COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

AN ELECTRONIC EXAMINATION OF THE APPLICATION OF THE FUEL ADJUSTMENT CLAUSE OF KENTUCKY POWER COMPANY FROM NOVEMBER 1, 2020 THROUGH OCTOBER 31, 2022	))))))	Case No. 2023-00008

DIRECT TESTIMONY OF

ALEX E. VAUGHAN

ON BEHALF OF KENTUCKY POWER COMPANY

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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, POSITION AND BUSINESS ADDRESS.

A. My name is Alex E. Vaughan. I am employed by AEPSC as Managing Director-Renewables & Fuel Strategy. My business address is 1 Riverside Plaza, Columbus, Ohio 43215. AEPSC is a wholly-owned subsidiary of American Electric Power Company, Inc. ("AEP"), the parent Company of Kentucky Power Company (the "Company" or "Kentucky Power").

II. BACKGROUND

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND BUSINESS EXPERIENCES.

A. I graduated from Bowling Green State University with a Bachelor of Science degree in Finance in 2005. Prior to joining AEPSC, I worked for a retail bank and a holding company where I held various underwriting, finance, and accounting positions. In 2007, I joined AEPSC as a Settlement Analyst in the RTO Settlements Group. I later became the PJM Settlements Lead Analyst, and in that role, I was responsible for reconciling AEP's settlement of its activities in the PJM Interconnection, LLC ("PJM") market with the monthly PJM invoices and for resolving issues with PJM. In 2010, I transferred to Regulatory Services as a Regulatory Analyst and was later promoted to the position of Regulatory Consultant. My responsibilities included supporting regulatory filings across AEP's eleven state jurisdictions and at the FERC. I also performed financial analyses

related to AEP's generation resources and loads, power pools, and PJM. In September 2012, I was promoted to Manager, Regulatory Pricing and Analysis, where I was responsible for cost of service, rate design, and special contract analysis for the AEP east operating companies. In September 2018, I was promoted to Director of Regulated Renewables and Pricing, at which time oversight of regulated renewable and fuel filings across the AEP operating companies was added to my responsibilities. I was promoted to my current position in June 2022.

Q. PLEASE DESCRIBE YOUR CURRENT RESPONSIBILITIES.

A. I am responsible for assisting Kentucky Power and the other AEP electric utility operating companies in the preparation of their regulatory filings before this and other commissions under whose jurisdiction these companies provide electric service. My responsibilities include the oversight of cost of service analyses, rate design, special contracts, energy supply costs, and renewables for the AEP System operating companies.

Q. HAVE YOU PREVIOUSLY TESTIFIED IN ANY REGULATORY PROCEEDINGS?

A. Yes. I have presented testimony on behalf of the AEP operating companies numerous times before the regulatory bodies in Virginia, West Virginia, Kentucky, Tennessee, Indiana, Michigan, and Oklahoma. In Kentucky, I have testified before the Kentucky Public Service Commission (the "Commission") in several cases, most notably in Kentucky Power's past five base rate case proceedings (Case Nos. 2013-00197, 2014-00396, 2017-00179, 2020-00174, and 2023-00159), and the proposed transfer of ownership of Kentucky Power in Case No. 2021-00481.

III. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to address the following areas:

a) Describe the PJM Regional Transmission Organization (RTO);

b) Discuss the wholesale market during the period of November 2020 through October 2022 ("Review Period");

c) Discuss how the Company mitigates high purchased power costs;

d) Discuss the Company's activities and how they generate off system sales; and

e) Discuss the Company's bidding practices in PJM.

IV. PJM OVERVIEW

Q. PLEASE PROVIDE A GENERAL DESCRIPTION OF PJM.

A. PJM is a regional transmission organization ("RTO") that is mandated by FERC to provide reliable supplies of power, adequate transmission infrastructure, and competitive wholesale prices of electricity. PJM operates markets for capacity, energy, and ancillary services. The capacity markets include annual auctions for capacity while the energy markets include both day-ahead and real-time markets. The ancillary services markets are each designed to address regulation-related and reserve-related ancillary services.

