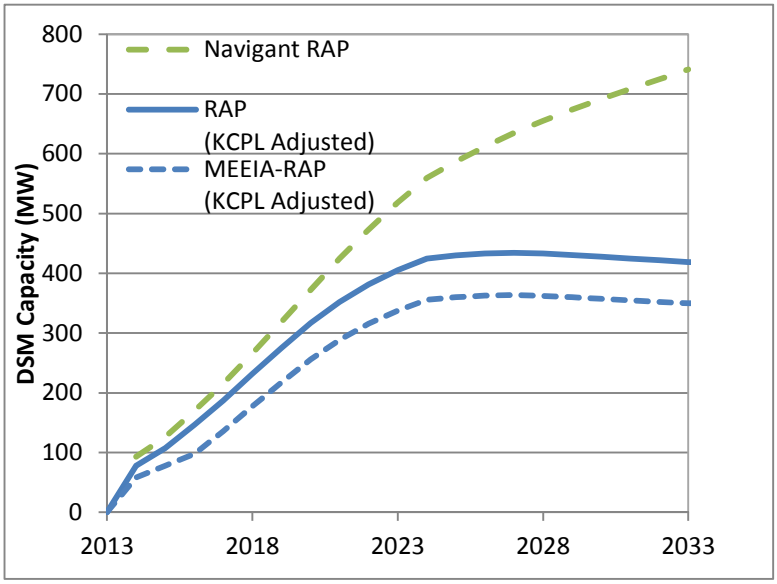
Figure 5: Annual DSM energy for RAP and MEEIA-RAP alternatives



KCP&L also adjusted the Navigant study downward based on the assumption that 15 percent of C&I customers will opt out of lower-cost DSM, as this is the percentage of GMO customers that have historically requested to opt out. This assumption is not adequately justified. Is the 15 percent opt-out for GMO based on a single year, or several? Perhaps the GMO DSM deployment did not include programs that were appealing to C&I customers, causing them to opt out, which the KCP&L program could improve on. In fact, data from EIA Form 861 indicates individual KCP&L industrial customers use substantially less energy than GMO customers—1,450 MWh per customer per year at KCP&L compared to 5,416 MWh per customer per year at GMO. This large difference in the average energy intensity of respective commercial and industrial customers suggests that using the same opt-out rate for both companies may not be a reasonable assumption.

In addition to being an essential low-cost energy resource, DSM also provides demand savings in the form of peak reductions. The cumulative demand savings potential from the Navigant study (Appendix L) grows every year, as shown in Figure 6, eventually rising to a total of 741 MW for KCP&L in the RAP scenario, including energy efficiency (EE), demand response (DR), and combined heat and power (CHP). KCP&L's Stakeholder Report (Appendix B) shows a peak DSM capacity of only 432 MW for the RAP scenario, and 363 MW for the MEEIA-RAP scenario. After the peak year in 2026, the capacity savings associated with DSM flattens and subsequently declines. It is unclear why this decline exists, given the Navigant study's finding of a steadily increasing potential out to 2033. While Navigant shows annual savings may decline as the market becomes more saturated (as indicated for energy in Figure 5), cumulative capacity should continue to increase.

Figure 6: DSM capacity from Navigant Report and KCP&L's plans



In calculating the rate impact comparison between the RAP and MEEIA-RAP plans, KCP&L had to make an assumption of fuel cost per MWh. This cost is used to calculate an aggregate average Gross Margin

Rate per MWh. This in turn is used to calculate the annual margin (in dollars) lost as a result of increased energy efficiency, of which KCP&L is allowed to recover 90 percent.[19] We believe this margin should also include non-fuel variable costs of generation, as well as factor in any other future costs that may reduce the margin, such as emissions pricing, rising fuel prices, and costs associated with environmental retrofits.

Environmental Compliance

Compliance Timeline

KCP&L and GMO are planning for environmental retrofits at all of their existing coal units to meet near-term compliance requirements. This analysis will focus on the Montrose, LaCygne, Lake Road 4/6, and Sibley plants, representing 1,771 MW of coal capacity built between 1958 and 1977.

In order to comply with the EPA's Mercury and Air Toxics Standards (MATS) by April 2016, activated carbon injection (ACI) systems will be installed as relatively low capital cost measures to allow Montrose Units 2 & 3 to operate until retirement in 2021. The existing electrostatic precipitator (ESP) will be rebuilt at the same time. Sibley 1 & 2 will be similarly upgraded to allow for operation until retirement in 2019.

While the 2012 KCP&L IRP indicates the company had considered installing dry sorbent injection (DSI) systems to comply with MATS acid-gas requirements, KCP&L states in its IRP update filing that it plans to use low-chlorine coal to comply with the acid gas requirements of MATS. .[20] The same is true for GMO.[21] Many power plants use SO_2 as a proxy for hydrochloric acid (HCl); however, it appears KCP&L will measure HCl directly and use low-chlorine coal to reduce emissions. Neither the Burns & McDonnell MEGA study for Montrose nor for Sibley did shows MATS compliance with low-chlorine coal alone, despite KCP&L's contention that compliance with future environmental requirements is based on that study. [22] Rather, the MEGA studies presuppose that Montrose and Sibley will be making the switch to low-chlorine Powder River Basin (PRB) coal, stating that "the design basis coal is 100% PRB with a 50% Antelope mine / 50% Caballo mine blend, defined in KCP&L's forecast of future fuel usage."[23]

Furthermore, assuming switching to PRB will make the facility "natively" compliant is not supported by the MEGA study. Table 2.3 (on pages 2-6) estimates the HCl emissions limit under MATS as 0.0020 pounds per MMBtu, while Table 2.4 (on pages 2-7) describes the estimated chloride content for PRB coal as 0.012 pounds per MMBtu. Burns and McDonnell go on to suggest that "while DSI has the ability to significantly reduce acid gases, the alkalinity of Powder River Basin (PRB) fly ash can also significantly

[19] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update Summary Report." June 2013. Appendix C.

[20] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013. Page 119.

[21] KCP&L Greater Missouri Operations Company (GMO), "Integrated Resource Plan 2013 Annual Update." June 2013. Page 114.

[22] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013. Page 137.

