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Issue:	Fuel Prices, Fuel Inventory, Fuel Adjustment Clause
Witness:	Jessica L. Tucker
Type of Exhibit:	Direct Testimony
Sponsoring Party:	KCP&L Greater Missouri Operations Company
Case No.:	ER-2018-0146
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MISSOURI PUBLIC SERVICE COMMISSION

CASE NO.: ER-2018-0146

DIRECT TESTIMONY

OF

JESSICA L. TUCKER

ON BEHALF OF

KCP&L GREATER MISSOURI OPERATIONS COMPANY

Kansas City, Missouri
January 2018

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Pursuant To 4 CSR 240-2.135.

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DIRECT TESTIMONY

OF

JESSICA L. TUCKER

Case No. ER-2018-0146

Q: Please state your name and business address.

A: My name is Jessica L. Tucker. My business address is 1200 Main Street, Kansas City, Missouri 64105.

Q: By whom and in what capacity are you employed?

A: I am employed by Kansas City Power & Light Company ("KCP&L") as Senior Manager, Fuels & Emissions.

Q: On whose behalf are you testifying?

A: I am testifying on behalf of KCP&L Greater Missouri Operations Company ("GMO" or the "Company").

Q: What are your primary responsibilities?

A: My primary responsibilities include management and oversight of fuel procurement and logistics (apart from natural gas) as well as coal combustion residual product management and marketing for Company operated generating stations.

Q: Please describe your education, experience and employment history?

A: I graduated Summa Cum Laude from Kansas State University in December 1999 with a Bachelor's of Science degree in Agriculture. I began my career in the energy industry in January 2001 with Aquila as an Associate Hourly Trader. In this role, my efforts were focused on executing short term physical power transactions in the real-time market across various North American Electric Reliability Corporation ("NERC") regions. My employment with KCP&L began in August of 2002 as an Hourly Trader on the real-time desk. From August 2002 to May 2006, my role focused on buying and selling power in the real-time market. In June 2006, I was promoted to Interchange Marketer, which focused my trading activity on day ahead and monthly power transactions. I was also a part of KCP&L's Regional Transmission Organization ("RTO") integration team that prepared the generation dispatching and trading area for participation in the Southwest Power Pool ("SPP") Energy Imbalance Service ("EIS") market, which launched on February 1, 2007. In November 2010, I was promoted to Manager, System Operations (Power). My primary responsibility was to oversee 24x7 Power Control Center functions, which consisted of real time and day ahead power trading, power scheduling, and generation dispatching operations. This not only included overseeing our participation in the SPP market, but compliance with applicable NERC Reliability Standards. I was also responsible for preparing the dispatching and trading group for participation in the SPP Integrated Marketplace ("IM"), which launched on March 1, 2014. In April 2015, I was promoted to Senior Manager, Power System Operations. In July 2017, I transitioned to the position of Senior Manager, Fuels & Emissions within the Fuels group.

Q: **Have you previously testified in a proceeding at the Missouri Public Service Commission ("MPSC" or "Commission") or before any other utility regulatory agency?**

A: I testified before the MPSC in early 2017 for case number ER-2016-0285 on certain topics associated with the SPP Integrated Marketplace.

Q: On what subjects will you be testifying?

A: I will be testifying on fuel-related issues. My testimony serves two purposes. First I am supporting the fuel prices, emission prices, and certain fuel and emission related costs, including fuel inventory, additives, and adders, used to develop the Company's Cost of Service ("COS") calculations. Second, I will address certain fuel and emission allowance related issues as required when a company seeks to continue a fuel adjustment clause ("FAC").

I. FUEL IN COST OF SERVICE

Q: What is the purpose of this portion of your testimony?

A: The purpose of this part of my testimony is to explain how prices for fuel and fuel-related commodities were forecast to project fuel expense for the COS included in the Company's Direct filing and how we plan to true-up those costs later in this proceeding.

A. Fuel Price Forecast

Q: What fuel prices did GMO use to develop its COS?

A: GMO used coal prices projected for June 2018. We used SNL's spot natural gas index prices for July through November 2017 and projected prices, as described below, for December 2017 through June 2018. Oil prices were projected for June 2018, except for Greenwood Station which utilized inventory value as discussed below. Please refer to the Direct Testimony of Company witnesses Ronald A. Klote and Darrin R. Ives regarding the test year and expected true-up period.

Q: Will these projected prices be replaced with actual prices in the June 2018 true-up?

A: Yes. We expect to replace the projected prices for coal, oil, and natural gas with actual prices in the June 2018 true-up.

Q: How did you forecast the coal prices?