Q. PLEASE DESCRIBE THE COMPANY'S DAILY ACTIVITIES IN THE PJM ENERGY MARKETS.

A. Every day, Kentucky Power offers all of its available generating resources into the PJM Day-Ahead energy market and purchases all of its expected load in the PJM Day-Ahead energy market. Offering the Company's generation resources involves submitting a large volume of data to PJM that includes unit commitment designation, offer curves that cover

the range of output from economic minimum to economic maximum, and market parameters. The market parameters include, but are not limited to, a unit's startup cost, startup time in hours, how quickly a unit can ramp-up energy production, and other characteristics defined in PJM protocols. PJM protocols are established in various documents such as the PJM tariff and the manuals published on www.pjm.com. This process involves a high level of coordination among AEPSC Commercial Operations, AEPSC Fuel Procurement, and generating unit personnel located at the individual plant sites. The purpose of this process is to provide the most up-to-date and accurate information to PJM prior to the market deadline. Commercial Operations relies on the generating unit personnel to provide the most up-to-date information on each generating unit's availability and capability. Commercial Operations relies on Fuel Procurement to provide the most up-to-date information on fuel availability and pricing, especially for natural gas, which has prices that change daily. The daily process concludes when Commercial Operations compiles and submits all information required by PJM in advance of the Day-Ahead market deadline.

Q. WHO ULTIMATELY DETERMINES THE LEVEL OF OUTPUT FOR A GENERATING UNIT?

A. PJM, through its economic dispatch model, determines the ultimate level of generation required to meet the load based on the units available in each hour and the economics of those units. In basic terms, PJM uses the offer information provided by market participants and arranges, or "stacks", the available units in economic order from the least cost to the highest cost. PJM's model then instructs, or dispatches, units to run by solving for the least cost solution to serve the level of load while factoring in transmission constraints. The

PJM model is continuously updated in the Real-Time market to adjust for changing conditions in order to optimize the dispatch instructions that seek to provide the least cost solution to meet the RTO's load. This is beneficial to customers because it ensures that the lowest cost units are prioritized to serve the load.

Q. DOES PJM PLACE ANY OBLIGATIONS ON THE AVAILABILITY OF GENERATING UNITS?

A. Yes. The first obligation is that any generating unit that is a capacity resource must offer its energy into the Day-Ahead energy market. Specifically, if a generating unit either sells its capacity through the PJM capacity auctions or supplies capacity through a Fixed Resource Requirement plan, it must offer its energy every day in the Day-Ahead energy market.

The second obligation is that all scheduled generating unit outages must be approved by PJM before the units are allowed to be taken out of service. This includes taking units out of service for either a planned or a maintenance outage. PJM also explicitly prohibits planned outages during PJM Peak Period Maintenance Season, which runs from the 24th Wednesday (in mid-June) through the 36th Wednesday (in early September) of each year in order to ensure reliability during the summer season. Although not scheduled, a generator is also required to report forced outages to PJM.

Q. DOES PJM PLACE ANY REQUIREMENTS ON THE AVAILABILITY OF FUEL FOR GENERATING UNITS?

A. Yes. In October 2021, PJM focused on the importance of coal and reagent inventories for coal-fired plants located within the RTO. In a revision to PJM Manual 13, PJM stated that it now has the ability to request a generating unit with less than ten days of coal move to a