[23] Burns & McDonnell, "Multi-Station Environmental and Generation Assessment (MEGA) Study: Results for Montrose Generating Station". March 2013. Page 3-1.

reduce HCl emissions. Consequently, many utilities that burn PRB have found their units to be 'natively' compliant with the MATS HCl limit. For this reason, it is suggested that KCP&L perform stack testing to confirm whether the Montrose units are natively compliant or require DSI to meet the MATS HCl limit as assumed herein." The MEGA study suggests that the Montrose and Sibley stations may need dry sorbent injection systems in addition to low-chlorine coal; stack tests will be necessary before a final conclusion can be made.

Switching to low-chlorine coal to comply with MATS will affect the company's fuel supply arrangements and costs in at least two ways: its current contracts for coal supply, and any future contracts it may procure for low-chlorine coal. KCP&L does not address if any current long-term coal supply contracts can be adjusted to provide low-chlorine coal, nor if there are any one-time associated costs or savings therein. Furthermore, KCP&L does not detail how low-chlorine coal price projections will differ from its current coal price projections. The Retrofit Variable O&M Estimates tables in the 2013 IRP Updates do not appear to reflect any variable O&M impacts from fuel supply that would result from changing coal supply sources in 2016.[24,25]

Low-chlorine coal has also been shown to reduce the efficacy of untreated activated carbon injection in mercury removal.[26] This finding may imply a higher activated carbon injection rate for the same level of mercury removal, or higher costs for activated carbon. It is unclear whether KCP&L has accounted for this effect and its resulting impact on the variable operating costs at Montrose and Sibley.

In addition to MATS compliance, compliance with a reinstated version of EPA's Cross-State Air Pollution Rule (CSAPR) also presents substantial risks for the company. Compliance with the Clean Air Interstate Rule (CAIR), the regulation in effect in the absence of CSAPR, could reasonably be achieved with banked SO_2 allowances, assuming KCP&L was able to bank substantial quantities in the last few years, given lower-than-expected loads. The Supreme Court is now considering CSAPR, which did not allow the use of banked SO_2 allowances, and could reinstate it.[27] The proposed retrofits to Sibley and Montrose would mitigate mercury and HCl, but do nothing to address SO_2 emissions. The 2013 IRP Update states that CSAPR compliance would be achieved primarily through "generation planning and allowance trading" and "anticipated control additions or generation planning associated with compliance with other rules (MATS, SO_2 NAAQS, etc) will also assist in compliance."[28] Control additions planned for Montrose 2 & 3 and Sibley 1 & 2 would not address the SO_2 requirements of CSAPR. A dependence on allowance trading leaves KCP&L vulnerable to very high market prices for allowances, particularly if other utilities implement similar compliance strategies.

[24] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013. Page 130.

[25] KCP&L Greater Missouri Operations Company (GMO), "Integrated Resource Plan 2013 Annual Update." June 2013. Page 125.

[26] Machalek T et al. "Full-Scale Activated Carbon Injection for Mercury Control in Flue Gas Derived from North Dakota Lignite." Combined Power Plant Air Pollutant Control Meg Symposium. 2004. Available at: http://www.netl.doe.gov/technologies/coalpower/ewr/mercury/control-tech/pubs/MEGA_41989_stanton.pdf.

[27] Tejinder Singh, "More on today's orders: Good news for the EPA," SCOTUSblog. June 24, 2013, 5:51 PM. Available at: http://www.scotusblog.com/2013/06/more-on-todays-orders-good-news-for-the-epa/.

[28] KCP&L Greater Missouri Operations Company (GMO), "Integrated Resource Plan 2013 Annual Update." June 2013. Page 123.

The units remaining after the initial wave of retirements face significant expenses related to Particulate Matter and SO_2 National Ambient Air Quality Standards (NAAQS), Clean Water Act 316(a) & 316(b), Effluent, and Coal Combustion Residuals (CCR). These policies were primary drivers in the decision to retire Sibley 1 & 2 and Montrose 1, 2, & 3, and to convert Lake Road 4/6.

In 2019, compliance with Clean Water Act 316(a) and 316(b) will necessitate the installation of cooling towers at Sibley, Lake Road 4/6, Iatan, and Hawthorn. In 2023, cooling towers will be installed at LaCygne, although the LaCygne MEGA study assumed a 2021 compliance date.[29] KCP&L failed to explain the discrepancy between the LaCygne MEGA study and its own assumptions in the IRP update.

There is uncertainty regarding the required compliance dates for Effluent and CCR evident in the 2013 KCP&L IRP Update itself. Table 64 of the update lists the expected compliance year as 2019, while the text on page 103 as well as the final plan indicates the company assumed the compliance year to be 2021. A final rule is expected in the first half of 2014; as currently proposed, the rule would require compliance with new Clean Water Act "Best Available Technology" treatment requirements for waste streams such as scrubber wastewater and coal ash transport water at a plant's first permit renewal after July 2017.[30] EPA has considered providing some flexibility in compliance dates, allowing plants until up to July 2022 in exchange for implementing technologies and/or processes that achieve protections beyond that of the base rule.[31,32] Page 103 of the IRP notes that the retirement date "could be delayed depending on future environmental regulations," but KCP&L should also consider that planned retirement dates may be accelerated if new regulations come into effect in advance of its planning.

Finally, in 2023 more stringent PM and SO_2 National Ambient Air Quality Standards (NAAQS) will require the installation of a baghouse at Sibley 3.

Like many utilities, KCP&L and GMO face substantial environmental compliance obligations related to a number of pollutants and a number of different generating units. KCP&L and GMO must ensure that all upcoming regulations are modeled, incorporating all future costs, in order to adequately plan appropriate resource allocation.

Capital Costs

Non-environmental costs over the 2018-2020 period total [redacted] at Montrose station. KCP&L refers to these expenditures as part of its Life Assessment and Management Program (LAMP).[33] It is

[29] Burns & McDonnell, "Multi-Station Environmental and Generation Assessment (MEGA) Study: Results for La Cygne Generating Station." March 2013. Page 1-3.

[30] Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category, 78 Fed. Reg. 34,432, 34,462 (June 7, 2013).

[31] 78 Fed. Reg. at 34,467.

[32] Rubrecht, Gale Lee. "EPA Favors Non-hazardous Management of Coal Combustion Residuals." Jackson Kelly PLLC Energy & Environment Monitor. Aug 2, 2013. Available at: http://eem.jacksonkelly.com/2013/08/epa-recently-provided-its-current-thinking-on-its-coal-combustion-residuals-ccrs-final-rule-that-is-not-expected-unti.html.

