COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

The Electronic Application of Duke Energy Kentucky, Inc. for a Certificate of Public Convenience and Necessity to Convert its Wet Flue Gas Desulfurization System from a Quicklime Reagent Process to a Limestone Reagent Handling System at its East Bend Generating Station and for Approval to Amend its Environmental Compliance Plan for Recovery by Environmental Surcharge Mechanism	)	Case No. 2024-00152

REBUTTAL TESTIMONY OF

MATTHEW KALEMBA

ON BEHALF OF

DUKE ENERGY KENTUCKY, INC.

November 27, 2024

TABLE OF CONTENTS

PAGE

I. INTRODUCTION AND PURPOSE

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Matthew Kalemba, and my business address is 525 South Tryon Street, Charlotte, North Carolina.

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

A. I am employed by Duke Energy Business Services LLC (DEBS) as Vice President, Integrated Resource Planning. DEBS provides various administrative and other services to Duke Energy Kentucky and other affiliated companies of Duke Energy Corporation (Duke Energy).

Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A. I received a Bachelor of Science in Chemical Engineering from North Carolina State University in 2000 and a Master of Business Administration from Lake Forest Graduate School of Management in Chicago in 2012. From 2000 to 2014, I held various roles in the petroleum refining and petrochemical industry including process engineering, feedstock, and supply chain management, and short-term, mid-term, and long-term strategy development. I joined Duke Energy in 2014 as an analyst in the Carolinas Integrated Resource Planning team and became Director of Distributed Energy Technologies Planning and Forecasting in March of 2020. In March of 2023, I became Managing Director IRP & Analytics for Duke Energy's Midwest regulated utilities. In March of 2024, I was promoted to my current position as Vice President Integrated Resource Planning.

Q. PLEASE DESCRIBE YOUR RESPONSIBILITIES AS VICE PRESIDENT INTEGRATED RESOURCE PLANNING.

A. I oversee the development of the long-term resource plans for Duke Energy's electric utility operating companies, including that of Duke Energy Kentucky. The overriding objective of those plans is to provide customers with a generating system that is mindful of costs and risks, is increasingly diverse and environmentally sustainable.

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

A. Yes. Most recently, I provided testimony in Case No. 2023-00413.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THESE PROCEEDINGS?

A. My testimony is to respond to the allegations and recommendations made by Sierra Club's witness Ms. Chelsea Hotaling regarding the Company's 2024 Integrated Resource Plan (IRP) as it relates to Duke Energy Kentucky's proposal for a certificate of public convenience and necessity (CPCN) to convert East Bend's lime-based reagent process to a limestone-based reagent handling system Limestone Conversion). In doing so, I provide an overview of the Company's IRP modeling and the results of the 2024 IRP. I discuss Duke Energy Kentucky's modeling as it relates to its generation supply portfolio forecasts, which include the estimated life of the Company's electric generating fleet and how the Company will replace those assets. Finally, I summarize and explain the analysis that was performed in the Company's most recent Integrated Resource Plan (IRP) filed in Case No. 2024-00197.

II. DISCUSSION

Q. ARE YOU FAMILIAR WITH THE INTEGRATED RESOURCE PLANNING PROCESS FOR DUKE ENERGY KENTUCKY?

A. Yes. Duke Energy Kentucky files its IRP approximately every three years. The Company recently filed its current IRP with the Commission in Case No. 2024-00197 in June 2024 (2024 IRP). This IRP provides a snapshot of Duke Energy Kentucky's resource planning at that point in time.

Q. WERE YOU INVOLVED WITH THE CREATION OF DUKE ENERGY KENTUCKY'S MOST RECENTLY FILED IRP?

A. Yes. I supervised the development of the Duke Energy Kentucky's IRP including developing the various portfolio scenarios that were analyzed in the IRP.

Q. PLEASE GENERALLY DESCRIBE THE IRP PLANNING PROCESS.

A. The IRP planning process assesses various supply-side, demand-side and emission compliance alternatives to develop a long-term, cost-effective portfolio to provide customers with reliable service at reasonable costs. The IRP planning process involves various assumptions such as future energy prices, future environmental compliance requirements and reliability constraints.