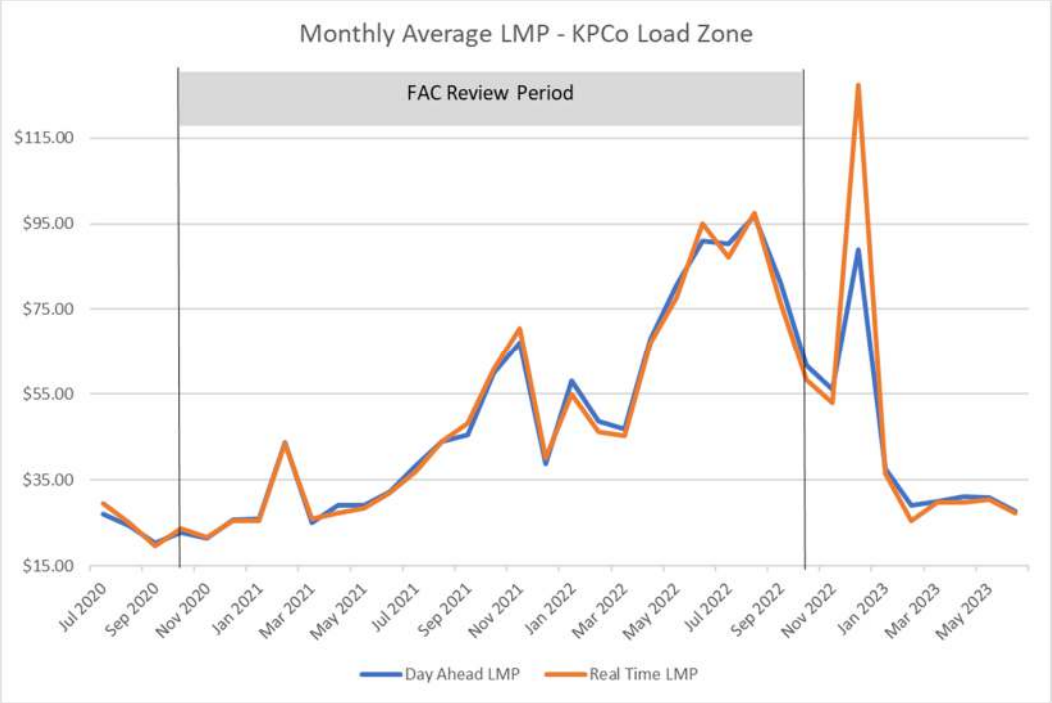
Maximum Emergency status until its coal inventory exceeds 21 days. This means that any unit below that 10-day limit may be forced to shut down and remain offline until its inventory reaches 21 days or the unit is required for a PJM Emergency Event. In such a case, the unit could be forced to forgo market revenues during a period when it may be highly profitable to operate or, if it denied PJM's request and subsequently ran out of fuel or the reagents needed to manage its emissions, the unit may be subject to performance penalties if a market performance event occurred.

V. MARKET OVERVIEW

Q. PLEASE DESCRIBE THE PJM ENERGY MARKETS DURING THE REVIEW PERIOD.

A. As shown in Figure AEV-1 below, the energy price for Kentucky Power's load zone, like the rest of PJM, experienced an extended period of overall price increase and volatility. The Review Period includes a period of overall lower prices as the nation recovered from the economic effects of the COVID-19 pandemic in late 2020 and early 2021. In the second half of 2021, market energy prices began to rise, and that increase peaked in August 2022, when the average market price for Day Ahead energy for the Company's load peaked at $96.77 per Megawatt-hour. Prices began to trend downward from that point through the end of the Review Period and have remained low in 2023 year to date.

