

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

AN ELECTRONIC EXAMINATION OF THE)	
APPLICATION OF THE FUEL ADJUSTMENT)	
CLAUSE OF DUKE ENERGY KENTUCKY, INC.)	Case No. 2022-00267
FROM NOVEMBER 1, 2021 THROUGH APRIL)	
30, 2022)	

DIRECT TESTIMONY OF
KIMBERLY HUGHES
ON BEHALF OF
DUKE ENERGY KENTUCKY, INC.

September 30, 2022

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I. INTRODUCTION AND PURPOSE

1 **Q. STATE YOUR NAME AND BUSINESS ADDRESS.**

2 A. My name is Kimberly Hughes and my business address is 526 S. Church Street,
3 Charlotte, North Carolina 28202.

4 **Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

5 A. I am employed as Manager of Coal Origination & Contract Administration, by
6 Duke Energy Progress, Inc., a utility affiliate of Duke Energy Kentucky, Inc.
7 (Duke Energy Kentucky, or Company).

8 **Q. PLEASE DESCRIBE BRIEFLY YOUR EDUCATIONAL BACKGROUND
9 AND PROFESSIONAL EXPERIENCE.**

10 A. I am a 1996 graduate of Northern Kentucky University where I received a
11 Bachelor of Science Degree in Business Administration. I began my career with
12 Duke Energy's predecessor Cinergy Corp. in September 1997. I have held various
13 positions in Human Resources, Power Trading, and Coal Procurement. I assumed
14 my role as Manager of Coal Origination and Contract Administration for Duke
15 Energy in 2020.

16 **Q. HAVE YOU TESTIFIED PREVIOUSLY BEFORE THE PUBLIC
17 SERVICE COMMISSION?**

18 A. Yes, I have testified in a previous fuel adjustment clause (FAC) proceeding before
19 the Kentucky Public Service Commission (Commission).

20

1 **Q. PLEASE SUMMARIZE YOUR DUTIES AS MANAGER OF COAL**
2 **ORIGINATION & CONTRACT ADMINISTRATION.**

3 A. As Manager of Coal Origination & Contract Administration, I oversee Duke
4 Energy's Coal Procurement Group. I am ultimately responsible for all aspects of
5 the procurement of coal and reagents in the five regulated jurisdictions (Kentucky,
6 Indiana, Florida, North Carolina, and South Carolina) that encompass Duke
7 Energy regulated electric utilities' collective footprint. As part of this
8 responsibility, I review forecasts of supply and demand, price, quality,
9 availability, and deliverability. These coal forecasts cover both existing supply
10 sources and potential supply sources that may be economically developed. On
11 behalf of Duke Energy Kentucky, I also supervise the Company's coal
12 procurement activities, including the evaluation, negotiation and oversight of coal
13 purchase contracts.

14 **Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?**

15 A. The purpose of my testimony is to respond to Paragraph 9(a)-(e) of the
16 Commission's September 13, 2022 Order, to more broadly discuss and support
17 Duke Energy Kentucky's fuel procurement practices from November 1, 2021
18 through April 30, 2022. Finally, I sponsor several of Duke Energy Kentucky's
19 responses to the Commission's Data Requests contained in Appendix B of its
20 September 13, 2022 Order.

II. DISCUSSION

1 **Q. PLEASE COMMENT GENERALLY ON THE REASONABLENESS OF**
2 **DUKE ENERGY KENTUCKY'S COAL PROCUREMENT PRACTICES**
3 **DURING THE REVIEW PERIOD.**

4 A. Duke Energy Kentucky's coal procurement policy is designed to assure that we
5 procure a reliable and consistent supply of appropriate quality coal for our coal
6 generating station at an economic price. Coal is generally purchased under long-
7 term contracts of one to three years in length. The Company secures both its spot
8 (one year or less) and long-term coal supply from producers through competitive
9 bid processes, that are evaluated thoroughly, taking into account coal quality,
10 quantity, transportation alternatives and price, among other factors. The producer
11 (or producers) whose coal offers the best value, particularly with regard to overall
12 utilization costs, is selected for further negotiations to produce contracts. The
13 Company's long-term contracts may contain provisions for periodic price
14 adjustments or a mechanism to adjust prices based upon published market price
15 indices. The Company has established guidelines for the amounts of coal to be
16 placed under contract during a specific period of time, and the Coal Procurement
17 Group follows these guidelines.

18 The Company's Coal Procurement Group stays continually informed as to
19 the current market for spot and contract coal and specific opportunities for the
20 purchase of such coal. Coal supply needs are determined by an ongoing review of
21 generating station stockpiles, consumption projections, and current coal supply
22 quantities already contracted. In addition, Duke Energy's Coal Procurement

1 personnel visit the Company’s contract producers and mining operations regularly
2 and any potential new spot producers as well, gathering information which assists
3 in our analysis of spot coal needs. This information, coupled with constant
4 monitoring of pricing information published in various places (*e.g.* industry
5 newsletters, trade publications, regulatory filings, *etc.*), as well as a close review
6 of the weekly spot market pricing indices published by brokers and traders
7 provides a thorough understanding of the various spot and long-term alternatives
8 for coal supply. Usually, spot coal commitments are made for small quantities of
9 coal, over short durations, as compared to long-term contracts of greater than one
10 year.