A: The June 2018 delivered prices of Powder River Basin ("PRB") coal were forecast as the sum of the mine price and the transportation rate, inclusive of diesel fuel surcharge. Most of the coal contracts under which GMO expects to purchase PRB coal in 2018 specify a fixed mine price that is only subject to adjustment for quality or government imposition such as changes in laws, regulations, or taxes. Those contracts that are not fixed either specify a base price and allow for an adjustment for some form of inflation or are tied to a market index.

Q: How did you develop projections of the freight rates for moving PRB coal?

A: We developed the freight rate projections based on the contractually defined escalation mechanisms. Where those contracts called for an index, we constructed the forecasted index from data forecast by Moody's Analytics.

Q: How did you forecast the natural gas prices used to develop the Company's COS?

A: Natural gas prices for the 12 months from July 2017 through June 2018 were used to develop the cost of natural gas in the COS. Natural gas prices for each month of July through November 2017 were based on the daily average of SNL's Panhandle Eastern Pipe Line ("PEPL") Spot Natural Gas Index. Monthly natural gas prices for December 2017 through June 2018 were based on the October 2, 2017 through December 1, 2017 average NYMEX daily settlement prices for the December 2017 through June 2018 Henry Hub natural gas futures contracts. These monthly Henry Hub prices were then adjusted using the October 2, 2017 through December 1, 2017 average of NYMEX's PEPL monthly basis swap contracts. These basis-adjusted values were used to develop the cost of natural gas in the COS. Again, we expect to true-up to GMO's actual natural gas prices during the course of this proceeding.

Q: How did you forecast the oil prices?

A: Oil prices are handled differently than natural gas because GMO purchases and uses oil differently. Oil is used primarily for flame stability and start-up at the Iatan and Jeffrey coal units. Greenwood and most of Lake Road use oil as a backup to natural gas. Nevada, Lake Road 6, and Lake Road 7 are the only units that use oil as the primary fuel. Except for Greenwood, the price of oil for each station was based on the June 2018 heating oil futures contract. The fuel price forecast for oil at these stations was based on NYMEX's daily settlement prices for October 2, 2017 through December 1, 2017. Greenwood station has considerable storage capability and working inventory onsite, thus the price of oil for Greenwood was based on the month-end inventory value for September 2017. We expect to true-up oil prices during the course of this proceeding.

B. Fuel Additives and Fuel Adders

Q: Are there costs related to fuel that are not included in the price of fuel?

A: Yes. Generally, those costs fall into two categories: "fuel additives" and "fuel adders." Common GMO fuel additives include ammonia, lime, limestone, powder activated carbon ("PAC"), propane, urea, coal dust suppressant, and anti-slagging chemicals which are used to control emissions or improve boiler performance. Less common fuel additives used include hydrated lime and calcium bromide. The fuel adders include unit train lease expense, unit train maintenance, unit train property tax, unit train depreciation, coal dust mitigation, freeze protection, and costs associated with transporting natural gas.

We expect to true-up these forecasted costs to actual costs during the course of this proceeding.

Q: Why does GMO need fuel additives?

A: Fuel additives, which include pollution control reagents, are commodities that are consumed in addition to the fuel either through combustion or chemical reaction. For example, ammonia/urea is added to a stream of flue gas where it reacts with nitrogen oxide (“NO_x”) as the gases pass through a catalyst chamber. Propane is used with urea in the decomposition chamber to convert the urea to ammonia. Lime (or limestone) is added to the flue gas stream in a flue gas desulfurization module to “scrub” sulfur dioxide (“SO_2”). Some units also use PAC as a sorbent for controlling mercury emissions. Anti-slagging additive is used to improve the slag characteristics when coal is burned.

Q: How did you determine the cost of the fuel additives?

A: The cost was determined as the quantity times the price, where the price was the value projected for the June 2018 true-up and the quantity was based on historical usage rates applied to volumes developed by Company witness Burton Crawford. We expect to true-up these costs and usage rates during the course of this proceeding.

Q: How did you determine the cost of the fuel adders?

A: I will address each of the fuel adders in turn, but generally the costs of the various fuel adders were based on a projection of their annual expense.

Q: Please describe the unit train-related expenses.

A: Unit train related expenses included:

- Unit train lease expense (which is separated into two components):
    - Long-term unit train lease expense;

    - Short-term unit train lease expense;
- Ad valorem private car line taxes;
- Railcar depreciation;
- Unit train maintenance expense consisting of:
    - Foreign car repair which is the cost of repairing railcars that are running in service for GMO but are not owned by or under lease to GMO;
    - Shared expenses which are costs for items like Association of American Railroads publications, Railinc applications and services fees, and railcar management software fees that cannot be assigned to an individual car but are "shared" or distributed across the fleet; and
    - Maintenance and repair of GMO's owned and leased railcar fleet.

Q: Are there other coal transportation related adders?