[33] Non-environmental capital plans were not provided for years before 2018. This number may be higher than $41 million if KCP&L intends for upgrades and maintenance in these earlier years.

unclear whether any of these expenses at Montrose or any other unit can be avoided in plans where those units will retire shortly, and KCP&L did not demonstrate an attempt to avoid capital expenditures for soon-to-be-retired units in its LAMP reporting. Furthermore, no projected LAMP expenditures before 2016 are provided in the update documents. For units retiring in 2016, it is important to know if these expenditures exist and could be avoided knowing retirement will follow very shortly.

Capital costs for environmental retrofits are summarized in Table 2, based on Table 65 of the GMO 2013 IRP Update and Table 68 of the KCP&L 2013 IRP Update.

Table 2: KCP&L/GMO environmental retrofit capital cost summary ($M) (R indicates retired before compliance required)

	Sibley 1	Sibley 2	Sibley 3	LaCygne 1 & 2	Montrose 2	Montrose 3	Hawthorn	Iatan 1
MATS/ACI	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
MATS/ESP	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
PM&SO2/ Scrubber/ Baghouse	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
316(b) Fish Screens	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
CCR Landfill	[redacted]	[redacted]	[redacted]					
316(a) Cooling Tower	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
CCR Dry Ash Handling	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

While the Montrose MEGA study suggests a much higher cost for the ESP rebuild in particular (at a combined cost of $65.6 million for Montrose 2 & 3), KCP&L projects upgrades to Montrose 2 & 3 to only cost [redacted]. This substantial difference in estimated cost is not explained.

Clean Water Act (CWA) compliance will necessitate the addition of cooling towers at Sibley at an expense of [redacted]. KCP&L's share of cooling towers at LaCygne 1 &2 will be [redacted].

GMO's Preferred Plan on Figure 5 of its 2013 IRP Update indicates Lake Road 4/6 will also need cooling towers, the cost of which is not provided.[34]

KCP&L and GMO face tremendous costs if each company is to retrofit units for compliance purposes. There are a number of discrepancies between the companies' projected costs and the MEGA studies. These costs must be well understood and modeled appropriately, and it is not apparent that either company has achieved that.

[34] KCP&L Greater Missouri Operations Company (GMO), "Integrated Resource Plan 2013 Annual Update." June 2013. Page 7.

Off-System Sales

KCP&L may sell excess generation from its power plants in the wholesale market to generate additional sales. The only mention of off-system sales in the 2013 IRP Update is KCP&L's response to our original comment, noting that "to the extent that KCP&L resources are available to make wholesales sales after all retail obligations are met, plan results include such sales."[35] Neither KCP&L nor GMO provided any details regarding how revenue from off-system sales is divided between the ratepayers and the shareholders. The companies also omitted how the sales revenue is modeled when calculating NPVRR. The ability to make such sales, and the revenue they generate, is dependent on historically volatile market prices. To the extent that Montrose 2 & 3 and Sibley 1 & 2 rely on these sales to justify their continued operation between now and their 2021 and 2019 retirement dates, this presents an additional risk to the company and its ratepayers. Furthermore, the off-system sales revenue must be appropriately shared with the ratepayers who are financing the environmental retrofits detailed in the 2013 IRP updates, and only the ratepayer benefit should appear in the NPVRR analysis.

KCP&L is a member of the Southwest Power Pool (SPP) regional transmission organization. When KCP&L sells power into the market (in the absence of bilateral contracts), it sells into the SPP market. Annual average day ahead on-peak prices in SPP have been steadily trending downward over the past five years. This is a result of declining natural gas prices, increased wind generation, and lower regional loads, which are still well below the 2008 peak. While these prices will almost certainly increase in the future, this trend lends substantial uncertainty to the revenue KCP&L can expect from off-system sales.

Table 3: Annual average day ahead on-peak prices in SPP ($/MWh)[36]

	2008	2009	2010	2011	2012
Price ($/MWh)	$68.77	$32.94	$38.71	$36.41	$28.76

According to the direct testimony of KCP&L witness Terry Bassham (page 7, lines 2-6) in KCP&L's 2012 rate case (Case No. ER-2012-0174), declining revenue from off-system sales was one of the primary reasons for KCP&L's 2012 rate increase request:

> "Changes in the wholesale energy market including a challenging economy and low natural gas prices, have significantly impacted KCP&L's ability to sell power outside its service territory. In addition to a reduction in off-system sales margins, in recent months KCP&L has also lost several long term wholesale contracts once they expired."

At the same time as benefits from off-system sales are declining, those declining market prices also mean that the cost for purchasing power to replace capacity from retiring Sibley and Montrose earlier than 2019 will decline, making market purchases a more attractive option and relying on off-system sales revenue a riskier position for the company and the ratepayers.

[35] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013. Page 144.

[36] FERC. "Southwest Power Pool Electric Market: Overview and Focal Points." July 2013. Available at: http://www.ferc.gov/market-oversight/mkt-electric/spp/2013/07-2013-elec-spp-archive.pdf.

Wind Generation Resource Planning

Wind generation contributes to a variety of important planning metrics, including capacity, energy, risk reduction, and RPS compliance. The capacity credit for wind in SPP is 8.15 percent,[37] and capacity factors are on the order of 38 percent.[38] Because wind doesn't require the purchasing of fuel, incorporating wind in a generating portfolio reduces risk by limiting the ratepayers' exposure to swings in fuel prices. Wind power also generates the renewable energy credits (RECs) necessary to comply with both the Kansas and Missouri renewable portfolio standards. Because wind contributes to a number of distinct planning requirements, it is important to consider carefully the holistic impacts of increasing wind generation as part of a preferred resource plan, even if wind is not the optimal generating resource for one particular criterion.