11 **Q. PLEASE DESCRIBE THE MODELING OUTPUTS THE COMPANY**
12 **USES TO ASSIST IN EVALUATING ITS PROCUREMENT NEEDS.**

13 A. In the past, the Company used the modeling outputs from its forecast model,
14 GenTrader, in evaluating its coal procurement needs. In October 2020, Duke
15 Energy Kentucky began transitioning to incorporating the outputs of its new Fleet
16 Analytics Stochastic Tool “FAST” model into its fuel evaluation process for 2021
17 and beyond.

18 **Q. PLEASE EXPLAIN THE MODEL CHANGES UTILIZING STOCHASTIC**
19 **CAPABILITIES.**

20 A. The stochastic model uses historic weather information to simulate numerous
21 scenarios of future weather and commodity prices. For each of these scenarios,
22 system load and commodity prices (gas, coal, oil and power) are all calculated in
23 a correlated manner using historical correlations with each other and with

1 weather. The resulting forecasts of this stochastic model gives the Company not
2 only expected fuel burns, but also the range of fuel burns and the probability
3 associated with each range.

4 **Q. PLEASE DESCRIBE THE COAL SUPPLIER'S ADHERENCE TO**
5 **CONTRACT DELIVERY SCHEDULES DURING THE REVIEW**
6 **PERIOD.**

7 A. During the review period, the Company received approximately 73 percent of all
8 contracted coal during the agreed upon delivery schedule. The amount of contract
9 delivery shortfalls were caused by typical operational and logistical delays. The
10 Company maintained adequate inventory levels and a reliable supply of fuel
11 during the review period.

12 **Q. PLEASE DESCRIBE DUKE ENERGY KENTUCKY'S EFFORTS TO**
13 **ENSURE COAL ADHERENCE TO CONTRACT DELIVERY**
14 **SCHEDULES DURING THE REVIEW PERIOD.**

15 A. Duke Energy Kentucky constantly monitors and enforces the provisions of our
16 coal contracts with respect to quantities and qualities of coal due the Company.
17 The Company monitors supplier performance monthly and determines the causes
18 of any supplier's under-performance for quantity or quality. If our review
19 determines that the supply shortages were not the result of a Force Majeure event,
20 we will either work with the particular supplier to determine a new alternate
21 delivery schedule or seek damage provisions per the terms of the contract. In
22 either case, we preserve as much of the market value as possible. All coal
23 contracts contain quality adjustment provisions to account for the differences

1 between the actual coal quality shipped and the contracted quality. Monthly
2 quality pricing adjustments are made per the terms of the contract which include
3 penalties for non-conforming shipments of coal. Contracts also contain terms
4 stating if shipments are not in compliance with contract specifications, the
5 Company has the ability to suspend deliveries and terminate the contract if quality
6 deficiencies cannot be corrected.

7 **Q. PLEASE DESCRIBE DUKE ENERGY KENTUCKY'S EFFORTS TO**
8 **MAINTAIN THE ADEQUACY OF ITS COAL SUPPLIES IN LIGHT OF**
9 **ANY SUPPLIER'S INABILITY OR UNWILLINGNESS TO MAKE**
10 **CONTRACT DELIVERIES.**

11 A. As mentioned earlier, the Company monitors supplier delivery performance
12 monthly as part of a strong adherence to contract administration. The Company
13 also closely monitors actual coal burns, actual coal inventories and projected coal
14 burns and inventories. If a supplier fails to make contracted deliveries per the
15 agreed upon schedule, the Company immediately notifies the supplier and
16 discusses the reasons and nature of the shortfall. Depending upon the nature of
17 the failure to perform, the parties either agree to reschedule the missed shipments
18 or the Company enforces the legal terms of the contracts for non-performance.
19 The Company then factors any shortfall or agreed upon make up schedule for
20 missed tons into the forward plans for projected inventories. If the missed
21 shipments will lead to a situation where the Company's coal inventories will fall
22 below established inventory guidelines, the Company will purchase replacement
23 coal through its competitive bid process.

1 **Q. WERE THERE ANY CHANGES IN COAL MARKET CONDITIONS**
2 **THAT OCCURRED DURING THE REVIEW PERIOD OR THAT DUKE**
3 **ENERGY KENTUCKY EXPECTS TO OCCUR IN THE NEXT TWO**
4 **YEARS THAT HAVE SIGNIFICANTLY AFFECTED OR WILL**
5 **SIGNIFICANTLY AFFECT DUKE ENERGY KENTUCKY’S COAL**
6 **PROCUREMENT PRACTICES?**

7 A. Coal markets continue to be distressed, and there has been increased market
8 volatility due to a number of factors, including: (1) deteriorated financial health of
9 coal suppliers following the past several years of steep declines in coal generation
10 demand, which has impacted the ability of producers to respond to changes in
11 demand during 2021 and the first half of 2022; (2) natural gas price volatility; (3)
12 continued uncertainty regarding proposed and imposed U.S. Environmental
13 Protection Agency regulations for power plants; (4) increased demand in global
14 markets for both steam and metallurgical coal; (5) uncertainty surrounding
15 regulations for mining operations; (6) tightening access to investor financing,
16 coupled with deteriorating credit quality is increasing the overall costs of
17 financing for coal producers; (7) continued shifts in production from thermal to
18 metallurgical coal as producers move away from supplying declining electric
19 generation to take advantage of increasing demand from industry; and (8)
20 continued labor and resource constraints due to structural changes in the coal
21 industry further limiting suppliers’ operational flexibility. In addition, the coal
22 supply chain experienced increasing challenges throughout 2021 and the first half
23 of 2022 as historically low utility stockpiles—combined with rapidly increasing

1 demand for coal, both domestically and internationally—made procuring
2 additional coal supply increasingly challenging. Producers were unable to
3 respond to this rapid rise in demand due to capacity constraints resulting from
4 labor and resource shortages. These factors combined to drive both domestic and
5 export coal prices in 2021 and the first half of 2022 to record levels. Despite
6 current market conditions, coal producers are seeing the inflationary impacts of
7 rising costs associated with mining operations including, but not limited to, labor
8 and equipment costs putting additional pressure on their ability to respond to
9 market demand.