A: Yes. Topper agents are applied to the surface of loaded railcars to mitigate the loss of coal dust while in transit. Side-release agents may be applied to railcars or freeze conditioning agents may be applied to coal to minimize the amount of carry-back coal during cold weather. These agents are applied by the coal companies during the loading process at the mines. They are to improve the safety of railroad operations. In addition, body spray is added at the mines in order reduce coal dust during the unloading process.

Q: What are the costs associated with transporting natural gas?

A: The costs for transporting natural gas fall into two categories. The first category is those costs which are relatively fixed. That includes reservation or demand charges, meter charges, and access charges. The second category of transportation costs is those costs which are volumetric. They include: commodity costs, commodity balancing fees, transportation charges, mileage charges, fuel and loss reimbursement, Federal Energy Regulatory Commission ("FERC") annual charge adjustment, storage fees, and parking fees.

Q: How did you determine the costs associated with transporting natural gas?

A: The cost of transporting natural gas was separated into its various components. For the reservation or demand charges, the pipeline's current rates were used to calculate the demand or reservation charges we expect to pay for the 12 months of July 2017 through June 2018. For the variable costs, the pipeline's and local distribution company's current rates were applied to the volumes developed by Company witness Burton Crawford. Those various components were then aggregated into either commodity based charges or reservation charges. We plan to update these costs at true-up.

C. <u>Emission Allowance Cost</u>

Q: How did you forecast emission allowance prices?

A: Emission allowance prices used for dispatch and market prices in our models were forecast as the average price published in Argus Air Daily for November 21, 2017 through December 1, 2017. For expense, we used our test year book value for allowances. We expect to true-up emission allowance costs.

Q: Do you expect to replace all of these fuel, fuel-related, and emission allowance price or cost estimates with actual prices or costs that are known at true-up?

A: Yes.

D. Fuel Inventory

Q: What is the purpose of this portion of your testimony?

A: The purpose of this portion of my testimony is to explain the process by which GMO determines the amount of fuel inventory to keep on hand and how the level of fuel inventory impacts GMO's COS.

Q: Why does GMO hold fuel inventory?

A: GMO holds fuel inventory because of the uncertainty inherent in both fuel requirements and fuel deliveries. Both fuel requirements and deliveries can be impacted by weather. Fuel requirements can also be impacted by unit availability—both the availability of the unit holding the inventory and the availability of other units in the GMO or Southwest Power Pool ("SPP") system. Fuel deliveries can also be impacted by breakdowns at a mine or in the transportation system. Events like the 1993 and 2011 Missouri River floods, the 2005 joint line derailments in the Southern Powder River Basin ("SPRB"), and more recently the railroad service issue that significantly reduced the delivery of coal to GMO's plants from March 2013 through September 2014. Fuel inventories are insurance against events that interrupt the delivery of fuel or unexpectedly increase the demand for fuel. All of these factors vary randomly. Fuel inventories act like a "shock absorber" when fuel deliveries do not exactly match fuel requirements, and enable GMO to continue generating electricity reliably between fuel shipments.

Q: How does GMO manage its fuel inventory?

A: Managing fuel inventory involves ordering fuel, receiving fuel into inventory, and burning fuel out of inventory. GMO controls inventory levels primarily through its fuel ordering policy. That is, GMO sets fuel inventory targets and then orders fuel to achieve those targets. We define inventory targets as the inventory level that we aim to maintain on average during “normal” times.

In addition to fuel ordering policy, plant dispatch policy can be used to control inventory, however GMO does not solely control the dispatch of its units. Effective March 1, 2014, NERC certified SPP as the Balancing Authority (“BA”) for the SPP region. As the BA and RTO operating an integrated marketplace for electric power, SPP optimizes the generation resources for its members. To do that, it uses a regional security constrained, offer-based economic algorithm to dispatch the members’ units. If a plant is low on fuel, SPP might reduce the operation of that plant to conserve inventory. This could require other plants under SPP’s dispatch to operate more and to use more fuel than they normally would. One can view this as a transfer of fuel “by wire” to the plant with low inventory. To determine the best inventory level, GMO balances the cost of holding fuel against the expected cost of running out of fuel.

Q: What are the costs associated with holding fuel inventory?

A: Holding costs reflect cost of capital and operating costs. Holding inventories require an investment in working capital, which require providing investors and lenders those returns that meet their expectations. It also includes the income taxes associated with providing the cost of capital. The operating costs of holding inventory include costs other than the cost of the capital tied up in the inventories. For example, we treat property tax as an operating cost.

Q: Please explain what you mean by the expected cost of running out of fuel.

A: In this context, expected cost means the probability of running out of fuel times the cost of running out of fuel. The cost of running out of fuel at a power plant is the additional cost incurred when a more expensive resource must be dispatched to serve the load that would have otherwise been served by the plant if it had the fuel to do so. If there are not enough resources available to serve load, there could be a failure to meet customer demand for electricity.