Costs

The all-in cost used by KCP&L and GMO to model future wind construction and operation is too high. The KCP&L and GMO 2013 IRP Updates both include supply-side technology options reported in dollars per MWh in Table 15 of each 2013 update; both tables list an "all-in cost of the supply side option … including the components of capital cost, fixed O&M, variable O&M, fuel, and emissions."[39] For wind, the cost used by KCP&L and GMO is $[redacted] per MWh. These costs are noticeably higher than the 2011 wind power prices in the region for 2010-2011 projects (approximately $50 per MWh),[40] and substantially higher than the 2011-2012 levelized long-term wind PPA price for the Interior region ($31 per MWh).[41] Both capital and O&M costs for wind projects continue to decline year-on-year.[42,43] Despite the downward trend of capital and O&M costs for wind farm construction and operation, KCP&L and GMO appear to use a constant price for wind for all future years.

While it's true that the *Wind Technologies Market Report* prices do not include integration costs, the integration costs KCP&L and GMO expect to face aren't detailed in their IRP updates, making comparisons impossible. Furthermore, those wind integration costs faced by KCP&L and GMO will decline as the Southwest Power Pool (SPP) implements its Integrated Marketplace. SPP's Integrated Marketplace will "provide participants with greater access to reserve energy, improve regional balancing of supply and demand, [and] facilitate integration of renewable resources."[44]

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[37] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update, Appendix B." June 2013.

[38] Ryan Wiser and Mark Bolinger, "2012 Wind Technologies Market Report." August 2013. Page 48. Available at: www2.eere.energy.gov/wind/pdfs/2012_wind_technologies_market_report.pdf.

[39] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013. Page 25. KCP&L Greater Missouri Operations Company (GMO), "Integrated Resource Plan 2013 Annual Update." June 2013. Page 26.

[40] Ryan Wiser and Mark Bolinger, "2011 Wind Technologies Market Report." August 2012, page 53. Available at: www2.eere.energy.gov/wind/pdfs/2011_wind_technologies_market_report.pdf.

[41] Ibid.

[42] Ibid., page 33, Figure 19.

[43] Ibid., page 39, Figure 25.

[44] Pete Hoelscher, "SPP 101." August 9, 2013. Available at: http://www.spp.org/publications/Intro_to_SPP.pdf.

Build-Out Timeline

Most of the plans in the KCP&L IRP have an identical wind build-out schedule: 50 MW in 2016, 150 MW in 2020, and 200 MW in 2024. Similarly, the GMO IRP plans have identical wind build-out schedules: 150 MW in 2019, 100 MW in 2021, and 100 MW in 2025. Neither KCP&L nor GMO explain the rationale for those quantities of wind built in those years, except to state that the total quantities of wind and solar are "based upon current Missouri RPS (sic) rule requirements."[45]

Even if the build-out is compliant with the Missouri RES, the companies have not demonstrated that the proposed size and construction timeline is optimal for a given portfolio. It is inappropriate to determine a resource, a quantity, or a specific year of construction *a priori* when doing resource planning; instead, KCP&L and GMO should have modeled the costs for wind generation (and other renewables) and allowed an optimization model to select the appropriate quantities and years, given the RES and RPS compliance requirements of Missouri and Kansas (see Table 4).

Table 4: Missouri Renewable Energy Standard and Kansas Renewable Portfolio Standard

	Missouri RES	Kansas RPS
2011	2% (0.04% solar)	10%
2014	5% (0.1% solar)	--
2016	--	15%
2018	10% (0.2% solar)	--
2020	--	20%
2021	15% (0.3% solar)	--

Source: Database of State Incentives for Renewables & Efficiency (DSIRE), http://www.dsire.org

Implications of fuel conversion

GMO's Preferred Plan (AICGA) includes the conversion of Lake Road 4/6 to natural gas/fuel oil use. This plan was $12 million more expensive than the least-cost plan GMO discovered (AEFGA) on an NPVRR basis. The least-cost plan assumed retirement of Lake Road 4/6 in 2016. GMO argues that it would prefer to own this capacity, rather than purchase capacity on the market and face the risk of rising prices. After reviewing annual generation data provided by the company, it appears that Lake Road 4/6 is acting not only as a capacity resource, but as a substantial energy resource as well. Figure 7 plots annual generation at Lake Road 4/6 for the Preferred Plan, using the middle CO_2, gas, coal, and load growth assumptions. Capacity factors are in the 20-25 percent range for the first ten years following conversion, and rise above 40 percent in the final years of the study period.

[45] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013. Page 87.

Synapse has been provided with very limited data on the Lake Road 4/6 conversion. Assuming the heat rate remains the same when operating as a gas-fired unit that it was as a coal-fired unit,[46] and the price of gas per MMBtu is roughly double the price of coal in 2017 (based on the company fuel forecasts in Figure 1 and Figure 2), the converted unit would have a dispatch cost of [redacted] per MWh. This estimation is based purely on changing fuel costs from the switch to natural gas firing, and does not include additional O&M requirements or savings. This dispatch cost is approximately double today's Lake Road 4/6 dispatch cost of [redacted] per MWh, according to Table 62 of the 2013 IRP update. The Lake Road MEGA Study estimates variable O&M costs would be [redacted] per MWh at the converted facility, which would further decrease any economic dispatch of the unit.[47] A dramatic increase in operating cost would presumably result in decreased utilization of the plant, yet the model projects that Lake Road 4/6 will operate substantially more often in future years.

While neither the IRP Update nor the Lake Road MEGA study provide current variable O&M costs at Lake Road 4/6, we believe at the Lake Road MEGA study estimation of $[redacted] per MWh cost represents a significant increase when compared to the current marginal cost of dispatch.[48] Figure 8 shows SPP daily average real time pricing; the number of hours with prices in excess of [redacted] per MWh is very limited (and even fewer are in the [redacted] per MWh range, accounting for increased variable O&M costs). Figure 7 shows that, in the absence of dramatic increases in market prices, the capacity of Lake Road 4/6 will remain well below the [redacted] percent range of capacity factors GMO modeling asserts.

GMO did not provide its model input files to stakeholders for review. In the absence of a detailed explanation in the 2013 IRP Update, the unexpectedly high capacity factor for Lake Road 4/6 in the company's modeling results (reproduced in Figure 7) generates several questions about the modeling methodology. The Lake Road MEGA study asserts a heat rate of [redacted] Btu per kWh after conversion, which is poor in comparison to the company's other coal and gas units.[49] Perhaps the Lake Road 4/6 heat rate input was improperly modeled by a failure to correctly adjust the properties associated with the fuel change. How does the Lake Road 4/6 dispatch cost compare to market prices? It is important to understand why GMO models the unit operating as frequently as it does in light of its relatively poor heat rate. GMO is pursuing a more expensive plan by not retiring Lake Road 4/6, but this level of operation raises questions about the model inputs directly related to Lake Road 4/6.