Duke Energy Kentucky's load forecasting group develops the load forecast by: (1) obtaining service area economic forecasts primarily from Moody's Analytics; (2) preparing an energy forecast by applying statistical analysis to certain variables such as number of customers, economic measures, energy prices, weather conditions, *etc.;* and (3) developing monthly peak demand forecasts by statistically analyzing weather data. The Company updates the load forecasts on a regular basis and the updated load forecasts are used for all modeling analysis. It is important to

note that while Duke Energy Kentucky develops internal load forecasts for system planning purposes, the actual load forecast and the Duke Energy Kentucky PJM Interconnection, L.L.C (PJM) load obligation, which includes peak coincidence factors and system reserve requirements, is calculated by PJM and can differ slightly from the Company's internal forecast.

Q. PLEASE BRIEFLY DESCRIBE WHAT THE COMPANY'S 2024 IRP DETERMINED AS IT RELATES TO THE COMPANY'S GENERATING PORTFOLIO, AND PARTICULARLY, THE EAST BEND GENERATING STATION.

A. The Company's 2024 IRP shares some of the characteristics of its previous IRPs. It represents Duke Energy Kentucky's proposed roadmap to meet future energy and demand requirements without compromising reliability of service, energy affordability or the power demands of a growing region. The 2024 IRP reflects updated fuel and load forecasts, as well as updated new generation capital costs reflecting a dynamic macroeconomic and inflationary environment impacting supply chain and resource costs. Additionally, the 2024 IRP includes updated policies at both the state and federal level including:

- The Inflation Reduction Act (IRA) particularly expanded investment and production tax credits for non-CO_2 emitting generating resources;
- The Environmental Protection Agency (EPA) Clean Air Act (CAA) Section 111 April 2024 Updates (EPA CAA Section 111 Update) regulating existing coal and new natural gas generation facilities;

- Updates to Effluent Limitation Guidelines (ELG); 316 a & b (thermal discharge limits and fish impingement/entrainment at water intakes); and tightened Mercury & Air Toxics Standards (MATS); and
- Removal of a CO_2 tax on plant emissions as a likely future policy primarily due to the inclusion of the IRA and EPA CAA Section 111 Update provisions.

Importantly, the 2024 IRP reflects Duke Energy Kentucky's conversion of East Bend from 100% coal generation to coal generation with gas co-firing capabilities, or dual fuel operation (DFO) to be in service as of December 31, 2029. The 2024 IRP includes continued operation of the Woodsdale CT's and the addition of a combined cycle (CC) at East Bend beginning on January 1, 2039. The resource mix is supplemented by demand response and solar resources. A summary of the preferred portfolio of resources through 2040 as modeled in the IRP is provided as follows:

Resources (MW)	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
East Bend (coal)	600	600	600	600	600											
East Bend DFO						600	600	600	600	600	600	600	600	600		
East Bend CC (1x1)															664	664
Woodsdale CTs	564	564	564	564	564	564	564	564	564	564	564	564	564	564	564	564
Demand Response	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Solar	9	9	9	9	59	59	109	109	159	159	209	209	259	259	309	309

The primary difference between the 2021 plan and the 2024 plan is the conversion of East Bend from 100% coal generation to coal generation with natural gas co-firing capabilities, or DFO. This change is driven by environmental regulations, primarily the EPA CAA Section 111 Update that was not in place in 2021. EPA CAA 111 Update limits coal plants to four compliance pathways:

1. Retire by January 1, 2032, without restriction on operation until retirement;
2. Convert the unit to full natural gas operation by January 1, 2030;
3. Convert to at least 40% gas-cofiring by January 1, 2030; or
4. Add Carbon Capture and Sequestration (CCS) by January 1, 2032.

As part of its modeling, the Company determined that natural gas-cofiring was the preferred strategy because it adds needed fuel diversity and security to the Duke Energy Kentucky system, reduces customers' exposure to PJM market prices, provides for a measured energy transition while allowing time for technological advancements related to permanent replacement generation, and is in line with Kentucky's energy policies and priorities.