10 **Q. PLEASE IDENTIFY THE RESPONSES TO COMMISSION DATA**
11 **REQUESTS YOU ARE SPONSORING.**

12 A. I sponsor the Company's responses to Data Request Numbers 1, 2, 3, 4, 5, 8, 9,
13 10, 11, 19, 21, 22 in this proceeding. These responses were prepared by me and
14 under my direction and control and are true and accurate.

III. CONCLUSION

15 **Q. IN YOUR OPINION, WERE DUKE ENERGY KENTUCKY'S FUEL**
16 **COSTS AND PROCUREMENTS DURING THE REVIEW PERIOD**
17 **REASONABLE?**

18 A. Yes.

19 **Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

20 A. Yes.

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

AN ELECTRONIC EXAMINATION OF THE)	
APPLICATION OF THE FUEL ADJUSTMENT)	
CLAUSE OF DUKE ENERGY KENTUCKY, INC.)	Case No. 2022-00267
FROM NOVEMBER 1, 2021 THROUGH APRIL)	
30, 2022)	

DIRECT TESTIMONY OF
JIM MCCLAY
ON BEHALF OF
DUKE ENERGY KENTUCKY, INC.

September 30, 2022

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I. INTRODUCTION AND PURPOSE

1 **Q. STATE YOUR NAME AND BUSINESS ADDRESS.**

2 A. My name is James J. McClay, III, and my business address is 526 South Church
3 Street, Charlotte, North Carolina 28202.

4 **Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

5 A. I am employed as Managing Director of Natural Gas Trading for Duke Energy
6 Corporation (“Duke Energy”).

7 **Q. PLEASE DESCRIBE BRIEFLY YOUR EDUCATIONAL BACKGROUND
8 AND PROFESSIONAL EXPERIENCE.**

9 A. I received a Bachelor’s Degree in Business Administration, majoring in Finance
10 from St. Bonaventure University. I joined Progress Energy in 1998 as the
11 Manager of Power Trading and held that position through early 2003 and then
12 became the Director of Power Trading and Portfolio Management for Progress
13 Energy Ventures through February 2007. From March 2007 through late 2008, I
14 was the Director of Power Trading for Arclight Energy Marketing. From March
15 2009 through the present, I’ve been employed in various managerial roles at
16 Progress Energy and Duke Energy overseeing Natural Gas and Oil trading,
17 hedging procurement. Prior to my tenure with Duke Energy, I was employed for
18 approximately 13 years in Capital Markets as a U.S. Government fixed income
19 securities trader with various banks and brokers/dealers.

1 **Q. HAVE YOU TESTIFIED PREVIOUSLY BEFORE THE PUBLIC**
2 **SERVICE COMMISSION?**

3 A. Yes, I have testified in a previous fuel adjustment clause (FAC) proceeding before
4 the Kentucky Public Service Commission (Commission).

5 **Q. PLEASE BRIEFLY DESCRIBE YOUR DUTIES AS MANAGING**
6 **DIRECTOR OF NATURAL GAS TRADING.**

7 A. As Managing Director of Natural Gas Trading, I manage the organization
8 responsible for the natural gas trading, optimization and scheduling functions for
9 the regulated gas-fired generation assets in the Carolinas (Duke Energy Carolinas
10 and Duke Energy Progress), Duke Energy Florida, Duke Energy Indiana and
11 Duke Energy Kentucky (collectively, the “Utilities”), as well as the organization
12 responsible for power trading for Duke Energy Indiana and Duke Energy
13 Kentucky. Additionally, I oversee the execution of the Utilities’ financial
14 hedging programs, fuel oil procurement, and emissions trading.

15 **Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?**

16 A. The purpose of my testimony is to respond to Paragraph 9(a)&(f) of the
17 Commission’s September 13, 2022 Order, to more broadly discuss and support
18 Duke Energy Kentucky’s fuel procurement practices from November 1, 2021
19 through April 30, 2022. Finally, I sponsor several of Duke Energy Kentucky’s
20 responses to the Commission’s Data Requests contained in Appendix B of its
21 September 13, 2022 Order.

II. DISCUSSION

1 **Q. PLEASE COMMENT GENERALLY ON THE REASONABLENESS OF**
2 **DUKE ENERGY KENTUCKY’S GAS PROCUREMENT PRACTICES**
3 **DURING THE REVIEW PERIOD.**

4 A. With respect to natural gas, the company maintains supplier agreements to ensure
5 natural gas can be procured at a competitive market price to meet the needs of the
6 Company’s gas generation fleet. The gas procurement personnel stay abreast of
7 market trends and prices through real-time market electronic pricing platforms
8 such as the Intercontinental Exchange (*i.e.* ICE) real-time price feeds, information
9 published in trade publications, industry reports, and various interactions with
10 suppliers and pipelines. As part of natural gas procurement, the gas personnel
11 review daily forecasts of natural gas needed based on projected generation unit
12 runs before making commitments to purchase natural gas. The Company’s natural
13 gas supply agreements enable the Company to procure the needed volume of
14 natural gas at the most competitive price each day.