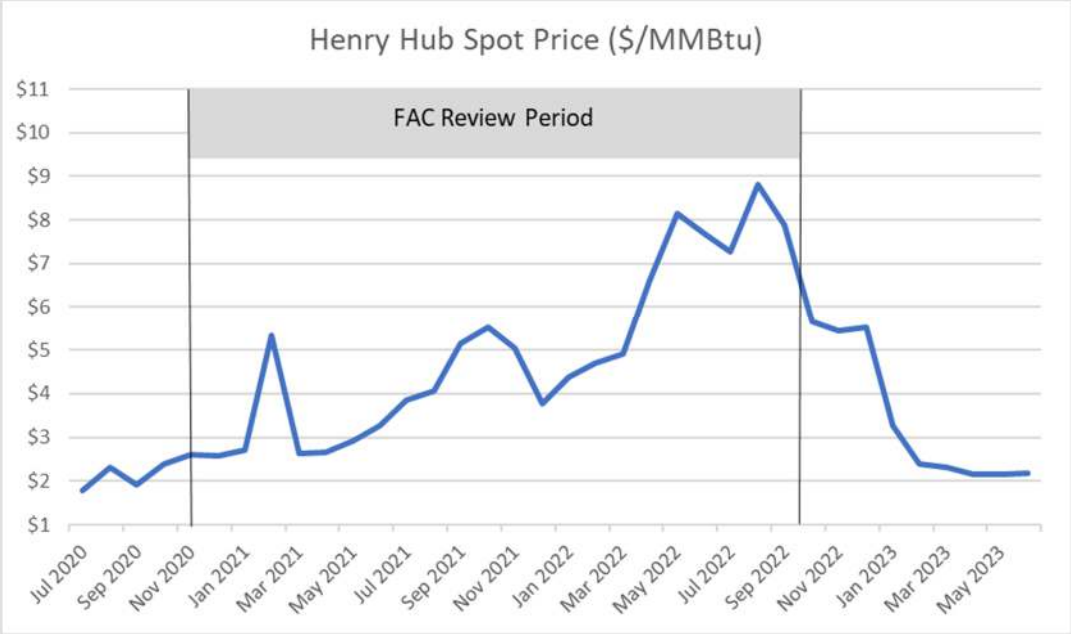
Figure AEV-1



Q. IS THERE ANY UNDERLYING FACTOR THAT HAS CAUSED THE RISE IN PJM ENERGY MARKET PRICES?

A. Yes, the rise in prices is largely due to the rise in prices in the natural gas markets. Figure AEV-2 below provides the monthly average spot market price of natural gas at the Henry Hub. The shape of the graph in Figure AEV-2 looks very similar to the one in Figure AEV-1, providing visual evidence of the correlation between natural gas prices and PJM energy market prices.

Figure AEV-2



Q. WHAT EFFECTS, IF ANY, RESULT FROM THE RISE IN NATURAL GAS PRICES?

A. Typically, the rise in natural gas prices should result in an increase in coal generation across PJM as those generating units become more economic in light of the trend in PJM energy market prices that has occurred following the COVID-19 pandemic. In general, when natural gas prices rise, coal units become more economic and are more likely to be dispatched by PJM, especially as the price of natural gas causes the costs of natural gas-fired units to exceed that of coal-fired units. However, as discussed by Company Witness Chilcote, the coal supply in the United States was constrained during the Review Period and remains constrained. As a result, coal-fired generation units were, and continue to be, subject to tightened supply and rising prices which limits the benefits of coal-fired generation in relation to the rise in natural gas prices.

VI. KENTUCKY POWER'S PARTICIPATION IN ENERGY MARKETS

Q. PLEASE IDENTIFY THE MARKET OFFER CURVES THAT THE COMPANY SUBMITS TO PJM EACH DAY.

A. The Company provides offer curves for each of its generating units that cover the range of output from a unit's economic minimum output to its economic maximum output. Furthermore, the Company submits two offer curves for each unit, a market-offer curve and a cost-based offer curve. Both PJM and FERC have set maximums on the cost that a company may offer for a unit's output included in its market-offer curve but have otherwise allowed participants to develop their own means to determine those curves. In contrast, the cost-based offer curve is subject to a detailed set of rules established by PJM in PJM Manual 15. Said more simply, the offer curve is the price at which the Company's resources will produce some corresponding amount of MWh for sale into the PJM wholesale energy market. The cost based offer adheres to strict guidelines while the market based offer allows for other factors such as opportunity costs to be considered by a market participant.

Q. DID THE PJM ENERGY MARKET CONDITIONS DURING THE REVIEW PERIOD CREATE CHALLENGES FOR KENTUCKY POWER?

A. Yes, as they did for almost all energy market participants. While the rise in energy market prices increased the need for Kentucky Power's generating units to supply energy into the market, the tightening of coal supply described by Company Witness Chilcote resulted in challenges procuring coal to replace consumption. These emerging challenges required the Company to implement a strategy that allowed it to participate in PJM energy markets per its obligations but also recognize the risk in securing adequate coal supply, while also

attempting to maximize the value of finite fuel supplies for customers. The Company had to make decisions with the information available to it during a review period which saw historic amounts of commodity volatility.

Q. AT A HIGH-LEVEL, PLEASE DESCRIBE THE MACROECONOMIC EVENTS IMPACTING THE PJM ENERGY MARKET DURING THE REVIEW PERIOD.

A. The economic slowdown caused by the COVID-19 pandemic in 2020 drastically reduced electricity demand in the US. Reduced electricity demand, combined with low natural gas prices, resulted in low PJM energy market prices which in turn reduced the amount coal-fired generating units were dispatched. During the same period of time coal mine production was sharply reduced.

