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Issue: Fuel Prices, Fuel Inventory, Fuel Adjustment Clause
Witness: Wm. Edward Blunk
Type of Exhibit: Direct Testimony
Sponsoring Party: KCP&L Greater Missouri Operations Company
Case No.: ER-2016-0156
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MISSOURI PUBLIC SERVICE COMMISSION

CASE NO.: ER-2016-0156

DIRECT TESTIMONY

OF

WM. EDWARD BLUNK

ON BEHALF OF

KCP&L GREATER MISSOURI OPERATIONS COMPANY

Kansas City, Missouri
February 2016

"[redacted]****" Designates "Highly Confidential" Information Has Been Removed.**
Certain Schedules Attached To This Testimony Designated "Highly Confidential" Have Been Removed
Pursuant To 4 CSR 240-2.135.

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DIRECT TESTIMONY

OF

WM. EDWARD BLUNK

Case No. ER-2016-0156

Q: Please state your name and business address.

A: My name is Wm. Edward Blunk. 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 Generation Planning Manager.

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 responsibilities?

A: My primary responsibilities include facilitating the development and implementation of strategies for managing procurement and market related risks associated with fuel or energy.

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

A: In 1978, I was awarded the degree of Bachelor of Science in Agriculture cum laude by the University of Missouri at Columbia, where I was an Honors Scholar in Agricultural Economics. In 1980, I was awarded the Master of Business Administration degree by the University of Missouri at Columbia. Since then I have completed additional graduate coursework in forecasting theory and applications at the University of Missouri in Kansas

City. In addition to those academic credentials, the Global Association of Risk Professionals has certified me as an Energy Risk Professional.

Before graduating from the University of Missouri, I joined the John Deere Company from 1977 through 1981 and performed various marketing, marketing research, and dealer management tasks. In 1981, I joined KCP&L as Transportation/Special Projects Analyst. My responsibilities included fuel price forecasting, fuel planning and other analyses relevant to negotiation and/or litigation with railroads and coal companies. I was promoted to the position of Supervisor, Fuel Planning in 1984. In 2007, my position was upgraded to Manager, Fuel Planning. In 2009 my position was changed to Supply Planning Manager. In 2013, it was changed to Generation Planning Manager. While in these positions I have been responsible for developing risk management and hedging programs.

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 have previously testified before both the MPSC and the Kansas Corporation Commission in multiple cases on multiple issues including fuel prices, forecast prices for fuel and emission allowances, strategies for managing fuel price risk, hedging, fuel-related costs, fuel inventory, and the management of emission allowances.

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, 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 and oil prices projected for July 2016. We used actual natural gas prices for August through November 2015 and projected prices, as described below, for December 2015 through July 2016. 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 July 2016 true-up?

A: Yes. We expect to replace the projected prices for coal, oil, and natural gas with actual prices in the July 2016 true-up.

Q: How did you forecast the coal prices?

A: The July 2016 delivered prices of Powder River Basin ("PRB") coal were forecast as the sum of the mine price and the transportation rate. Most of the coal contracts under which GMO expects to purchase PRB coal in 2016 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 construct their price from 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 August 2015 through July 2016 were used to develop the cost of natural gas in the COS. Natural gas prices for each month of August through November 2015 were based on the daily average of SNL's Panhandle Eastern Pipe Line ("PEPL") Spot Natural Gas Index. Monthly natural gas prices for December 2015 through July 2016 were based on the October 27 through November 3, 2015 average NYMEX daily settlement prices for the December 2015 through July 2016 Henry Hub natural gas futures contracts. These monthly Henry Hub prices were then adjusted using the October 27 through November 3, 2015 average of ClearPort's PEPL monthly basis 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 Lake Road use oil as a backup to natural gas. Nevada is the only unit that uses oil as its primary fuel. Because all three uses of oil are typically low volume and sporadic making it difficult to predict when GMO will next purchase oil, we used the September 2015 inventory book value of oil at each station.

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." Fuel additives include ammonia, lime, limestone, powder activated carbon ("PAC"), and urea which are used to control emissions. The fuel adders include unit train lease expense, unit train maintenance, unit train property tax, unit train depreciation, coal dust mitigation, freeze protection, costs associated with transporting natural gas, and hedging costs for both natural gas as fuel and as cross hedges for power purchases. We expect to true-up these costs to actual 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 is added to a stream of flue gas where it reacts with nitrogen oxide ("NO_x") as the gases pass through a catalyst chamber. 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.