Q: How does GMO determine the best inventory level, *i.e.*, the level that balances the cost of holding fuel against the expected cost of running out?

A: Except for Jeffrey Energy Center, GMO uses the Electric Power Research Institute's Utility Fuel Inventory Model ("UFIM") to identify those inventory levels with the lowest expected total cost. That is, we minimize the sum of inventory holding costs and the expected cost of running out of fuel. The inventory level for Jeffrey Energy Center is determined by Westar, who is the owner-operator of the station.

Q: How does UFIM work?

A: UFIM uses a Markov decision model to iterate through various order policies to determine the optimal order policy. It identifies an inventory target as a concise way to express the following fuel ordering policy:

Current Month Order = (Inventory Target – Current Inventory)
+ Expected Burn this Month
+ Expected Supply Shortfall

That is, UFIM's target assumes all fuel on hand is available to meet expected burn. "Basemat" is added to the available target developed with UFIM to determine GMO's inventory target. Generally, and in the rest of my testimony, references to inventory targets mean the sum of fuel readily available to meet burn plus basemat.

Q: What is basemat?

A: Basemat is the quantity of coal occupying the bottom 18 inches of our coal stockpile footprint. It may or may not be useable due to contamination from water, soil, clay, or fill material on which the coal is placed. Because of this uncertainty about the quality of the coal, basemat is not considered readily available. However, because it is dynamic and it can be burned (although with difficulty), it is not written off or considered sunk. To determine basemat under our compacted stockpiles, we only consider the area of a pile that is thicker than 9 inches. The basemat values presented here for all inventory locations are premised on work performed by MIKON Corporation, a consulting engineering firm that specializes in coal stockpile inventories and related services for utilities nationwide.

Q: How does the UFIM model work?

A: The fundamental purpose of UFIM is to develop least-cost ordering policies, *i.e.*, targets, for fuel inventory. UFIM does this by dividing time into "normal" periods and "disruption" periods where a disruption is an event of limited duration with an uncertain occurrence. It develops inventory targets for normal times and disruption management policies. The inventory target that UFIM develops is that level of inventory that balances the cost of holding inventory with the cost of running out of fuel.

Q: What are the primary inputs to UFIM?

A: The key inputs are: holding costs, fuel supply cost curves, costs of running out of fuel, fuel requirement distributions, "normal" supply uncertainty distributions, and disruption characteristics.

Q: What are the holding costs you used to develop coal inventory levels for this case?

A: GMO based the holding costs it used to develop fuel inventory levels for this case on the cost of capital as of May 31, 2017.

Q: What do you mean by "fuel supply cost curves"?

A: A fuel supply cost curve recognizes that the delivered cost of fuel may vary depending on the quantity of fuel purchased in a given month. For example, our fuel supply cost curves for PRB coal recognize that when monthly purchases exceed normal levels, we may need to lease additional train sets. Those lease costs cause the marginal cost of fuel above normal levels to be slightly higher than the normal cost of fuel.

Q: What did you use for the normal cost of fuel?

A: The normal fuel prices underlying all of the fuel supply cost curves were the average quarterly projected price forecasts for 2018.

Q: What did you use for the costs of running out of fuel?

A: There are several components to the cost of running out of fuel. The first cost is the opportunity cost of forgone non-firm off-system power sales. We developed that cost by constructing a price duration curve derived from the distribution of monthly non-firm off-system megawatt-hour transactions for January 2015 through December 2017. We supplemented those points with estimates for purchasing additional energy and using oil-fired generation. The last point on the price duration curve is the socio-economic cost of failing to meet load for which we used GMO's assumed cost for unserved load. These price duration curves are referred to in UFIM as burn reduction cost curves. Burn reduction cost curves can vary by inventory, location, and disruption.

Q: What fuel requirement distributions did you use?

A: Except for Lake Road, we used distributions based on projected fuel requirements. Lake Road utilized historical data.

Q: What do you mean by "normal" supply uncertainty?

A: We normally experience random variations between fuel burned and fuel received in any given month. These supply shortfalls or overages are assumed to be independent from period to period and are not expected to significantly affect inventory policy. To determine these normal variations, we developed probability distributions of receipt uncertainty based on the difference between historical burn and receipts.

Q: What are disruptions?

A: A disruption is any change in circumstances that persists for a finite duration and significantly affects inventory policy. A supply disruption might entail a complete cut-off of fuel deliveries, a reduction in deliveries, or an increase in the variability of receipts. A demand disruption might consist of an increase in expected burn or an increase in the variability of burn. Other disruptions might involve temporary increases in the cost of fuel or the cost of replacement power. Different disruptions have different probabilities of occurring and different expected durations.