[46] The Lake Road MEGA Study indicates a minimal heat rate increase of 13 btu per kWh after conversion, less than 0.1 percent. See Burns & McDonnell, "Lake Road MEGA Study." Draft date: March 5, 2013. Table 1.5.

[47] Burns & McDonnell, "Lake Road MEGA Study." Draft date: March 5, 2013. Page 1-9.

[48] Variable O&M costs would likely increase relative to today's use of coal at Lake Road. If GMO opted to consider burning coal, environmental retrofits would increase the Variable O&M costs as well.

[49] Burns & McDonnell, "Lake Road MEGA Study." Draft date: March 5, 2013. Page 5-21.

Figure 7: Annual generation at Lake Road 4/6 after conversion to gas/oil, plan AICGA, mid load, gas, and CO_2 assumptions[50]

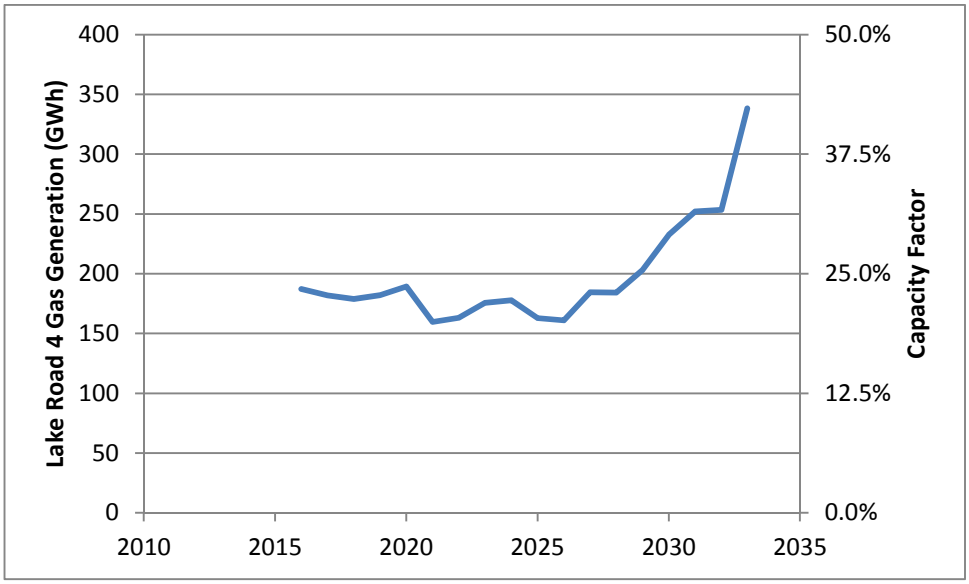

Figure 8: Lake Road 4/6 dispatch cost and daily average SPP real time prices - all hours (reproduced from FERC)[51]

[redacted]

[50] GMO Workpaper, "GMO Gen & Emissions Plan Summaries_Final.xlsx." Worksheet "Generation – AICGA."

[51] FERC Market Oversight, "Daily Average of SPP Real Time Prices – All Hours." Available at: http://www.ferc.gov/market-oversight/mkt-electric/spp/elec-spp-rto-pr.pdf.

Modeling

Choosing which plans to model

In preparing for IRP analyses and subsequent updates, KCP&L and GMO create a series of alternative resource plans, and then perform Monte Carlo analysis to determine the expected value of the Net Present Value of Revenue Requirements (NPVRR) for each of those plans. The analysis is limited to selecting the Preferred Plan from among the set of plans which KCP&L and GMO choose to study. This approach is problematic because it lacks optimization – the model is not used to identify the lowest cost resources. It is entirely possible that there are other resource plans which would comply with reliability and environmental requirements that have an even lower NPVRR than the plans studied by KCP&L and GMO. A systematic resource planning approach using optimization techniques can ensure that the least-cost plan is identified; an *ad hoc* collection of resource plans run through Monte Carlo analysis cannot.

Synapse has identified a number of plans which *may* have lower revenue requirements than those KCP&L and GMO modeled. This list is not intended to be comprehensive; additional plans may exist that *also* have lower revenue requirements. As stated earlier, the only way to be sure that the plan with the lowest NPVRR is included is to perform a more thorough resource planning optimization. Table 5 and Table 6 contain a number of plans KCP&L/GMO did not include in the IRP updates or appendices that should undergo the analysis KCP&L/GMO performed on plans published in the IRP update Total Revenue Requirement Table (KCP&L: Table 29; GMO: Table 35).[52]

Table 5: Alternate KCP&L resource plans

Plan Name	DSM Level	Retirement Assumption	Retirement Year
ADEKA	RAP	Montrose-1 Montrose-2 Montrose-3	2016 2023 2023
ADFKA	RAP	Montrose-1 Montrose-2 Montrose-3	2019 2021 2021
ADHKA	RAP	Montrose-1 Montrose-2 Montrose-3	2016 2021 2021
AIBKA	RAP	LaCygne-1 Montrose-1 Montrose-2 Montrose-3	2015 2016 2016 2016
AIEKA	RAP	LaCygne-1 Montrose-1 Montrose-2 Montrose-3	2015 2016 2023 2023

[52] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013, page 64. KCP&L Greater Missouri Operations Company (GMO), "Integrated Resource Plan 2013 Annual Update." June 2013, page 63.

Plan Name	DSM Level	Retirement Assumption	Retirement Year
AIFKA	RAP	LaCygne-1	2015
		Montrose-1	2019
		Montrose-2	2021
		Montrose-3	2021
AIHKA	RAP	LaCygne-1	2015
		Montrose-1	2016
		Montrose-2	2021
		Montrose-3	2021

Note: The naming convention corresponds with the KCP&L naming convention for alternative resource plans. These plans all use CT additions (the fifth character in the name), but should also be modeled with CC additions.