15 **Q. PLEASE IDENTIFY THE RESPONSES TO COMMISSION DATA**
16 **REQUESTS YOU ARE SPONSORING.**

17 A. I sponsor the Company’s responses to Data Request Numbers 6, 8, 9, 10, 11, 19,
18 21 in this proceeding. These responses were prepared by me and under my
19 direction and control and are true and accurate.

20 **Q. PLEASE DESCRIBE ANY CHANGES IN THE NATURAL GAS MARKET**
21 **THAT OCCURRED DURING THE REVIEW PERIOD OR THAT DUKE**
22 **ENERGY KENTUCKY EXPECTS TO OCCUR WITHIN THE NEXT**

1 **TWO YEARS THAT HAVE SIGNIFICANTLY AFFECTED OR WILL**
2 **SIGNIFICANTLY AFFECT DUKE ENERGY KENTUCKY’S NATURAL**
3 **GAS PROCUREMENT PRACTICES.**

4 A. Duke Energy Kentucky did experience volatile natural gas market prices over the
5 review period and expects the natural gas market to remain volatile in the future.
6 Duke Energy Kentucky procures natural gas in the spot market when needed to
7 serve the Woodsdale CT unit dispatches. Duke Energy Kentucky has secured
8 active NAESB agreements with gas suppliers to provide firm delivered gas at
9 competitive market prices.

10 **Q. PLEASE DESCRIBE THE PJM CAPACITY MARKET.**

11 A. PJM’s capacity market is called RPM, which is an acronym for Reliability Pricing
12 Model. The purpose of RPM is to provide a market construct that enables PJM to
13 secure adequate generation resources to meet the reliability needs of the regional
14 transmission organization (RTO). The RPM construct and the associated rules
15 regarding how PJM members participate in the PJM capacity market is described
16 within the PJM Open Access Transmission Tariff (OATT) and Reliability
17 Assurance Agreement (RAA). The PJM capacity market operates on a planning
18 period that spans twelve months beginning June 1st and ending May 31st of each
19 year (Delivery Year). In PJM, the capacity market structure is intended to provide
20 transparent forward market signals that support generation and infrastructure
21 investment. There are two ways for a PJM member to participate in the RPM
22 capacity structure: 1) through the RPM baseline procurement auctions; or 2) as a
23 self-supply FRR entity. The baseline procurement auction is called a base residual

1 auction (BRA). BRAs are typically conducted three years in advance of the actual
2 (Delivery Year) in order to allow bidders to complete construction of projects that
3 clear the BRA. The PJM capacity market is designed to provide incentives for the
4 development of generation, demand response, energy efficiency, and transmission
5 solutions through capacity market payments. Another important component of
6 RPM is that price signals are locational and designed to recognize and quantify
7 the geographical value of capacity. PJM divides the RTO into multiple sub-
8 regions called locational delivery areas (LDA) in order to model the locational
9 value of generation.

10 **Q. PLEASE EXPLAIN THE RECENT TIMING CHANGES IN THE PJM**
11 **CAPACITY MARKETS?**

12 A. PJM is conducting a delayed schedule of auctions. The 2024/2025 auction will
13 occur in December 2022, the 2025/2026 auction in June 2023, and finally the
14 2026/2027 auction will occur in November 2023 (back on schedule).

15 **Q. HAS THE DUKE ENERGY OHIO KENTUCKY (DEOK) DELIVERY**
16 **ZONE SEPERATED AS A CONSTRAINED ZONE SINCE THE 2020/2021**
17 **PLANNING YEAR AS PREVIOUSLY REPORTED?**

18 A. Yes. As noted, in the BRA for the 2020/2021 Planning year, the Duke Energy
19 Ohio Kentucky (DEOK) delivery zone separated as a constrained zone clearing at
20 \$130/MW-Day as opposed to the \$76.53/MW-Day for the Rest of RTO. In the
21 BRA for the 2022/2023 Planning year, the DEOK delivery zone separated as a
22 constrained zone clearing at \$71.69/MW-Day as opposed to the \$50.00/MW-Day
23 for the Rest of RTO. This is relevant since Duke Energy Kentucky is required to

1 provide capacity in its FRR plans that meet the requirements of the DEOK zone.
2 While the Company's owned generation at East Bend and Woodsdale stations
3 meet that requirement, if satisfying upcoming FRR plans required purchases of
4 additional short or long-term capacity, such capacity would need to meet those
5 same requirements. The DEOK zone separation could impact market liquidity for
6 capacity; particularly when combined with retirements of other generation in the
7 zone. While this diminished liquidity has not impacted Duke Energy Kentucky to
8 date, the Company is mindful of the potential impacts on capacity planning.