Economic activity began to recover in late Summer 2021 and increased in Fall 2021, which is demonstrated in the energy market and natural gas pricing shown in Figure AEV-1 and Figure AEV-2. The economic recovery brought with it increased electricity demand and higher natural gas prices. Suddenly, coal was relatively attractive compared to natural gas, but reduced mine production and an inability to quickly ramp up production meant there was insufficient coal supply to meet demand, particularly when global demand for coal spiked. Prices thus rose significantly and coal was scarce.

Q. HOW DID THE COMPANY ADDRESS THESE CHALLENGES AND WHAT ACTIONS WERE TAKEN BY THE COMPANY TO MITIGATE HIGH FUEL AND PURCHASED POWER RELATED COSTS FOR ITS CUSTOMERS?

A. Generally speaking, the Company's fuel procurement strategies as discussed by Company Witnesses Chilcote and Stutler; new tariff program offerings available to customers such as the Tariff V.C.S. (Voluntary Curtailment Service); and the Company's energy market offer strategy regarding the Mitchell Plant, were actions taken by the Company during the Review Period intended to mitigate fuel and purchased power costs.

Q. PLEASE DESCRIBE THE COMPANY'S MARKET OFFER STRATEGY FOR MITCHELL.

A. The Company included an adder, or increment, associated with fuel supply risk that recognizes potential opportunity costs to its customers to the market offer curves it submitted to PJM for the Mitchell Plant to address its concerns with coal supply. As a hypothetical example, assume the Company had a generating unit that was currently online and capable of producing energy at a price of $40 per Megawatt-hour (MWh). If the Company's market forward price was expected to average $40/MWh in the off-peak hours while reaching $80/MWh in the peak hours, adding an increment to price the unit above $40/MWh would ensure the unit was not dispatched off of its eco min level of generation in the off-peak hours but still available to ramp up and generate in the higher priced peak hours. In this example, the increment is ensuring that the limited coal supply is consumed when it can produce the most economic benefit for Kentucky Power customers. The adder strategy was not needed for Big Sandy Unit 1 because it did not experience similar fuel constraints during the Review Period.

Q. ARE THE INCREMENTS INCLUDED IN BOTH THE MARKET- AND COST-BASED OFFER CURVES FOR THE MITCHELL PLANT?

A. No, they are only included in the market-offer curve for the Mitchell Plant. As stated above, the calculation of the cost-based offer curves is subject to the rules and framework established in PJM Manual 15.

Q. PLEASE EXPLAIN HOW THE COMPANY DETERMINED THE INCREMENTS TO INCLUDE IN ITS MARKET OFFER CURVES FOR THE MITCHELL PLANT.

A. Each month, in order to provide customers with the most economic benefit from the Company's generation portfolio, members of Kentucky Power Regulatory, AEPSC Commercial Operations, AEPSC Fuel Procurement, various generation personnel, and AEPSC Regulatory Services meet to review the current inventory levels at each coal-fired generating unit, the expected deliveries of coal, expected electricity demand, and market forward prices in order to forecast future coal inventory levels. This meeting also includes a discussion of scheduled outages, scheduled equipment testing, potential market events such as a transmission outage that may require PJM to commit the unit, and whether or not financial power hedging should be undertaken. The outcome of the discussion is the determination of a pricing increment and operational strategy needed to manage each unit's coal inventory based on the information available.

Q. PLEASE EXPLAIN HOW PRICING INCREMENTS ARE IMPLEMENTED.

A. The Company uses a proprietary software package to calculate the cost at each segment of its market offer curve. As part of this process, the Company has the capability to include

an adjustment in any segment in that offer curve. If an adjustment is included, the market offer curve submitted to PJM will be the final values that include that adjustment.

Q. ARE PRICING INCREMENTS ONLY ESTABLISHED IN THIS MONTHLY MEETING?

A. No, the monthly meetings were used to agree upon a consensus strategy for the upcoming month. The effects of pricing increments are reviewed daily and updated if new information warrants a modification. For example, a decline in the forward price curve may result in a decrease to the pricing increment or the delay of a scheduled coal delivery may result in an increase to the pricing increment.