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 July 2016 true-up and the quantity was based on projected usage rates. 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 cost 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 a long-term lease to GMO;
    - Shared expenses which are costs for items like Association of American Railroads publications, Universal Machine Language Equipment Register 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 railcar fleet.

Q: How did you determine the natural gas hedging costs?

A: The hedging costs reflect the sum of the option premiums, realized and unrealized gains and losses on GMO's portfolio for the period August 2015 through July 2016 as known or expected based on market close of September 30, 2015.

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: I separated the cost of transporting natural gas into its various components. For the reservation or demand charges I used the actual demand or reservation charges we paid for the 12 months of October 2014 through September 2015. For the variable costs I applied the average variable rate we paid for gas shipped between October 2014 through September 2015 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. Emission Allowance Cost

Q: How did you forecast emission allowance prices?

A: GMO's emission allowance cost for the test period was about $300,000. We used that historical value for our projection. We expect to true-up emission allowance costs.

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

A: Yes.

D. <u>Fuel Inventory</u>

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 GMO's 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 also act like a "shock absorber" when fuel deliveries do not exactly match fuel requirements. They are the working stock that enables 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, we set fuel inventory targets and then order 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 inventories. For example, GMO might reduce the operation of a plant that is low on fuel to conserve inventory. Of course, this might require other plants in the system to operate more and to use more fuel than they normally would, or it might require either curtailing generation or purchasing power in the market. 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 company must use replacement power instead of operating the plant. On the other hand, if the plant runs out of fuel and replacement power is unavailable, a company could fail 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: 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.

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 nine inches. The area of the coal pile that covers either a hopper or concrete slab is not included in the calculation of basemat. 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 proposed by the Company.

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 was the normal cost of fuel?

A: The normal fuel prices underlying all of the fuel supply cost curves were prices forecast for 2016 coal deliveries.

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 October 2012 through September 2015. 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: For all units we used distributions based on projected fuel requirements for 2016.

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, in particular 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 four 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 WEB-1 **(Highly 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.

Q: Company witness Tim Rush explained how upcoming environmental regulations lead the Company to decide to cease burning coal in Lake Road Boiler 6 effective April 15, 2016. How has that change affected your coal inventory values?

A: Currently, Boiler 6 which supports Turbine-Generator Unit 4 is capable of full load on coal and/or natural gas, with coal being the primary fuel. In April we will stop burning coal in Boiler 6 and change to natural gas as our primary fuel with fuel oil as the back-up fuel. Boiler 5 which supports the steam system and Turbine-Generator Units 1, 2, and 3 will continue to burn coal. Boiler 5's coal requirements are only a fraction of what Boiler 6 typically consumed. Consequently, the level of coal inventory needed for Lake Road will drop substantially. Because the coal for Boiler 5 can serve both electric and steam customers, we have apportioned the coal inventory required for Boiler 5 between steam and electric services.

Q: How were the inventory values for ammonia, lime, limestone, PAC, propane, and urea determined?

A: Inventory values for ammonia, lime, limestone, PAC, propane, and urea were calculated as the average month-end quantity on hand for the 13-month period from September 2014 through September 2015 multiplied by the projected July 2016 per unit value. The inventory values for ammonia, lime, limestone, PAC and urea are shown in Schedule WEB-1 **(Highly Confidential)** and were included in the derivation of adjustment RB-74.

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 13-month period from September 2014 through September 2015 multiplied by the October per unit value. The inventory values for oil are shown in Schedule WEB-1 **(Highly 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 13-month averages representing July 2015 through July 2016 and use July 2016 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 market impact on fuel costs is substantial; 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, "Although many factors determine electricity prices, gas cost is the primary driver for the trend in electricity prices over time."[1]

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

A: Schedule WEB-2 shows how fuel prices have changed dramatically over the past several years. Schedule WEB-2 shows how from January 2010 through December 2015 the price for natural gas has ranged from $1.91/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 $0.39/MMBtu to $0.86/MMBtu.