9 **Q. PLEASE BRIEFLY EXPLAIN PJM'S FRR PROCESS.**

10 A. The PJM OATT and RAA specify the obligations and compensation to load
11 serving entities (LSE) for supplying capacity. The FRR process is an alternative
12 means for a PJM LSE such as Duke Energy Kentucky to satisfy its customer
13 capacity obligation under the PJM RAA. Under the FRR construct, an LSE must
14 annually submit a preliminary three-year forward, and a final current year FRR
15 capacity plan that meets a PJM defined customer capacity obligation (FRR Plan).
16 The FRR Plan must identify the unit-specific generating or demand response
17 resources that will be providing the capacity that will fulfill the LSE's customer
18 obligation. FRR allows the LSE to match its customer reliability requirement to
19 its own generation, demand response, energy efficiency and/or transmission
20 resources, while still being permitted to sell some or all of its excess supply into
21 RPM. Duke Energy Kentucky would face severe penalties and limitations on its
22 ability to choose the FRR option if PJM were to deem either its initial or final
23 FRR plans to be insufficient or it's generation otherwise non-compliant with PJM

1 requirements. Duke Energy Kentucky annually submits both a preliminary and a
2 final FRR Plan to PJM. These submittals are consistent with the Commission's
3 Order in Case No. 2010-00203 whereby the Commission required the Company
4 to participate in PJM as an FRR entity until such time as it received Commission
5 approval to participate in the PJM capacity auctions. To date, Duke Energy
6 Kentucky has not requested such permission, but will do so if the Company
7 determines that a change would be in the best interests of its customers and should
8 be made. The Company continues to evaluate the merits of both an FRR entity but
9 also considers benefits of becoming a full RPM auction participant.

III. CONCLUSION

10 **Q. IN YOUR OPINION, WERE DUKE ENERGY KENTUCKY'S FUEL**
11 **COSTS AND PROCUREMENTS DURING THE REVIEW PERIOD**
12 **REASONABLE?**

13 A. Yes.

14 **Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

15 A. Yes.

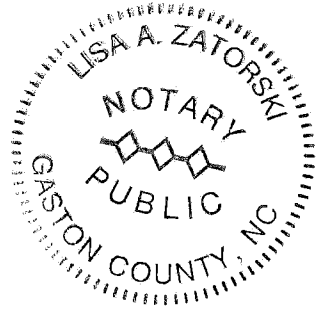
VERIFICATION

STATE OF NORTH CAROLINA)
) SS:
COUNTY OF ~~MECKLENBURG~~)
 Lincoln

The undersigned, Jim McClay, Manager Director Natural Gas Trading, being duly sworn, deposes and says that he has personal knowledge of the matters set forth in the foregoing testimony and that it is true and correct to the best of his knowledge, information, and belief.

Jim McClay
Jim McClay, Affiant

Subscribed and sworn to before me by Jim McClay on this 30th day of Sept, 2022.



Lisa A. Zatorski
NOTARY PUBLIC

My Commission Expires: 3-19-23

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

AN ELECTRONIC EXAMINATION OF THE)
APPLICATION OF THE FUEL ADJUSTMENT)
CLAUSE OF DUKE ENERGY KENTUCKY, INC.) Case No. 2022-00267
FROM NOVEMBER 1, 2021 THROUGH APRIL)
30, 2022)

DIRECT TESTIMONY OF

BRAD DANIEL

ON BEHALF OF

DUKE ENERGY KENTUCKY, INC.

September 30, 2022

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I. INTRODUCTION AND PURPOSE

1 **Q. STATE YOUR NAME AND BUSINESS ADDRESS.**

2 A. My name is Brad Daniel, and my business address is 526 S. Church Street,
3 Charlotte, North Carolina 28202.

4 **Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

5 A. I am employed as Director, Generation Dispatch and Operations, by Duke Energy
6 Carolinas, LLC, a utility affiliate of Duke Energy Kentucky, Inc. (Duke Energy
7 Kentucky or Company).

8 **Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATIONAL BACKGROUND
9 AND PROFESSIONAL EXPERIENCE.**

10 A. I received a Bachelor of Arts degree from the University of Oklahoma in 2000. I
11 received a Master's in Business Administration from Wake Forest University in
12 2009. I joined Cinergy Corporation in 2001 and have held various positions with
13 the Company or its affiliates in the generation dispatch and operations and power
14 trading roles. I have managed the Midwest short term trading portfolio, where I
15 was responsible for power, natural gas, and Financial Transmission Rights (FTR)
16 hedging portfolios covering Duke Energy Kentucky. I also have managed our
17 Fuels and Fleet Analytics team, responsible for fuels forecasting of the Duke
18 Energy Kentucky portfolio. I assumed my current position in December of 2019.

19

1 **Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE KENTUCKY**
2 **PUBLIC SERVICE COMMISSION?**

3 A. Yes, I have testified in previous fuel adjustment clause (FAC) proceedings before
4 the Kentucky Public Service Commission (Commission).

5 **Q. PLEASE BRIEFLY DESCRIBE YOUR DUTIES AS DIRECTOR,**
6 **GENERATION DISPATCH & OPERATIONS.**

7 A. I am responsible for the Company's: (i) generation dispatch; (ii) unit
8 commitment; (iii) 24-hour real-time operations; and (iv) short-term generating
9 maintenance planning. I am also responsible for the submission of the Company's
10 supply offers to the PJM Interconnection, L.L.C. (PJM) regional transmission
11 organization (RTO) day-ahead and real-time electric power markets, as well as
12 managing the Company's short-term supply position to ensure that the Company
13 has adequate resources committed to serve its retail customers' electricity needs.