Q: What disruptions did GMO use in developing its inventory targets?

A: GMO recognized three types of disruptions in development of its inventory targets:

- Railroad or mine capacity constraints;
- Fuel yard failures; and
- Major floods.

Q: Please explain what you mean by disruptions related to railroad or mine capacity constraints.

A: Supply capacity is the ultimate quantity of coal that can be produced, loaded, and shipped out of the PRB in a given time period. Constraints to supply capacity can come from either the railroads or the mines, but regardless of which of these is the constraint source, the quantity of coal that can be delivered is restricted. A constrained supply caused by railroad capacity constraints can come from an inability of the railroad to ship a greater volume of coal from the PRB. A scenario such as this can arise from not having enough slack capacity to place more trains in-service. It can also come from an infrastructure failure such as the May 2005 derailments on the joint line in the SPRB. Beginning in the winter of 2013-2014, there was a serious decline in rail service across the U.S. rail network particularly in the upper Midwest region. That degradation in service which persisted into fall 2014 is another example of the disruptions that we refer to as a railroad or mine capacity constraint.

A variety of mine issues can constrain supply, such as there not being enough available load-outs, not enough space to stage empty trains, reaching the productive limits of equipment such as shovels, draglines, conveyors, and trucks, or the mine reaching the production limits specified in its environmental quality permits. We lump the mine and railroad capacity constraints together because they can occur simultaneously and one may mask the other.

Q: Please explain what you mean by disruptions related to fuel yard failures.

A: GMO and other utilities have experienced major failures in the equipment used to receive fuel. As used here, "disruption" is designed to cover the variety of circumstances that could result in a significant constraint on a plant's ability to receive fuel. For example, in 1986 KCP&L's Hawthorn station lost an unloading conveyor in a fire caused by coal dust combustion. That outage materially limited fuel deliveries for 4 months.

Q: Please explain what you mean by "major flood" disruptions.

A: Since 1993, the Missouri River has had two major floods. This disruption was modeled after those floods. Floods can lengthen railroad cycle times as the railroads reroute trains and curtail the deliveries of coal to generating stations.

Q: What are the coal inventory targets used in this case?

A: The coal inventory targets resulting from application of UFIM and their associated value for incorporation into rate base are shown in the attached Schedule JLT-1 **(Confidential)** and are the values used to determine adjustment RB-74, "Adjust Fossil Fuel Inventories to required levels" included in Schedule RAK-2 of the Direct Testimony of GMO witness Ronald A. Klote. Since these coal inventory targets are a function of fuel prices, cost of capital and other factors that may be adjusted in the course of this proceeding, we would expect to adjust the coal inventory targets as necessary. As noted above, the inventory target for Jeffrey Energy Center is determined by Westar.

Q: How were the inventory values for fuel additives determined?

A: Inventory values for ammonia, anti-slagging chemical, calcium bromide, coal dust suppressant, hydrated lime, limestone, PAC, propane, and urea were calculated as the average month-end quantity on hand for the 12-month period from December 2016 through November 2017 multiplied by the projected June 2018 per unit value. The inventory values for these additives are shown in Schedule JLT-1 **(Confidential)**.

Q: How were the inventory values for oil determined?

A: Inventory values for oil were calculated as the average month-end quantity on hand for the 12-month period from December 2016 through November 2017 multiplied by the June 2018 per unit value, except for Greenwood in which the September 2017 month end inventory price per unit was used as explained above. The inventory values for oil are shown in Schedule JLT-1 **(Confidential)** and were included in the derivation of adjustment RB-74.

Q: Will you true-up the fuel additives and oil inventory volumes and values?

A: Yes. We expect to calculate new 12-month averages representing July 2017 through June 2018 and use June 2018 prices to calculate these inventory values at true-up.

II. FUEL ADJUSTMENT CLAUSE

A. Factors Considered

Q: Commission Rule 4 CSR 240-20.090(2)(C) identifies factors the Commission will consider in determining which cost components to include in a rate adjustment mechanism. Which of those factors will you address?

A: I will address those factors related to the market impact on fuel costs. Specifically, I will discuss:

1. fuel market volatility and how market volatility impacts fuel costs;
2. the substantial market impact on fuel costs; and
3. the market impact on fuel costs is beyond the control of management.

1. Fuel Market Volatility and How Market Volatility Impacts Fuel Costs

Q: How do changes in fuel markets affect GMO's COS?

A: Changes in fuel markets affect GMO's COS in multiple ways. The first and most obvious impact is the effect of changes in fuel prices and their direct effect on fuel expense. Second, is the effect of changing fuel prices on the cost of electricity production, thus impacting the cost of electricity bought and sold in the SPP market.

Q: How have fuel prices changed over the past few years?