[1] *State of the Market Report, Winter 2015, December 2014 – February 2015*, SPP Market Monitoring Unit, March 24, 2015, p. 2.

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 49% volatility for December 2014 through November 2015 is very close to the 50% volatility for January 2009 through November 2015 and the 57% for January 2000 through November 2015.

This volatility is a measure of variation in prices from one period to another. When combined with the z-Score for a given probability it can be used to estimate the maximum price movement for that given confidence interval. For example, assuming a normal distribution, the 95% confidence level has a z-score of 1.645. Multiplying the 1.645 z-score times the 49% volatility then times the average November 2015 price of $2.28 yields an estimated maximum price movement of $1.84. Applying that $1.84/MMBtu to the estimated **[redacted]** of natural gas equivalent for GMO's expected natural gas and on-peak purchased power requirements for 2017 yields about **[redacted]** of risk for 2017.

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. Since then prices have with a few hiccups trended down to end 2015 at $0.57/MMBtu.

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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 affect the Company's procurement decisions and the prices it pays for these fuels. Regarding natural gas, GMO makes purchases on the day it needs the gas. After the Company receives a dispatch instruction for one of its natural gas units, we solicit offers for natural gas. This "same day" gas is subject to intra-day volatility, in addition to the daily volatility shown by the daily settlement prices in my Schedule WEB-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 my Schedule WEB-2. It is 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: Can GMO manage this volatility through its hedging program?

A: Not completely. As discussed below, GMO will manage some of the shorter term volatility in coal through its and KCP&L's practice of laddering into a portfolio of coal contracts. Such hedging programs dampen the volatility of fuel prices in the short-term.

They do not protect against long-term market shifts or trends. As of September 30 about **[redacted]** of GMO's expected coal burn from 2017 through 2020 was not under contract. In other words, GMO is currently exposed to volatile market prices for about **[redacted]** of its expected coal requirements for the period rates from this proceeding may be effective.

2. Market Impact On Fuel Costs Is Substantial

Q: How might that market price volatility affect GMO?

A: Over the four-year period of 2017 through 2020 GMO is exposed to **[redacted]** million in coal price risk alone. Besides that coal market risk, GMO's rail contract expires 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.

Q: How did you calculate GMO's **[redacted] million in coal price risk?**

A: GMO uses a distribution of forecasts to construct a composite forecast which becomes our base forecast. From that distribution we also calculate "low" and "high" forecasts to represent the uncertainty in expectations within the portfolio of independent forecasts used to construct our base forecast. I calculated the coal price risk as the difference between the "base" and the "low" and "high" in GMO's coal price forecast for anticipated purchases that are not yet under contract.

Q: Why did you look at the four-year period of 2017 through 2020?

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 January 2017, the four year horizon would run from late January 2017 into January 2021.

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3. Fuel Costs Are Beyond The Control Of Management

Q: How are the short-term and long-term risks different?

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. Unexpected temperature spikes or drops can also cause short-term imbalances between the demand and the immediately available supply. Since energy prices tend to be inelastic, 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.

Q: Can GMO control the fundamentals that drive the short- and long-term 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 2017 represents almost 1% of the projected PRB production or about 0.4% 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.

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") as described by 4 CSR 240-20.090(2) in which it 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 the FAC and allowance purchases and sales. Mr. 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 for managing the price risk of coal?

A: Yes, it does.

Q: Which stations does GMO's coal hedging program apply to?

A: Lake Road and Sibley. KCP&L uses a similar program to manage the purchases of coal for Iatan.

Q: Please describe GMO's coal price hedging program.

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 modified 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. **[redacted]**

Q: **What does that laddered portfolio look like?**

A: By third quarter 2015, GMO had contractual commitments for essentially all of its expected requirements for 2016 and about 65% of its expected coal requirements for 2017. It also has commitments for about 50% for 2018 and about 25% for 2019 but no commitments for 2020.

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: Since 2009, this strategy has helped GMO mitigate much of the coal market volatility impact on its customers. If we calculate volatility as the annualized standard deviation of percent change in price, the volatility of the prices GMO paid was about 5%. That is significantly less than the 23% volatility of the annual average prices developed from the ClearPort's prompt calendar year strip.

Q: What risk is GMO managing through its natural gas hedge programs?