14 **Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?**

15 A. The purpose of my direct testimony is to respond to the Commission's September
16 13, 2022 Order and address the changes in the wholesale electric power market
17 that occurred during the six-month review period of November 1, 2021 through
18 April 30, 2022, and how those changes have impacted Duke Energy Kentucky's
19 power procurement practices. In doing so, I describe the Company's participation
20 in PJM. Finally, I sponsor several of the Company's responses to the
21 Commission's Data Requests contained in Appendix B of its September 13, 2022
22 Order.

**II. DISCUSSION OF DUKE ENERGY KENTUCKY'S POWER
PROCUREMENT PRACTICES**

1 **Q. PLEASE GENERALLY DESCRIBE DUKE ENERGY KENTUCKY'S**
2 **POWER PROCUREMENT PRACTICES.**

3 A. During the entire review period, Duke Energy Kentucky has been a member of
4 PJM, the nation's first fully functioning RTO that operates the power grid and
5 wholesale electric market for all or parts of thirteen states and the District of
6 Columbia. As discussed herein and in the Direct Testimony of Jim McClay, this
7 electric market consists of energy markets, capacity markets, ancillary services
8 markets, and a FTR market. PJM's operation is governed by agreements approved
9 by the Federal Energy Regulatory Commission (FERC) including the Operating
10 Agreement, Open Access Transmission Tariff (OATT), and the Reliability
11 Assurance Agreement. As a member of PJM, Duke Energy Kentucky is subject to
12 these agreements, which among other things, require Duke Energy Kentucky to
13 offer its available generation to PJM and to purchase its customer energy load
14 from the PJM Day-Ahead or Real-Time Energy Markets. The Day-Ahead and
15 Real-Time Energy Markets are collectively referred to as the PJM Energy Market
16 for the remainder of my testimony.

17 Consistent with its PJM membership, during the period under review, the
18 Company met all its energy needs through the PJM Energy Market and did not
19 purchase any energy outside of PJM. Through PJM's Day-Ahead market, market
20 participants can mitigate their exposure to real-time price risk by selling available
21 generation and purchasing forecasted demand in the Day-Ahead energy market.
22 Duke Energy Kentucky submits demand bids and supply offers as both a load

1 serving entity and a generator owner, respectively. Thus, the Company
2 simultaneously functions as both a buyer and seller to serve its retail electric
3 customers.

4 During the review period, Duke Energy Kentucky also participated in
5 PJM's Ancillary Services Markets. Day-Ahead and Real-Time prices for ancillary
6 services appear to be at reasonable price levels consistent with market conditions.
7 Furthermore, Duke Energy Kentucky's generating units are appropriately
8 receiving day-ahead and real-time awards for supply of reserves.

9 **Q. PLEASE BRIEFLY DESCRIBE THE PJM ENERGY MARKET.**

10 A. PJM administers its Energy Market utilizing locational marginal pricing (LMP).
11 LMP can be broadly defined as the value of one additional megawatt of energy at
12 a specific point on the electric grid. In PJM, LMP is composed of three
13 components: the system energy price, the transmission marginal congestion price,
14 and the marginal loss price. Both the Day-Ahead and Real-Time Energy Markets
15 are based on supply offers and demand bids submitted to PJM by market
16 participants, including both generator owners (as sellers) and load serving entities
17 (as buyers).

18 The Day-Ahead Energy Market provides a means for market participants
19 to mitigate their exposure to price risk in the Real-Time Energy Market. The Day-
20 Ahead Energy Market also provides meaningful information to PJM regarding
21 expected real-time operating conditions for the next day, which enhances PJM's
22 ability to ensure reliable operation of the transmission system. The Real-Time
23 Energy Market functions as a balancing market between generation and load in

1 real-time. Through the PJM Energy Market and the LMP price signals, PJM
2 provides a market-based solution to value and thus manages energy production,
3 transmission congestion, and marginal losses in the PJM region. PJM also
4 operates, and Duke Energy Kentucky participates in, the Ancillary Services
5 Market. Ancillary services include:

- 6 • Synchronized Reserves, which provide energy during an unexpected
7 period of need;
- 8 • Non-Synchronized Reserves, which also provide energy during an
9 unexpected period of need, but which are typically off-line;
- 10 • Regulating Reserves, which are utilized to manage short-term changes
11 in energy requirements;
- 12 • Day-Ahead Scheduling Reserves, a 30-minute day-ahead reserve
13 product;
- 14 • Black Start Service, which provides energy to the grid in the event of a
15 black out condition; and
- 16 • Reactive Supply and Voltage Control, which is produced by capacitors
17 and generators and absorbed by reactors and other inductive devices.

18 PJM Ancillary Services Markets are co-optimized with the PJM Energy Market to
19 minimize overall production costs across the PJM footprint.

20 In addition to these more physical Energy and Ancillary Services Markets,
21 PJM offers financial products that can be utilized to hedge exposure to the Energy
22 Markets. Virtual transactions can hedge risk in the Real-Time Energy Market, and
23 FTR transactions can hedge exposure to day-ahead congestion costs. FTR

1 auctions are conducted annually, quarterly, and monthly. FTRs are defined with
2 source and sink points that entitle and obligate the holder to a stream of revenues
3 or charges based on the hourly day-ahead congestion price differences across the
4 defined path. Duke Energy Kentucky utilizes FTRs to manage the congestion risk
5 from its generation stations to its load zone. Virtual transactions clear in the Day-
6 Ahead Energy Market as virtual generators and loads at specific points on the
7 grid. Virtual transactions settle based on the difference between the day-ahead
8 and real-time LMP at the specific node. Duke Energy Kentucky may utilize
9 virtual transactions to hedge generator performance risk, primarily during start up
10 or as a potential operational contingency.