The 2024 IRP analyzes the portfolio beyond the life of East Bend's December 31, 2038, estimated retirement date as a result of the EPA CAA 111 Update, and includes a 1x1 CC as the optimal replacement resource for East Bend at the time of its retirement. Additionally, the IRP also includes renewable resource assumptions. While the 2024 IRP identifies replacement generation as a 1x1 CC, there is time between this filing and East Bend's compliance-driven retirement to allow other technologies such as nuclear small modular reactors (SMR) or CC

paired with CCS (CC w/ CCS) to evolve such that these other technologies may be used as a replacement for East Bend.

Q. PLEASE EXPLAIN WHETHER AND HOW THE COMPANY'S LIMESTONE CONVERSION WAS INCLUDED IN COMPANY'S 2021 OR 2024 IRP.

A. The limestone conversion project, including all capital and operating costs, was included as a base assumption in each of the portfolios evaluated in the 2024 IRP. The capital cost associated with the project can be found in confidential Table H.2 – Generation Operational Characteristics on page 151 of the IRP.

Q. PLEASE SUMMARIZE MS. HOTALING'S CRITICISMS OF THE COMPANY'S IRP AS IT RELATES TO THE LIMESTONE CONVERSION CPCN.

A. Ms. Hotaling makes several observations and criticisms of the Company's 2024 IRP as it relates to East Bend and the limestone conversion project as issue in this case. She argues that the Company's IRP does not support the limestone conversion CPCN.[1] She is critical of the IRP analysis because it considered the limestone conversion as a base assumption, meaning it was part of all portfolios analyzed, and as a result it cannot be determined if there was a lesser cost resource alternative to meet Duke Energy Kentucky's customers' needs. She is critical of the levels of future cost of operation and necessary investments in East Bend in future planning years.[2] She is also critical of the Company's IRP not testing accelerated renewables as part of its evaluation of a natural gas conversion, arguing that the failure of

[1] Hotaling Direct pg. 12
[2] Hotaling Direct pg. 14.

additional renewables to the natural gas conversion scenario results in an incomplete IRP.[3] Ms. Hotaling concludes that the Commission should direct Duke Energy Kentucky to provide more resource planning analysis.

Q. PLEASE RESPOND TO MS. HOTALING'S OVERALL CLAIM THAT THE COMPANY'S IRP DOES NOT SUPPORT THE CPCN FOR THE LIMESTONE CONVERSION PROJECT.

A. As explained by Witness Verderame, the support for the Limestone Conversion project is included in the analysis as part of this CPCN docket. The IRP includes the limestone conversion project as a base planning assumption. The purpose of the IRP is to develop a plan for meeting the Company's Kentucky load requirements over a defined planning horizon based upon information known at the time of the analysis. A reasonable base assumption, given Kentucky's energy policy, at the time of the IRP analysis was that the Company's existing dispatchable fossil generation will be used to meet our Kentucky demand as long as economically and reasonably feasible. A key to that assumption for East Bend, was that the unit would need to take reasonable steps to continue to comply with known environmental regulations in the near term. The limestone conversion provides a reasonable assumption to address supply risks and meet those known compliance obligations and can be viewed as a proxy for other environmental investments that may be necessary should the Commission ultimately deny the Company's CPCN in this case. Moreover, because the limestone conversion enables other efficiency gains at the unit, the Company believes incorporating those in the IRP as a base assumption is a reasonable analysis assumption.

[3] Hotaling Direct pg. 16.

Q. PLEASE RESPOND TO MS. HOTALING'S CRITICISM OF THE INCORPORATION OF THE LIMESTONE CONVERSION AS PART OF THE BASE ASSUMPTION FOR EVERY PORTFOLIO ANALYSED.