A: GMO uses natural gas derivatives to mitigate adverse upward price volatility in natural gas and power.

Q: How does market price uncertainty for natural gas affect GMO?

A: Natural gas market price uncertainty primarily affects GMO in two ways. The first way is the direct impact on the price the Company pays for natural gas it consumes. The second impact is the effect of natural gas price on the market price for electricity.

Q: Does GMO use the same program to manage both the impact of natural gas market uncertainty on the price the Company will pay for the natural gas it consumes and the market price for electricity the Company will purchase?

A: Yes.

Q: What is the objective of GMO's hedging program?

A: The objective of GMO's hedging program is to reduce energy price risk inherent with floating with the market. The program is to protect the Company and its customers from large upward fluctuations in the price of natural gas while providing some opportunity to capture low prices.

Q: Briefly describe GMO's hedging strategy.

A: GMO's natural gas hedging program is oriented toward finding a balance between the need to protect against high prices and the opportunity to purchase gas at low prices. GMO's hedging program first divides the hedge volume into two parts. One-third of the volume is not hedged but is left to primarily absorb the risk of requirements being less than projected and secondarily float with the market. The remaining two-thirds are hedged under two hedging programs, Kase and Company, Inc.'s HedgeModel and ezHedge.

Q: **How does the HedgeModel program work?**

A: The approach of the HedgeModel program is to identify statistically favorable points at which to hedge. The strategy can be thought of as a three-zone strategy comprised of high price, normal price and low price zones. The high price zone identifies prices that are threatening to move upward. In this price zone actions are taken to protect against unfavorable high price levels, mostly through the use of options-related tactics. The normal price zone identifies prices that are in a "normal" range, neither high enough to warrant protecting price, nor low enough to be considered "opportunities." No action is taken whenever prices are deemed to be in the normal price range. The low price zone identifies prices that are statistically low. In this zone, actions are taken to capture favorable forward prices as the market moves into a range where the probability of prices remaining at or below these levels is decreasing. While the main focus in the high price zone is defensive, to set a maximum or ceiling on prices, in the low price zone the focus is on capturing attractive prices.

Q: **How does the ezHedge model work?**

A: Kase's ezHedge generates hedging signals based on market cycles and uses a volume averaging approach, similar to dollar cost averaging. The model divides a price range into five zones based on an evaluation of percentile levels over a range of look-back periods. It selects the look-back length based on market behavior relative to the highest and lowest zones. This approach results in hedges being placed under all but the most favorable conditions, in which case volumes are left unhedged. The volume averaging aspect results in more frequent hedges when prices are in the lower priced zones and fewer hedges when prices are in the higher price zones.

Q: What distinguishes these two hedging models?

A: ezHedge usually results, over time, in all of the volumes placed in that program being hedged. On the other hand, if prices do not fall low enough, or if prices stay too high, there is a possibility that certain contract months could go unhedged when using HedgeModel. Combining ezHedge with HedgeModel helps ensure that a modest portion of the exposure has a high probability of being hedged.

Q: How does GMO determine the amount of natural gas to hedge under its price risk management program?

A: GMO uses natural gas derivatives to hedge natural gas price risk and to cross hedge "on peak" purchased power price risk. The natural gas component is GMO's projected natural gas usage. The natural gas equivalent usage for projected purchased power is determined using the market implied heat rate from the Company's market model. "On peak" is defined as the Monday-Friday 5x16 block, excluding North American Electric Reliability Corporation holidays. GMO may hedge up to 67 percent of the sum of projected natural gas usage and projected "on peak" natural gas equivalent for purchased power.

Q: What is cross hedging?

A: Cross hedging is a risk management strategy that involves offsetting a position in one commodity with an equal position in a different commodity with similar price movements. Cross hedging is often used in markets where there is no active futures trading for the commodity of concern.

Q: In the time GMO has been using natural gas futures to cross hedge future purchases of electricity has there been strong correlation between these two markets sufficient upon which to base such "hedging?"