Table 6: Alternate GMO resource plans

Plan Name	DSM Level	Retirement Assumption	Retirement Year
ADFGA	RAP	Sibley-1	2019
		Sibley-2	2019
		Sibley-3	2016
ADDGA	RAP	Sibley-1	2023
		Sibley-2	2023
		Sibley-3	2016
A#FGA	RAP	Sibley-1	2019
		Sibley-2	2019
		Sibley-3	2016
		Lake Road 4/6	2016
A#DGA	RAP	Sibley-1	2023
		Sibley-2	2023
		Sibley-3	2016
		Lake Road 4/6	2016
A#BGA	RAP	Sibley-1	2016
		Sibley-2	2016
		Sibley-3	2016
		Lake Road 4/6	2016
A#FGA	RAP	Sibley-1	2019
		Sibley-2	2019
		Sibley-3	2016
		Convert to NG: Lake Road 4/6	2016*
A#DGA	RAP	Sibley-1	2023
		Sibley-2	2023
		Sibley-3	2016
		Convert to NG: Lake Road 4/6	2016*
A#BGA	RAP	Sibley-1	2016
		Sibley-2	2016
		Sibley-3	2016
		Convert to NG: Lake Road 4/6	2016*

Plan Name	DSM Level	Retirement Assumption	Retirement Year
A#FGA	RAP	Sibley-1	2019
		Sibley-2	2019
		Sibley-3	2016
		Convert to NG-FO: Lake Road 4/6	2016**
A#DGA	RAP	Sibley-1	2023
		Sibley-2	2023
		Sibley-3	2016
		Convert to NG-FO: Lake Road 4/6	2016**
A#BGA	RAP	Sibley-1	2016
		Sibley-2	2016
		Sibley-3	2016
		Convert to NG-FO: Lake Road 4/6	2016**
ADFGA	RAP	Sibley-1	2019
		Sibley-2	2019
		Convert to NG: Sibley-3	2016*
ADDGA	RAP	Sibley-1	2023
		Sibley-2	2023
		Convert to NG: Sibley-3	2016*
A#FGA	RAP	Sibley-1	2019
		Sibley-2	2019
		Convert to NG: Sibley-3	2016*
		Lake Road 4/6	2016
A#DGA	RAP	Sibley-1	2023
		Sibley-2	2023
		Convert to NG: Sibley-3	2016*
		Lake Road 4/6	2016
A#BGA	RAP	Sibley-1	2016
		Sibley-2	2016
		Convert to NG: Sibley-3	2016*
		Lake Road 4/6	2016
A#FGA	RAP	Sibley-1	2019
		Sibley-2	2019
		Convert to NG: Sibley-3	2016*
		Convert to NG: Lake Road 4/6	2016*
A#DGA	RAP	Sibley-1	2023
		Sibley-2	2023
		Convert to NG: Sibley-3	2016*
		Convert to NG: Lake Road 4/6	2016*
A#BGAB	RAP	Sibley-1	2016
		Sibley-2	2016
		Convert to NG: Sibley-3	2016*
		Convert to NG: Lake Road 4/6	2016*

Plan Name	DSM Level	Retirement Assumption	Retirement Year
A#FGA	RAP	Sibley-1	2019
		Sibley-2	2019
		Convert to NG: Sibley-3	2016*
		Convert to NG-FO: Lake Road 4/6	2016**
A#DGA	RAP	Sibley-1	2023
		Sibley-2	2023
		Convert to NG: Sibley-3	2016*
		Convert to NG-FO: Lake Road 4/6	2016**
A#BGA	RAP	Sibley-1	2016
		Sibley-2	2016
		Convert to NG: Sibley-3	2016*
		Convert to NG-FO: Lake Road 4/6	2016**

*Note: # denotes no GMO naming convention for given set of retirement units, * denotes conversion to natural gas, ** denotes conversion to natural gas/fuel oil. The naming convention corresponds with the GMO naming convention for alternative resource plans. These plans all use CT additions (the fifth character in the name), but should also be modeled with CC additions as well.*

As shown in Table 5, KCP&L failed to consider retirement and retrofit decisions within the RAP DSM level or give serious consideration to retirement of Sibley 3 independent of Sibley 1 & 2. KCP&L/GMO might object that Table 5 contains a large number of plans to analyze, and that performing that level of analysis is overly burdensome. Because the difference in total cost of varying plans is in the millions (or tens or hundreds of millions) of dollars, the savings would likely surpass the cost of additional model runs and analysis should KCP&L/GMO find an even lower cost plan through more resource planning.

Furthermore, KCP&L and GMO failed to consider wind as a supply-side resource option. Instead of allowing the model to optimize the least-cost level of wind development that would be in compliance of Missouri and Kansas renewable standards, the companies merely selected capacity levels and years of implementation *a priori*. There is no cost-based justification for this decision, nor is there any evidence that KCP&L or GMO performed analysis of various retire-versus-retrofit plans with a different wind build-out scheme, beyond a single sensitivity in Appendix F doubling the RPS contribution.

Choosing Plans to Include in IRP Update

KCP&L and GMO did study a number of plans that were not included in the final IRP Update Total Revenue Requirement (NPVRR) tables.[53] For example, KCP&L's Appendix F contains six additional plans; GMO's Appendix F contains an additional five plans. Some of those plans are more appropriately called sensitivities – the companies tested the NPVRR if a fundamental input assumption were changed (e.g., load loss contingency or a doubling of the renewable standard). However, both the KCP&L and GMO Appendix F documents contain resource plans that are calculated on the base assumptions of the main document *and contain a lower cost than any plan listed in the main document.* KCP&L's Appendix F

[53] Ibid.

contains plan ADBKA, which has an NPVRR of $20,722 million – a full $75 million less than the least cost plan appearing in Table 34 of the KCP&L 2013 IRP Update.[54] GMO's Appendix F contains plan AEFGA, which has an NPVRR equal to $11,691 million; this plan is $12 million less than the least cost plan appearing in GMO's IRP Update's Table 29.[55] Supporting discussion in the respective 2013 IRP Updates indicates KCP&L and GMO believe it is not in the ratepayers' best interest to implement the least-cost plan found by the company. However, publishing the least-cost plan in Appendix F marginalizes low-cost plans that merit significant consideration.

Selecting the Optimal Individual Plan

Code 4 CSR 240-22.010-(2)(B) states that "minimization of the present worth of long-run utility costs [is to be] the primary selection criterion in choosing the preferred resource plan, subject to the constraints in subsection (2)(C)." Both KCP&L and GMO acknowledge that their preferred plans are not those with the minimum present worth of long-run utility costs, but neither KCP&L nor GMO adequately demonstrate that a different resource plan was in the best interest of ratepayers.