A: Schedule JLT-2 shows how fuel prices have changed dramatically over the past 7+ years. Schedule JLT-2 shows how from January 2010 through December 2017 the price for natural gas has ranged from \$1.64/million British thermal units ("MMBtu") to \$6.15. While not as dramatic as natural gas, PRB coal has also demonstrated significant price changes in that same period. It has ranged from \$0.40/MMBtu to \$0.86/MMBtu. (Please note, natural gas uses the scale on the left while coal uses the scale on the right.)

Q: Have natural gas prices continued to demonstrate significant volatility since dropping from February 2014's high of \$6.15/MMBtu?

A: Yes. If we define volatility as the annualized standard deviation of the percent change in prices, we see that while the level of natural gas prices has dropped, the 44% volatility for June 2015 through December 2017 is equal to the 44% volatility for January 2010 through May 2015.

Q: How have PRB coal prices, like natural gas, demonstrated significant volatility in just the past few years?

A: Prompt month prices for PRB coal have experienced changes similar to natural gas. In June 2012, PRB coal prices were \$0.40/MMBtu. In less than two years, the price had almost doubled to $0.76/MMBtu. Since then prices have decreased to a low of $0.48/MMBtu in May 2016 before rebounding to end November 2017 at $0.69/MMBtu.

Q: **Why are these historical fluctuations in daily market prices for fuel the expressions of volatility the Commission needs to consider when determining which cost components to include in a rate adjustment mechanism?**

A: Historical fluctuations should be considered because they are the prices the Company faces when it looks to buy fuel. Only after the Company makes a purchase commitment or, if it were to place a hedge, is that volatility mitigated. Moreover, that mitigated price may be quite different than the fuel price embedded in the cost of service calculations upon which the Company's rates are built.

Q: What do you mean by saying the Company faces daily market prices when it looks to buy fuel?

A: Let's start with natural gas. GMO makes purchases on the day it needs the gas, or very close to it. After the Company receives a dispatch instruction for one of its natural gas units, we solicit offers for natural gas to support that run. These types of gas purchases are subject to intra-day volatility, in addition to the daily volatility shown by the daily settlement prices in Schedule JLT-2.

We buy oil much like a consumer buys gas for a car. That is, when the tank is low, we refill it. Like with a car, there are times when you have some flexibility about when to refill your tank and there are times when you do not have such freedom. In either case, you do not know whether the price will go up or down after you make your purchase. Even if you did, you may not have the flexibility to wait for the price to go down. Both price and timing are a function of the movement in market prices.

Coal is somewhat like my oil example above. As a coal buyer, we face the daily volatility shown in Schedule JLT-2. After we sign a contract that fixes the price, we mitigate that volatility for our customers. We face that market volatility for all of our fuel requirements that are not already locked in to fixed price contracts.

Q: What are the main volumes that are exposed to market volatility?

A: Regarding coal, as of December 31, 2017, **[redacted]** of GMO's expected coal burn from 2018 through 2021 was under contract. In other words, GMO is exposed to volatile market prices for **[redacted]** of its expected coal requirements for the period rates from this proceeding may be effective.

Regarding natural gas and oil, GMO does not hedge natural gas or oil thus all of the Company's expected natural gas & oil usage is exposed to market volatility.

2. Market Impact on Fuel Costs is Substantial

Q: How might that market price volatility affect GMO?

A: As noted above, because **[redacted]** of GMO's expected coal burn is not under contract over the four-year period of 2018 through 2021 GMO, is exposed to coal price risk. Besides that coal market risk, GMO's rail contracts expire at the end of 2018. With transportation costs representing half of the delivered cost of coal, that is another major exposure to prices which is beyond the Company's control. Additionally, as previously noted, the Company is exposed to adverse natural gas and oil commodity price risk for 2018 through 2021.

Q: Why did you look at the four-year period of 2018 through 2021?

A: Section 386.266.4(3) requires a utility with a FAC to file a general rate case with the effective date of new rates to be no later than four years after the effective date of the

Commission order implementing the FAC. Given that we expect the effective date of the Commission order for this case to be late November 2018, the four-year horizon would run from December 2018 into 2022. Fuel requirements for calendar years 2018 through 2021 are reasonably representative of that period.

3. Fuel Costs Are Beyond the Control of Management

Q: Can GMO control the fundamentals that drive the fuel markets?

A: No, GMO cannot control the market fundamentals for fuel. Perhaps an easy and somewhat objective way to answer that question is to look at what portion of the market GMO represents. GMO's projected coal burn for 2018 represents roughly 0.7% of the projected PRB production or about 0.3% of total U.S. coal production. The Company's natural gas usage is significantly less than 0.01% of U.S. natural gas production. Both of these markets are driven by factors other than GMO's market share.

Q: What are the fundamental drivers for the fuel markets?