11 Other non-PJM operated financial markets that are based on PJM market
12 settlements exist. During this review period, Duke Energy Kentucky participated
13 in these financial markets to hedge Duke Energy Kentucky's customers' exposure
14 to day-ahead and real-time energy prices when its generation stations are
15 unavailable due to planned maintenance outages or are not expected to clear the
16 PJM Energy Market in volumes sufficient to serve native load demands.

17 **Q. PLEASE EXPLAIN HOW PJM DISPATCHES GENERATING**
18 **RESOURCES TO MEET DEMAND.**

19 A. An RTO such as PJM performs a security constrained economic commitment and
20 least-cost security constrained economic dispatch process that simultaneously
21 optimizes energy and reserves for all generation in its footprint in determining
22 which assets to commit and dispatch. This process considers the various, unique
23 challenges faced in reliably and economically supplying power to all load across

1 its footprint, most significantly aligning the production of energy simultaneously
2 with the volatility in demand within the capability of the transmission network.
3 PJM must continually act to account for the fact that customer demand is dynamic
4 in nature, fluctuating over the course of a day, week, and season, while analyzing
5 factors such as costs and operating characteristics of generation from different
6 types of units within its entire footprint and expected and unexpected conditions
7 on the transmission network that affect which generation units can be used to
8 serve load economically and reliably given the numerous constraints that must be
9 considered. Because of these challenges, PJM’s dispatch process “is designed to
10 be an optimization process...so that a reliable supply of electricity at the lowest
11 cost possible under the conditions prevailing in each dispatch time interval can be
12 delivered.”¹

13 Importantly, PJM’s decisions as to which generating units should be
14 dispatched are not made exclusively based on the individual unit’s cost. Although
15 the price of energy at a generating unit is certainly important, PJM’s dispatch
16 process must consider several factors, including system-wide reliability,
17 transmission grid congestion and losses, and numerous operational conditions.
18 PJM has access to complete information regarding the operation of its Day-Ahead
19 and Real-Time Energy Markets in making the determination to commit and
20 dispatch a unit. Because of the efficient and informed nature of PJM’s dispatch
21 methodology, a utility’s energy purchases in PJM’s Day-Ahead and Real-Time
22 Energy Markets are efficient and economic means available to satisfy customer

¹ FERC Docket AD05-13-000, *Report on Security Constrained Economic Dispatch by the Joint Board of PJM/MISO Region*, Attachment 1, at pg. 5 (May 24, 2006).

1 load. Stated another way, energy acquired by all load serving entities from PJM
2 is necessarily, and by definition, purchased on an economic dispatch basis.

3 **Q. PLEASE BRIEFLY EXPLAIN HOW DUKE ENERGY KENTUCKY'S**
4 **CURRENT GENERATION PORTFOLIO PARTICIPATES AND IS**
5 **DISPATCHED IN THE DAY-AHEAD AND REAL-TIME ENERGY**
6 **MARKETS.**

7 A. Under the terms of PJM's Reliability Assurance Agreement, as a fixed resource
8 requirement (FRR) entity and generation owner in PJM, Duke Energy Kentucky
9 is under a must-offer requirement to offer its generation committed to the FRR
10 plan into the Day-Ahead Energy Market. The generating units are offered with
11 designations including Must Run, Economic, Emergency, and Unavailable. Units
12 offered with a Must Run status will clear the market and are available for dispatch
13 between the unit's economic minimum and economic maximum load. Units will
14 be dispatched down or at minimum load during periods when the marginal cost of
15 the unit is above the LMP solved by the dispatch model or will be dispatched up
16 or at full load during periods when the marginal cost of the unit is below the LMP
17 solved by the dispatch model. Economic status units generally are committed if
18 their "all in" costs, including startup costs, are economic across the following day
19 or during periods of the following day. Emergency status units are committed
20 during an energy emergency event. Unavailable status units will not be considered
21 by the commitment and dispatch model.

22 Duke Energy Kentucky offers its units to PJM's energy and ancillary
23 service market for commitment and dispatch purposes based on variable

1 production costs used for the calculation of incremental cost, no-load cost, and
2 startup cost. These costs are comprised of the daily market price of fuel and
3 emissions plus variable operation and maintenance costs. Each generating unit is
4 offered hourly with a segmented incremental energy price pair quantity and
5 ancillary service offer curve across the unit's operational range. Other factors that
6 impact hourly offer parameters are included but not limited to unit efficiency,
7 maximum and minimum loadings, and plant availability. Unit status therefore is
8 determined based upon unit availability, marginal energy costs, expected impact
9 of certain PJM charges and credits, and anticipated market clearing prices.

10 Day-ahead generation unit offers are submitted to PJM by 11:00 Eastern
11 Prevailing Time the day prior to energy flow. Generally, by 13:30 Eastern
12 Prevailing Time that day, following execution of a security constrained unit
13 commitment model, PJM posts energy and ancillary services awards for the
14 following day. These awards are financially binding on both Duke Energy
15 Kentucky and PJM.