KCP&L acknowledges that "the Preferred Plan was not the lowest cost plan from a Net Present Value of Revenue Requirement (NPVRR) perspective as a higher amount of DSM would reduce the NPVRR."[56] The company justifies this sub-optimal plan with a concern about near-term rate shock, ignoring that the Preferred Plan has a larger rate shock than the plan KCP&L identifies as the least-cost plan, albeit five years later (see Table 1).

GMO also acknowledges that "the Preferred Plan was not the lowest cost plan from a Net Present Value of Revenue Requirement (NPVRR) perspective."[57] Despite that the lowest cost plan GMO discovered calls for the retirement of Lake Road 4/6, GMO seeks to continue operating the unit indefinitely as a natural gas and fuel oil fired unit. The company's justification is that it would "only take a small increase in the assumed cost of capacity" to make the least-cost plan more costly. It is reasonable to consider the risk of fluctuating market prices, but GMO's conclusion is not defended with any substantial analysis, nor does it appear that GMO considered that a small *decrease* in the assumed cost of capacity would make its sub-optimal choice even more expensive as compared to the least-cost plan. A more robust analysis would test this conclusion quantitatively, analyzing the cost of capacity in its sensitivity analysis along with assumptions for fuel prices, carbon, and demand level. While adding another variable to the full complement of runs may be burdensome, at the very least demonstrating its impact on NPVRR with a smaller number of runs would be valuable.

[54] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013. Appendix F, page 2.

[55] KCP&L Greater Missouri Operations Company (GMO), "Integrated Resource Plan 2013 Annual Update." June 2013, Appendix F, page 2.

[56] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013. Page 92.

[57] KCP&L Greater Missouri Operations Company (GMO), "Integrated Resource Plan 2013 Annual Update." June 2013. Page 91.

Selecting Co-optimized Plan

Both the KCP&L and GMO 2013 IRP Updates seek to find a co-optimized plan – that is, the best plan should KCP&L and GMO optimize their resources as one set of shared assets. This approach has the potential to save ratepayers money, because a co-optimized plan may allow for better use of resources, e.g., operating lower cost resources more frequently and deferring the construction or acquisition of new generating resources for a year or more. A co-optimized plan must have the same or less cost than that of its component sub-plans.

Each co-optimized plan detailed by KCP&L and GMO can be sub-divided into its distinct KCP&L and GMO parts. Specifically, the DSM level, units selected for retirement, and corresponding retirement years of the combined-company plans listed in the Overview of Combined Company Resource Plans table can be mapped to specific KCP&L and GMO plans.[58] KCP&L and GMO designed the combined company plans this way, stating that "they reflect combinations of several of the lowest NPVRR plans on a stand-alone company basis."[59] For example, combined company plan FIECA is made up of KCP&L's FDHKA and GMO's plan AICGA, the two Preferred Plans. Appropriately, KCP&L/GMO modeled the combined company plans "under the same 27 scenarios analyzed for the standalone companies," including electricity market prices, fuel prices, allowance prices, etc.

Because both the stand-alone KCP&L and the stand-alone GMO plans meet reliability and renewable generation requirements, the combined plan can never cost more than the sum of the stand-alone plans when modeled with the same input assumptions, precisely because it would always be possible for the resource planning exercise to split the resources into the two sub-components (in this case, KCP&L and GMO) and optimize them separately. It is possible, however, that the combined plan allows additional generation construction be deferred as a result of superior cooperation, resulting in combined plan savings as compared to the sum of NPVRRs of the individual components of the plan.

Table 7 compares the combined and stand-alone costs of the five combined company resource plans included in the IRP update found in KCP&L 2013 IRP Update Tables 43 and 44, KCP&L 2013 IRP Update Tables 29 - 34, and GMO 2013 IRP Update Tables 24 - 29.

[58] Kansas City Power & Light Company, "Integrated Resource Plan 2013 Annual Update." June 2013. Page 74, table 43.
[59] Ibid., p. 73.

Table 7: Combined and stand-alone costs of company resource plans

	(A)		(B)		(C)		(D)		(E)	
	FIECA		**FIFCA**		**FIHCA**		**FIICA**		**FRECA**	
	Name	**NPVRR ($mm)**	**Name**	**NPVRR ($mm)**	**Name**	**NPVRR ($mm)**	**Name**	**NPVRR ($mm)**	**Name**	**NPVRR ($mm)**
Combined Plan	FIECA	$32,513	FIFCA	$32,676	FIHCA	$32,516	FIICA	$32,564	FRECA	$32,500
KCP&L Plan	KDHKA	$20,797	FDBKA	$20,799	FDFKA	$20,806	FDDKA	$20,832	FDHKA	$20,797
GMO Plan	AICGA	$11,703	AICGA	$11,703	AICGA	$11,703	AICGA	$11,703	AEFGA	$11,690
Total		$32,500		$32,502		$32,509		$32,535		$32,487
Additional Cost		***$13***		***$174***		***$7***		***$29***		***$13***

Notice that according to KCP&L/GMO, the Combined Plan has additional cost for all five plans studied. KCP&L/GMO have calculated that all five combined plans studied (FIECA, FIFCA, FIHCA, FIICA, and FRECA) have a rather peculiar outcome: implementing the KCP&L and GMO plans side by side cost *more* than implementing them separately—between $7 million (Table 7 (C)) and $174 million more (Table 7 (B)). This suggests a substantial and pervasive problem with the KCP&L and GMO model itself. The combined plan savings should always be zero or positive – there can never be a financial penalty for building two correctly modeled, feasible, compliant plans side-by-side. Yet, according to KCP&L and GMO, every time they are to build two distinct plans side by side, the companies will have to spend millions of dollars more than they would have to spend to build each company's plan separately. While KCP&L and GMO present the combined company plan as an exercise, this error calls into question the veracity of KCP&L and GMO's NPVRR outcomes across the entire IRP update.

Impacts on Fossil Units

Above we identified several issues and concerns with KCP&L and GMO's 2013 IRP Updates. These issues may materially impact the retrofit/retirement NPVRR for all plans, including the Preferred Plans. Here we summarize a number of concerns regarding the Montrose, LaCygne, Sibley, and Lake Road plants.