A: The fundamental drivers for the short-term market are different than the key drivers for the long-term market. Short-term markets reflect the convergence of changes in demand expectations and the fundamentals of readily available or stored energy. Some of the short-term fundamental drivers would include events such as storms that might disrupt immediate delivery of the energy. Temperature spikes or drops can also cause short-term imbalances between the demand and the immediately available supply. These weather induced imbalances can cause significant price spikes especially for natural gas and electricity due to their limited storage.

Long-term markets reflect the convergence of expectations of future potential supply including the cost to produce that supply and future potential demand. For example, the development of shale based natural gas resources has greatly increased the expected supply of natural gas. That in turn has depressed the long-term outlook for natural gas prices. Because most natural gas consumers have inelastic demands but do not have storage, the short-term fundamentals will still drive significant market uncertainty, just at a lower base level than expected before the development of shale gas.

B. 4 CSR 240-3.161(3) Requirements

Q: When an electric utility files a general rate proceeding following the general rate proceeding that established its rate adjustment mechanism ("RAM") and requests that its RAM be continued or modified, Commission rule 4 CSR 240-3.161(3) requires the electric utility file certain supporting information as part of, or in addition to, its direct testimony. Which of those requirements will you address?

A: I will address item (K) and explain the rate volatility mitigation features in GMO's FAC. I will also address the parts of item (S) focused on emission allowance costs or sales margins included in the FAC and allowance purchases and sales. The Direct Testimony of Company witness Burton Crawford will address the other part of item (S) regarding forecasted environmental investments.

1. Item (K): Mitigating Fuel Market Risk (Price Volatility)

Q: Does GMO have a program or strategy for managing the price risk of coal?

A: Yes, it does.

Q: Which stations does GMO's coal price risk management program apply to?

A: Lake Road and Sibley. KCP&L uses a similar program to manage the purchases of coal for Iatan. As the owner-operator, Westar manages the coal procurement for Jeffrey Energy Center.

Q: Please describe how GMO mitigates coal price risk.

A: In the PRB coal market, the primary means of managing price risk is through a portfolio of forward contracts. Generally, GMO has been following a strategy of laddering into a portfolio of forward contracts for PRB coal. Laddering is an investment technique of purchasing multiple products with different maturity dates. GMO's "laddered" portfolio consists of forward contracts with staggered terms so that a portion of the portfolio will roll over each year. GMO may modify that strategy when it anticipates market price increases. The Company may either commit for more coal before the increase, or delay committing until after the increase has waned.

Q: What does that laddered portfolio look like?

A: Inclusive of Jeffrey Energy Center, by the end of December 2017, GMO had contractual commitments for the **[redacted]** of its expected coal requirements for 2018 and **[redacted]** of its expected coal requirements for 2019. It also had commitments for **[redacted]** of its expected coal requirements for 2020, however **[redacted]** for 2021.

Q: Does GMO update its fuel procurement and planning process to adjust for changes in the marketplace?

A: Yes. GMO routinely reviews fuel market conditions and market drivers. We monitor market data, industry publications and consultant reports in an effort to avoid high prices and to take advantage of lower prices.

Q: How has this strategy performed for GMO?

A: Over the last eight years (2010-2017), this strategy has helped GMO mitigate much of the coal market volatility impact. If we calculate volatility as the annualized standard deviation of percent change in price, the volatility of the average annual prices GMO paid was about 5%. That is significantly less than the 24% volatility of the annual average prices developed from the prompt calendar year strip.

2. Item (S): Emission Allowance Purchases and Sales

Q: What is the purpose of this portion of your testimony?

A: I will discuss the legal requirements for emission allowances and explain GMO's current strategy for meeting those requirements.

Q: What emissions are GMO required to offset with allowances?

A: GMO is required to offset SO_2 and NO_x emissions with allowances issued by the Environmental Protection Agency ("EPA").

Q: What rules or regulations established the need for emission allowances?

A: Title IV of the 1990 Clean Air Act established the allowance market system known today as the ARP. Title IV set a cap on total SO_2 emissions and aimed to reduce overall emissions to 50% of 1980 levels. In 2011, the EPA finalized the Cross-State Air Pollution Rule ("CSAPR"). Title IV allowances cannot be used to comply with the CSAPR. Sources covered by the ARP must still use Title IV allowances to comply with that program.

The CSAPR is an allowance trading program and any unit specific shortages can be addressed by trading allowances within or outside GMO's system. We anticipate both Title IV and CSAPR allowances will be readily available because of the significant reduction in coal generation since the original rule driven by the impact of the natural gas market and unit retirements.

Q: Will GMO need to purchase emission allowances?

A: Yes. We currently expect GMO may need to purchase both annual and seasonal NO_x allowances to comply with the CSAPR.

Q: Will emissions allowance costs or sales margins be included in the FAC?