Q. HOW DOES THIS STRATEGY BENEFIT KENTUCKY POWER'S CUSTOMERS?

A. The Company's approach benefits customers by ensuring, to the extent reasonably possible, the Company is providing lower-cost generation when market prices are expected to be high. Given the limitations with coal supply, the Company had to make choices, based on the information available to it at the time, regarding when to provide generation and chose to do so in a manner that ensured generation was available when its customers were most exposed to market prices, during the winter and summer seasons. It did this by implementing practices (like the pricing increments described above) in order to conserve the finite amount of coal for those months when it was reasonably expected to be the most economically beneficial. Hypothetically speaking, the Company could provide generation when prices are $100 per megawatt (MW) or provide it when prices are $200/MW. By covering internal load with generation when prices are higher in the summer and winter, the customer is benefitted by the margin of the differences in the cost of the energy. If

Kentucky Power had simply let the Mitchell Plant dispatch on its cost based offer, it would have drawn from its available coal supply and generated energy during periods of lower market prices instead and subsequently fallen below PJM's 10-day inventory limit. This would have resulted in an increase in the overall cost of service because the Company would have been forced to meet its native load energy requirements through increased energy purchases from the PJM energy market during higher priced times.

Q. DID THE COMPANY'S OFFER STRATEGY ALSO PRESERVE THE CAPACITY VALUE OF THE MITCHELL PLANT?

A. Yes. If the Company had not implemented the coal conservation increment strategy the Mitchell units would have run out of coal, which is considered a forced outage. Forced outages count against the amount of unforced capacity ("UCAP") a unit can provide for capacity requirement purposes. The Company's offer strategy directly avoided 234 unit[1] forced outage days at the Mitchell Plant during the Review Period.

Q. IS THIS APPROACH CONSISTENT WITH THE REQUIREMENTS FOR OPERATING WITHIN THE PJM MARKET?

A. Yes. Kentucky Power continues to comply with the rules and regulations established by PJM.

Q. DOES KENTUCKY POWER CONTINUE TO EVALUATE THE NEED FOR PRICING INCREMENTS?

A. Yes.

Q. DOES KENTUCKY POWER KNOW IF INCREMENTS IN ITS MARKET OFFERS WILL BE USED IN THE FUTURE?

[1] There are two units at the Mitchell Plant, and this represents 117 avoided forced outage days per unit.

A. No. Pricing strategies will be considered and evaluated as a viable approach on an as-needed and economic basis.

Q. IN THE INSTANCE WHERE PLANNED OUTAGES EXTEND BEYOND THEIR ESTIMATED OUTAGE TIME, DO ENERGY AND CAPACITY SHORTFALLS RESULT?

A. No. As discussed earlier in this testimony, the Company does not dispatch its resources to its load obligations, it economically offers its resources into the PJM wholesale energy market and simultaneously purchases its load from the same market. If an outage of any sort is extended, the unit in question may or may not be economic to run during the extension time in question. Furthermore, through the Company's membership in PJM, as memorialized in PJM's governing documents, which include the Reliability Assurance Agreement, the Open Access Transmission Tariff and the Operating Agreement, the Company has access to the excess generation available in the wholesale energy market to serve its load as necessary. How the Company meets its annual capacity requirements are not currently impacted by planned outages or the extension of any approved planned outage.

Q. PLEASE EXPLAIN WHAT FORWARD POWER PURCHASE HEDGES ARE.

A. To mitigate exposure to spot energy market prices, the Company can hedge through forward power purchases. Although it is not possible to perfectly predict future energy prices, utilization of forward power purchases over a period of time can help reduce exposure to spot market energy price volatility. Such hedges can include seasonal or monthly forward contracts.

Q. ARE THERE RISKS ASSOCIATED WITH FORWARD POWER PURCHASES?

A. Yes, although forward power purchases reduce spot market exposure, there is a cost to procure those financial hedges, and with that cost a risk that customers will pay more for the financially hedged power than the spot market, if electricity prices turn out to be lower than the forward price.