A: Yes. Since February 2007 when Southwest Power Pool, Inc. ("SPP") launched its Energy Imbalance Service ("EIS") market and established real-time Locational Imbalance Prices the correlation between on-peak real-time power prices and natural gas prices have exceeded 90%. Moreover, the correlation also exceeded 90% for the period March 2014 through December 2015 a period which saw significant changes in both the power and natural gas market. In March 2014, SPP replaced the EIS market with the Integrated Marketplace and natural gas prices collapsed from $6.15 in February 2014 to less than $2.00 in December 2015.

Q: What are the benefits of using NYMEX natural gas futures contracts and options to cross hedge electricity price risk?

A: Perhaps the three most significant benefits of using NYMEX natural gas futures contracts and options to hedge electricity price risk are:

1) Liquidity – the NYMEX natural gas market is very liquid. That is NYMEX natural gas contracts can easily be bought or sold quickly. There are large numbers of buyers and sellers ready and willing to trade at any time during market hours. Because of high trading volumes there tend to be low spreads between asking and selling prices which results in little to no premium when entering or exiting a position.

While the Company could probably hedge its purchased power risk with electricity bilateral forward contracts, it would be at a price. There is not a liquid secondary market where the Company could sell out of a position should its requirements change. Even if it could sell out it would likely be at a significant discount.

2) Minimal counterparty credit risk – the NYMEX uses a central counterparty clearing model. All trades are cleared through the Exchange clearinghouse which becomes the ultimate counterparty, acting as the "buyer to every seller" and the "seller to every buyer." Counterparty credit risk is shared among clearing members, who represent some of the largest names in financial services. Consequently, the NYMEX has received and maintains an AA+ long-term counterparty credit rating from Standard & Poor's.

3) Contract size – one (1) NYMEX natural gas contract represents 10,000 mmBtus of natural gas. That is roughly equivalent to one (1) megawatt hour (MWh) of electricity. Given the liquidity of the NYMEX there is essentially no premium for entering or exiting a position as small as one MWh. That liquidity gives GMO the ability to fine tune its hedge position as expectations change.

4) Besides the benefits of using the NYMEX there is another benefit of combining GMO's projected natural gas usage with natural gas equivalent volumes for it projected purchased power requirements. It manages the risk that while the total load served might equal the projection, the actual supply mix between GMO's natural gas-fired generation and purchased power will likely be different than projected.

Q: Has this Commission allowed GMO to use natural gas derivatives to cross hedge electricity price risk?

A: Yes. Since Case No. ER-2005-0436 this Commission has authorized GMO [formerly Aquila, Inc.] "to record in FERC Account 547 or Account 555, as part of fuel cost and purchased power costs, hedge settlements, both positive and negative, and related costs (e.g. option premiums, interest on margin accounts, and carrying cost on option premiums) directly related to natural gas generation and on-peak purchases power transactions...."[2]

Q: How does GMO's hedge program manage the risk of volume uncertainty?

A: The primary purpose for leaving one-third of the forecast volume requirements unhedged is to provide a cushion for the possibility that actual requirements may turn out to be less than projected.

Q: Does GMO adjust its hedges for changes in projected usage?

A: Yes. GMO updates its projected requirements monthly. If the projected requirements are determined to be significantly different than prior projections, hedge volumes may be adjusted. If the volumes increase, the increases are added to the volume available to hedge. If the volumes decrease but the decrease is not material and we already have the two-thirds hedged, those hedges that exceed the two-thirds may be liquidated. If the decrease were material, we would develop a remediation strategy.

Q: How often does GMO use the HedgeModel and ezHedge?

A: GMO monitors the HedgeModel and ezHedge daily. **[redacted]**

Q: How has this program performed for GMO?

A: Over the last five years, the strategy has reduced GMO's cost of natural gas by about **[redacted]**.

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[2] Order Approving Stipulation and Agreement, Case No. ER-2005-0436, pp. 5-6.

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 will 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-2016-0156

AFFIDAVIT OF WILLIAM EDWARD BLUNK

STATE OF MISSOURI)
) **ss**
COUNTY OF JACKSON)

William Edward Blunk, appearing before me, affirms and states:

1. My name is William Edward Blunk. I work in Kansas City, Missouri, and I am employed by Kansas City Power & Light Company as Generation Planning Manager.

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 thirty-one (31) 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 affirm and state 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.

William Edward Blunk

Subscribed and affirmed before me this 23rd day of February, 2016.