A: Yes.

Q: Does that conclude your testimony?

A: Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of KCP&L Greater Missouri Operations Company's Request for Authority to Implement A General Rate Increase for Electric Service	))))	Case No. ER-2018-0146

AFFIDAVIT OF JESSICA TUCKER

STATE OF MISSOURI)
) ss
COUNTY OF JACKSON)

Jessica Tucker, being first duly sworn on his oath, states:

1. My name is Jessica Tucker. I work in Kansas City, Missouri, and I am employed by Kansas City Power & Light Company as Senior Manager Fuels and Emissions.

2. Attached hereto and made a part hereof for all purposes is my Direct Testimony on behalf of KCP&L Greater Missouri Operations Company consisting of twenty-five (25) pages, having been prepared in written form for introduction into evidence in the above-captioned docket.

3. I have knowledge of the matters set forth therein. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded, including any attachments thereto, are true and accurate to the best of my knowledge, information and belief.

Jessica Tucker

Subscribed and sworn before me this 29th day of January 2018.

Notary Public

My commission expires: 4/26/2021

ANTHONY R WESTENKIRCHNER
Notary Public, Notary Seal
State of Missouri
Platte County
Commission # 17279952
My Commission Expires April 26, 2021

SCHEDULE JLT-1

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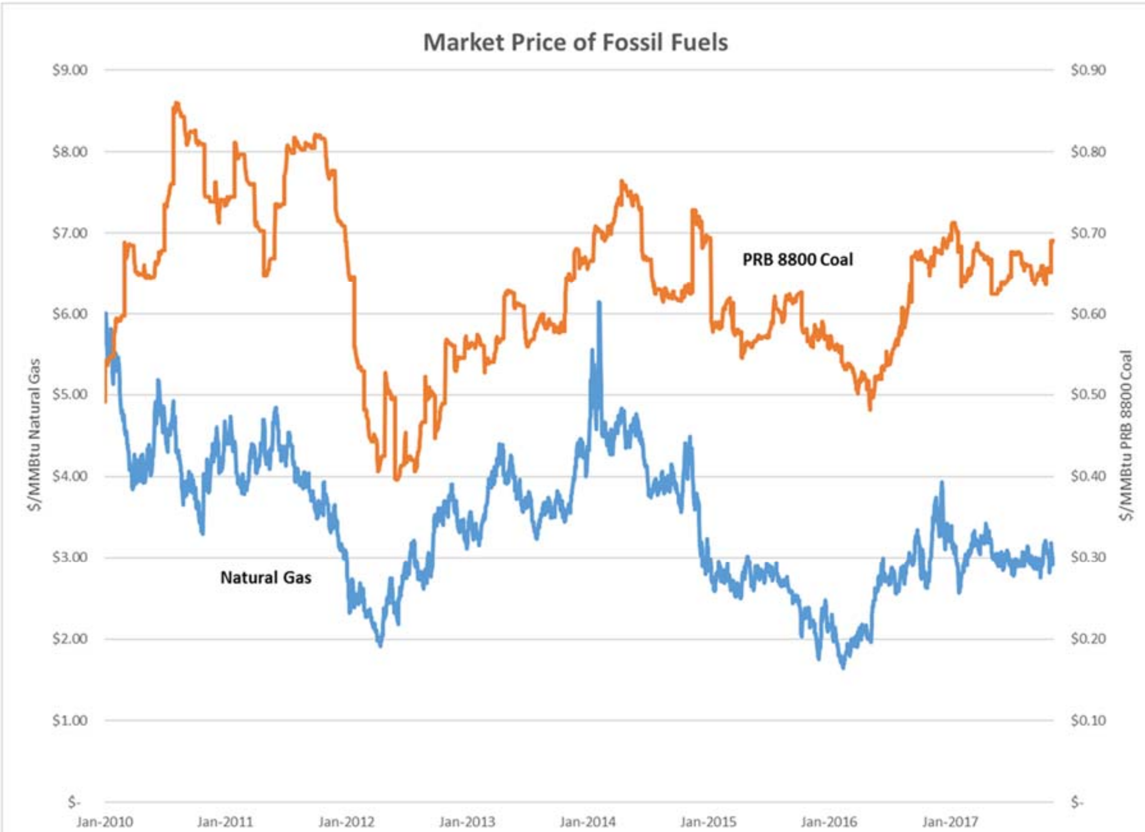
Market Price of Fossil Fuels
$9.00
$8.00
$7.00
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
$-
$/MMBtu Natural Gas
$0.90
$0.80
$0.70
$0.60
$0.50
$0.40
$0.30
$0.20
$0.10
$-
$/MMBtu PRB 8800 Coal
PRB 8800 Coal
Natural Gas
Jan-2010
Jan-2011
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017