16 In real time, Duke Energy Kentucky makes hourly updates to energy and
17 ancillary service offers, primarily with respect to unit availability, but also taking
18 into account unit operating parameters. The Duke Energy Kentucky generation
19 dispatcher follows PJM generation dispatch signal instructions and relay
20 necessary instructions to the generation stations.

21 It is possible that in real time, despite receiving a day-ahead energy award,
22 PJM dispatch signals will instruct Duke Energy Kentucky plants to move to
23 generation loadings other than their Day-Ahead award level. These instructions

1 are based on the Real-Time energy and ancillary services needs of the overall
2 system as manifested through LMP price signals at the generator bus. If the real-
3 time LMP is below a unit's marginal cost of energy, PJM will likely reduce
4 output, or delay or cancel a unit startup. Conversely, if system conditions have
5 changed from day-ahead model assumptions, PJM may direct a Duke Energy
6 Kentucky unit to start up even without a Day-Ahead energy award. Duke Energy
7 Kentucky has an obligation and financial incentive to follow PJM dispatch
8 instructions.

9 **Q. PLEASE DESCRIBE ANY CHANGES THAT OCCURRED IN THE**
10 **WHOLESALE ELECTRIC POWER MARKET BETWEEN NOVEMBER**
11 **1, 2021 AND APRIL 30, 2022 THAT SIGNIFICANTLY AFFECTED DUKE**
12 **ENERGY KENTUCKY'S ELECTRIC POWER PROCUREMENT**
13 **PRACTICES.**

14 A. Duke Energy Kentucky joined PJM effective January 1, 2012, and thus operated
15 within PJM during the period under review in this proceeding. Accordingly, the
16 Company continues to offer its generation and bid its load into the PJM market.
17 For the Duke Energy Kentucky generating capacity, the Company offered its
18 resources in an FRR capacity plan. The generating resources that are committed
19 in the FRR plan have a must-offer obligation for their energy in the Day-Ahead
20 Energy Market. Duke Energy Kentucky Witness Mr. McClay discusses the PJM
21 Capacity markets in greater detail through his direct testimony.

22 Over the period, natural gas and PJM power prices rose significantly and
23 coal markets became distressed. As natural gas prices rose beginning in the

1 summer of 2021, power prices rapidly climbed as well. This increase in power
2 prices drove coal burns significantly higher across the energy sector. Due to
3 several factors described in the testimony of Ms. Hughes, coal markets became
4 distressed, and the coal supply chain was significantly impacted. The impacts in
5 the coal supply chain along with rising coal, natural gas and power prices led to
6 sustained strength in energy prices throughout the period.

7 East Bend continues to compete favorably in the PJM market, with the
8 unit typically offered to PJM with a Must Run offer status to best optimize the
9 unit's availability for dispatch in PJM. The unit tends to be dispatched at full load
10 during on-peak periods and even during much of the off-peak periods as well.
11 However, as market coal prices and thus the marginal fuel cost of the unit has
12 increased, the unit dispatches between minimum and maximum load more often
13 in off peak hours while sustaining a high amount of dispatch at full load in on
14 peak hours. The Company's six combustion turbines at Woodsdale station
15 continue to see limited dispatch within the PJM energy markets. The Company
16 continued to make economic power purchases for both planned and unplanned
17 outages during the audit period to mitigate exposure to market prices. In addition,
18 Duke Energy Kentucky made economic purchases from PJM when the purchases
19 were more economic than dispatching its own generation for the benefit of the
20 Company's native load.

21 PJM commits and dispatches these resources via their security constrained
22 unit commitment and least-cost economic dispatch software by modeling the
23 Duke Energy Kentucky generating resources with all other generating resources

1 in the PJM area. If not committed day-ahead, the units may still be called upon in
2 real-time. There are separate LMPs calculated for Day-Ahead versus Real-Time
3 Markets that are paid to the generators or charged to the load. PJM also operates
4 an ancillary service market for regulation, day-ahead scheduling reserves, non-
5 synchronized, and synchronized reserves, each of which is cleared separately with
6 different prices for each product. In addition, PJM reimburses service providers
7 such as Duke Energy Kentucky for blackstart and reactive services. The Duke
8 Energy Kentucky Woodsdale gas-fired combustion turbine plant is currently a
9 blackstart unit in the applicable Duke Energy blackstart plan and, in addition, is
10 reimbursed for certain costs to provide blackstart service by PJM. Duke Energy
11 Kentucky continues to operate its generating resources to optimize revenues
12 available in the PJM capacity market and energy market and for ancillary
13 services, blackstart, and reactive service in a reliable manner for the benefit of
14 customers and shareholders.

15 **Q. PLEASE IDENTIFY THE RESPONSES TO COMMISSION DATA**
16 **REQUESTS YOU ARE SPONSORING.**

17 A. I sponsor the Company's responses to Data Request Numbers 7, 15, 18, 27, 28,
18 29, and 30. These responses were prepared by me and under my direction and
19 control and are true and accurate.

III. CONCLUSION

1 **Q. IN YOUR OPINION, WERE DUKE ENERGY KENTUCKY'S POWER**
2 **PROCUREMENT PRACTICES REASONABLE DURING THE AUDIT**
3 **PERIOD?**

4 **A. Yes.**

5 **Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

6 **A. Yes.**