LaCygne 1 & 2

LaCygne 1 is already the most expensive unit in terms of dispatch cost, with LaCygne 2 not far behind, according to Table 65 of the KCP&L 2013 IRP Update. As long-lived units, these plants are vulnerable to any future regulations on greenhouse gas emissions, including New Source Performance Standards. They are also vulnerable to any increases in the assumed costs of retrofit equipment between now and the time of retrofit, as all of these units are projected to need cooling towers. Because of LaCygne's high dispatch costs, high retrofit costs, declining capacity factors in future years, and KCP&L's energy surplus for many hours of the year, a comprehensive resource analysis using appropriate commodity prices, DSM levels, and environmental compliance scheduling and costs might have found that the retirement of LaCygne 1 was the appropriate future. As noted above, however, KCP&L did not conduct this analysis.

Montrose 1, 2, 3

The KCP&L Preferred Plan maintains Montrose 2 & 3 in service until 2021. Substantial environmental and non-environmental capital expenditures are necessary to allow operations. Gas prices in KCP&L's middle case forecast remain below $[redacted] per MMBtu throughout this period, implying that market prices for energy will also stay low. Similar to LaCygne 1, these units are among KCP&L's higher cost units, and could be effectively replaced with market purchases.[60]

Future environmental regulations are a serious risk for Montrose. If CSAPR is reinstated by the Supreme Court, SO_2 emissions from Montrose will not be in compliance. If compliance with Effluent Limitation

[60] GMO's Sibley 1&2 and Lake Road 4/6 units are also more expensive.

Guidelines or CCR regulations is required at Montrose in 2019 rather than the company's assumed 2021 retirement date, Montrose may not have a legal way of managing its coal ash and ash pond discharges. New Source Performance Standards for existing sources under the Clean Air Act Section 111, to be proposed in 2014 and finalized in 2015, would certainly affect Montrose based on its high CO_2 emissions rate. All three of these scenarios have a substantial possibility of occurring before Montrose station is closed in 2021.

KCP&L proposes changing the source of coal burned at Montrose, but does not disclose if that switch would entail a one-time or ongoing adjustment in fuel costs at Montrose, nor how those fuel cost changes are modeled.

KCP&L itself demonstrated in its modeling that retirement of all three Montrose units in 2016, coupled with the RAP DSM plan, was the lowest cost plan—$75 million less than the plan with less DSM that kept Montrose in service until 2021.

Sibley 1, 2

The GMO Preferred Plan maintains Sibley 1 & 2 in service until 2019. Capital expenditures required for these units are smaller than for Montrose, largely because station-level expenditures benefit Sibley 3, which is modeled as retrofitted and used throughout the study period. Sibley is vulnerable to environmental regulations similar to Montrose, though to a somewhat lesser extent due to the earlier retirement date. That these units are at the same site as a unit that will be maintained in service beyond the study period may allow for site-level averaging of emissions, although SO_2 and CO_2 performance at Sibley 3 are not substantially better than Sibley 1 & 2.

Sibley 3

In the near term, GMO's Preferred Plan treats Sibley 3 similarly to Sibley 1 & 2, with ACI and ESP upgrades planned to comply with MATS. In the long term, the plan includes major upgrades at Sibley 3 to allow the unit to stay in use throughout the study period. These major upgrades include a [redacted] investment in a scrubber and baghouse. Sibley 3 is also at risk for non-compliance for SO_2 emissions under a reinstated version of CSAPR before 2020.

Very few scenarios in GMO's modeling considered *not* retiring this plant, and the lack of information released by the company makes it impossible to determine if new generation or market purchases could adequately and economically replace Sibley 3. The only plan published in the GMO IRP 2013 Update that retired Sibley 3 used a 2016 retirement year, the same year as Sibley 1 & 2. This simultaneous retirement necessitates a substantial investment in new capacity that might be mitigated by retiring Sibley 3 in a different year than the other Sibley units.

Lake Road 4/6

While the conversion of Lake Road 4/6 to gas and oil mitigates some risks, others remain. The need for cooling towers going forward presents a very real risk of increasing costs that must be recovered. We

remain concerned about the high projected levels of operation of this unit after it has been converted, despite the very poor heat rate. The lowest cost GMO plan suggests retirement rather than conversion.

Additional Concerns

The following concerns, identified earlier in this memo, may materially impact decisions related to all of the plants discussed above:

- CO_2 prices: The use of [redacted] as the low case unreasonably discounts the possibility of any future regulations placed on carbon dioxide emissions. Even if Congress cannot agree on a comprehensive climate policy, there is a continued push to limit CO_2 emissions; e.g., through New Source Performance Standards for Existing Sources. The companies' projection of a 25 percent chance of a [redacted] CO_2 price over the next twenty years inappropriately favors high-emission plans when calculating NPVRR.
- Erroneous NPVRR calculations: Combined-company modeling in the IRP updates is more expensive than the relevant individual plans, despite the fact that both stand-alone plans meet individual reliability and renewable generation requirements. That the combined plans are more expensive than the sum of their parts calls into question the NPVRR calculations themselves. By statute NPVRR is the primary metric for plan comparison; the NPVRR calculation must be reliable and well understood.
- Off-system sales revenue: KCP&L's resource plans all produce far more annual energy than required by KCP&L's customers. The IRP updates do not include the breakdown of off-system sales revenue between shareholders and ratepayers, nor do the updates make explicit how this sharing agreement is modeled. The decision to invest ratepayer money in units used primarily for off-system sales is an investment with a level of risk appropriate for shareholders, but perhaps not for ratepayers.
- DSM: KCP&L's decision to use the MEEIA-RAP DSM forecast rather than the RAP forecast has not been adequately justified. RAP DSM results in savings of $75 million. KCP&L argues that the near-term program costs of RAP DSM will result in excessive rate impacts; however, the MEEIA-RAP plan has even higher annual rate impacts by 2020. Moreover, the MEEIA-RAP plan will require capital expenditures at the Montrose plant that the company did not include in the 2016 rate calculation spreadsheet that it presented to Commission Staff comparing the two plans. KCP&L's nearsighted approach will harm KCP&L's ratepayers, who will still be customers in 2020.