Nicole A. Wehry
Notary Public

My commission expires: Feb. 4 2019

NICOLE A. WEHRY
Notary Public - Notary Seal
State of Missouri
Commissioned for Jackson County
My Commission Expires: February 04, 2019
Commission Number: 14391200

SCHEDULE WEB-1

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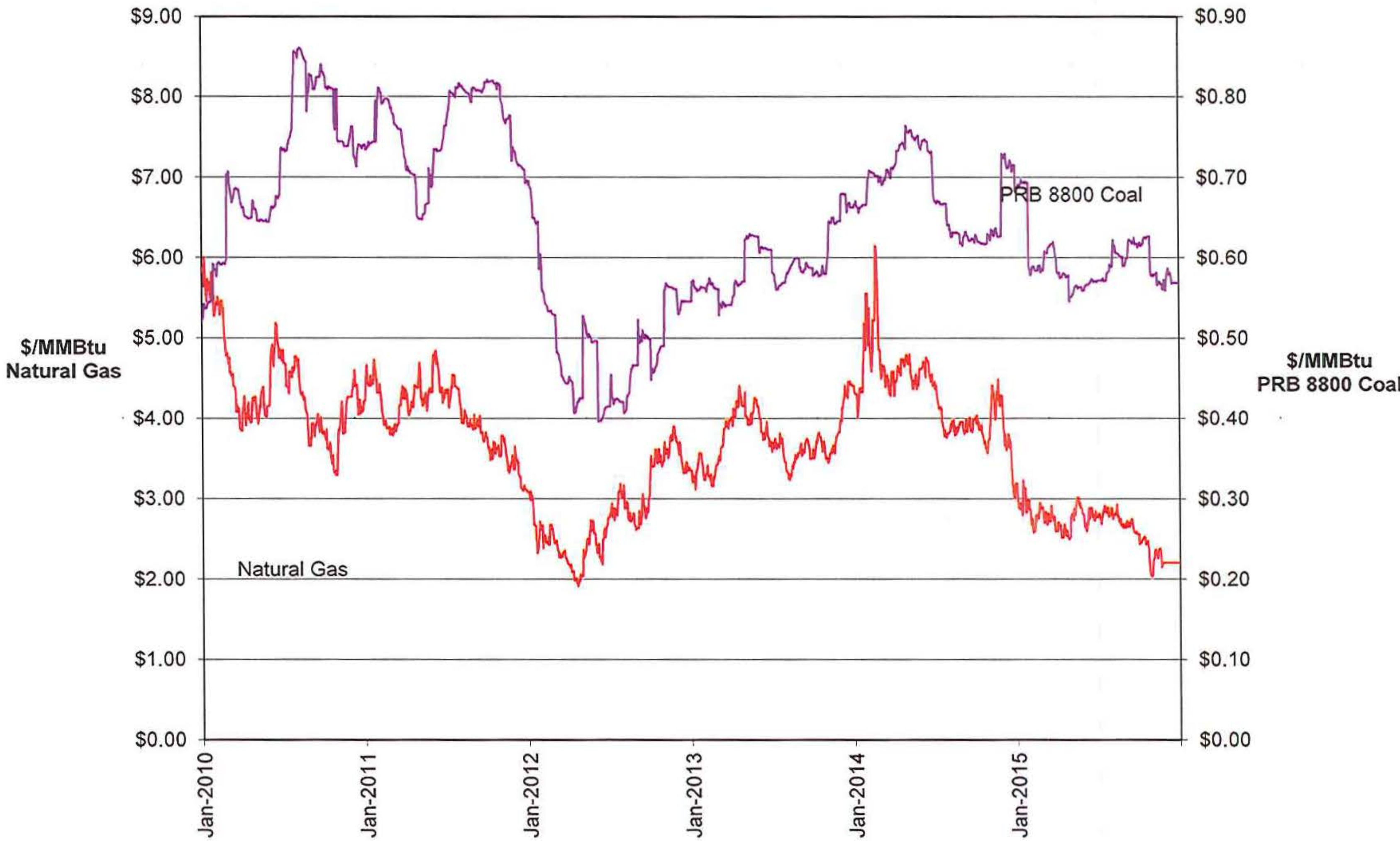
Market Price of Fossil Fuels



Schedule WEB-2