Q. DID THE COMPANY EVALUATE PROCURING FINANCIAL HEDGES DURING THE REVIEW PERIOD?

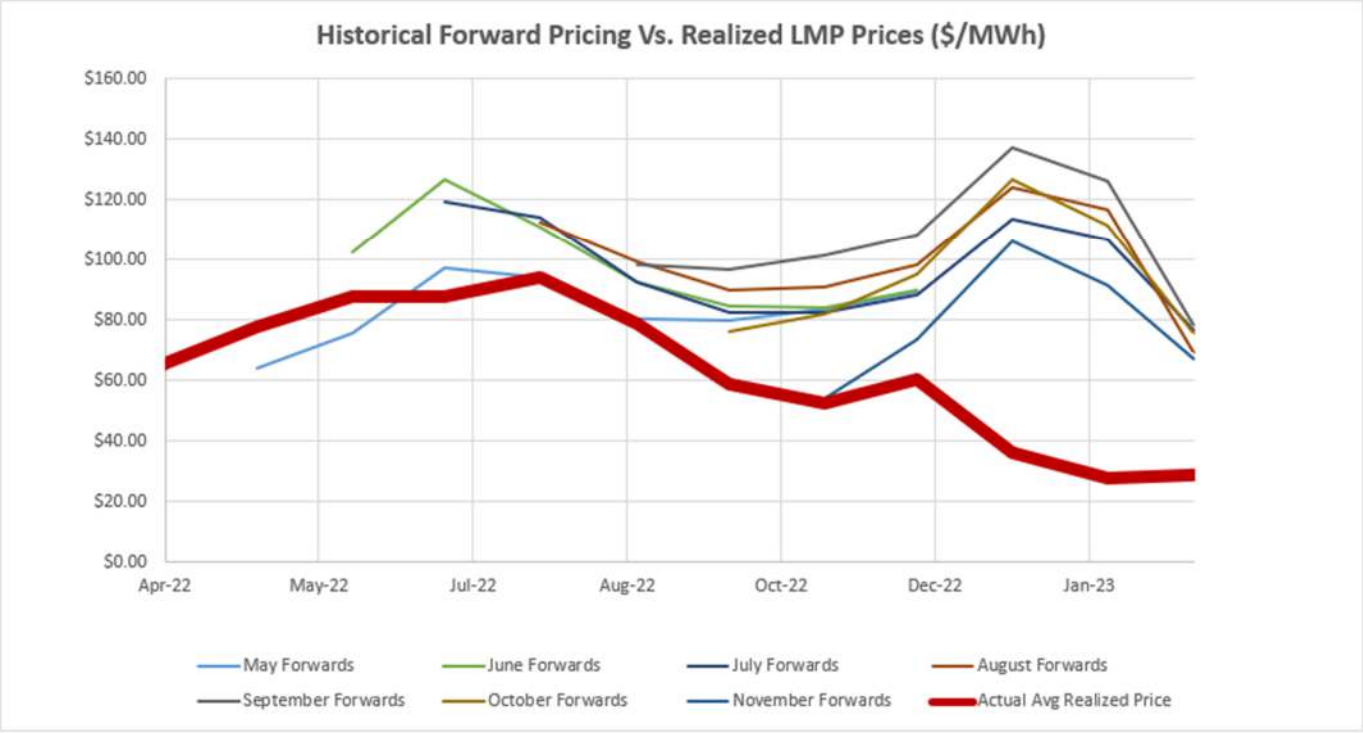
A. Yes, as noted above, Company personnel and AEPSC subject matter experts regularly evaluated the procurement of forward power purchases as part of their strategy to optimize the Company's market purchases.

Q. DID THE COMPANY PROCURE FINANCIAL HEDGES DURING THE REVIEW PERIOD?

A. No, it did not. Based on the available information at the time, which proved in hindsight to be true, procuring financial hedges would have been significantly more expensive for customers than the Company's reliance on its owned generation and PJM spot market purchases. As the result of global factors, including the war in Ukraine, the transition out of the COVID-19 pandemic, and high demand for U.S. liquified natural gas ("LNG"), natural gas prices rose to unprecedented levels. These increases in natural gas prices resulted in historically high forward energy prices. Indeed, during 2022, PJM's energy markets experienced historic volatility and price increases, resulting in the highest average energy market price levels since the Company joined PJM in 2004. Because the forward energy prices so far exceeded historical energy prices, creating the significant potential that actual market prices would be lower than the forward prices, the Company elected not to make any forward energy purchases during the period of steeply inclining forward prices

during the second half of the Review Period. As shown in Figure AEV-3, this decision in fact resulted in economic benefits to customers. During the Review Period, forward power purchases to hedge against the uptick in market prices would have resulted in a more costly outcome compared to the strategy the Company employed.

Figure AEV-3



Q. WERE THERE ANY CHANGES IN THE WHOLESALE ELECTRIC POWER MARKET THAT OCCURRED DURING THE REVIEW PERIOD OR THAT KENTUCKY POWER EXPECTS TO OCCUR WITHIN THE NEXT TWO YEARS THAT HAVE SIGNIFICANTLY AFFECTED OR WILL SIGNIFICANTLY AFFECT KENTUCKY POWER'S ELECTRIC POWER PROCUREMENT PRACTICES?

A. Yes. During the Review Period PJM instituted the 10 day rule on fuel stocks as I described earlier, and in subsequent years PJM will be proposing and implementing its

critical issue fast path ("CIFP") changes to its capacity construct. The proposed CIFP tariff changes are yet to be filed at FERC at the time of the Company's filing in this proceeding.

VII. OFF SYSTEM SALES

Q. PLEASE DESCRIBE OFF SYSTEM SALES.

A. Off system sales refer to the hours during the Review Period when Kentucky Power sold generation into the PJM energy markets in excess of the energy it purchased to satisfy its load.

Q. WHAT ARE THE COMPONENTS OF OFF SYSTEM SALES?

A. For reporting purposes, the Company separates the revenues it earns from off system sales into revenues that recover the cost of making those sales and the margins in excess of those costs. The revenues that recover the Company's cost to provide those sales are credited back through the Fuel Adjustment Clause while the margins are credited to customers through Tariff System Sales Clause. It should be noted that a base level of off system sales margins is embedded in the Company's base rates and the System Sales Clause tracks the actual amount of margins above or below that base level.

Q. DID CUSTOMERS RECEIVE A BENEFIT FROM THE COMPANY'S OFF SYSTEM SALES DURING THE REVIEW PERIOD?

A. Yes, the total off system sales margins produced during the Review Period was $25.2 million.

VIII. CONCLUSION

Q. WERE THE COMPANY'S PROCUREMENT PRACTICES REASONABLE DURING THE REVIEW PERIOD?

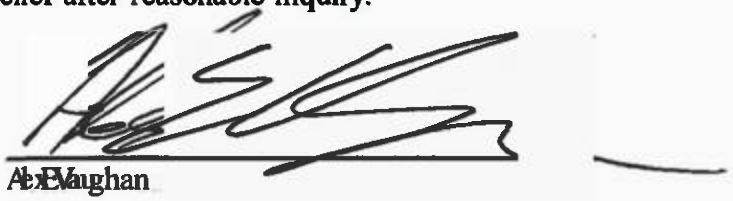
A. Yes. Especially given market conditions, the Company has operated in PJM in a manner that tries to maximize the long-term benefit provided by its generating units to its customers while also minimizing energy supply costs. The Company will continue to evaluate this strategy as the availability of coal and PJM energy market prices change.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

VERIFICATION

The undersigned, Alex E. Vaughan, being duly sworn, deposes and says he is the Managing Director for Renewables and Fuel Strategy for American Electric Power Service Corporation that he has personal knowledge of the matters set forth in the foregoing testimony and the information contained therein is true and correct to the best of his information, knowledge, and belief after reasonable inquiry.



Alex E. Vaughan

Franklin County)
) Case No. 2023-00008
Ohio)

Subscribed and sworn to before me, a Notary Public in and before said County and State, by Alex E. Vaughan, on 10-5-23.

Notary Public

Paul D. Flory
Attorney At Law
Notary Public, State of Ohio
My commission has no expiration date
Sec. 147.03 R.C.

My Commission Expires Never

Notary ID Number No ID