A. At the time that forecasts and assumptions were developed for the IRP (late 2023), the economics of the conversion project were favorable in comparison to the cost of reagents that would be required without the conversion even if the unit were to stop burning coal by 2030. In other words, it would be in the best interest of customers for the Company to undertake the conversion project regardless of whether the unit would be converted to gas fuel by 2030. However, since the forecasts and assumptions were developed for the IRP, the estimated costs of conversion have increased, and the forecasted cost of reagents required without the conversion has decreased. It remains true that failing to pursue the conversion project would expose customers to future cost and supply risk associated with reagent procurement in a future in which the unit continues to burn coal into the 2030s, including in the event that the EPA CAA Section 111d Update is reversed.

Q. PLEASE EXPLAIN WHY IT IS REASONABLE TO INCLUDE THE LIMESTONE CONVERSION AS A BASE ASSUMPTION.

A. As explained above, the limestone conversion project was assessed to be the best alternative at the time the inputs to the IRP were developed, and as such, the project was included as a base assumption. As Mr. Verderame explains, the Company continues to believe that the conversion remains a reasonable and beneficial investment for customers.

Q. PLEASE RESPOND TO MS. HOTALING'S CRITICISM OF THE INCORPORATION OF FUTURE OPERATIONAL COSTS AND INVESTMENTS IN THE 2024 IRP.

A. Ms. Hotaling notes that there is an uptick in fixed operations and maintenance (O&M) and maintenance capital at East Bend in 2028 and 2033, and that those costs may be avoided through DFO or natural gas conversion. The IRP analysis, specifically the PVRR, already accounts for differences in fixed O&M and maintenance capital when coal is no longer available and/or when gas is available at East Bend. In fact there is a significant decrease in costs in 2033 in the NGC case versus the DFO case that is accounted for in the PVRR for those cases.

Q. PLEASE RESPOND TO MS. HOTALING'S CRITICISM OF NOT INCLUDING ACCELERATED RENEWABLE INVESTMENTS AS PART OF THE NATURAL GAS CONVERSION SCENARIO EVALUATED IN THE 2024 IRP.

A First, Ms. Hotaling's criticism is based solely upon speculation. Including accelerated renewable investments as part of the natural gas conversion scenario would not have changed the outcome of the 2024 IRP and would have likely caused a more expensive portfolio in that case. The optimized Natural Gas Conversion case selected solar beginning in 2037, with a total of 50 MW being selected by 2040. On the other hand, the DFO case selected solar beginning in 2039 with a total of 250 MW being selected by 2040 With significantly more solar being selected in the DFO case, it was intuitive to test accelerating, and more evenly distributing those renewables over the portfolio. When the Company compared PVRRs in those DFO cases, there was a negligible impact to PVRR (approximately $2 million more

expensive in the accelerated renewables case over the 15-year planning horizon). There was no cause for testing similar acceleration of solar in the Natural Gas Conversion case because only 50 MW of solar was selected over the entire planning horizon.

Q. DO YOU AGREE WITH MS. HOTALING'S OVERALL CRITICISM THAT THE 2024 IRP IS INCOMPLETE? PLEASE EXPLAIN.

A. No. Appendix G of the IRP provides a detailed account of where in the document each Commission requirement of the IRP is met. Sierra Club's contention that the IRP fails to meet the Commission's regulations is founded in her conclusion that the Company failed to adequately evaluate alternatives to co-firing East Bend 2 with coal and gas starting in 2030. However, as detailed in Chapter 6 of the IRP, the Company provides a robust analysis of East Bend configuration and retirement alternatives in futures where EPA CAA Section 111 Update remains in place and where the Update is repealed

Q. PLEASE RESPOND TO MS. HOTALING'S REQUEST THAT THE COMMISSION DIRECT THE COMPANY TO CONDUCT MORE RESOURCE PLANNING ANALYSIS.

A. Ms. Hotaling's testimony is clearly an attempt to collaterally litigate the Company's IRP in this case. She fails to acknowledge that the Commission does not approve the Company's IRP, but rather following comments and a hearing if required, the Commission staff will issue its recommendations for incorporation in a future IRP. Recasting the existing IRP would be a waste of time and resources for the Company and the Commission and would only delay the Commission's decision in this case.

The approximate three-year cadence of IRP analysis provided by Kentucky regulation is a reasonable update horizon.

Further, conducting additional resource planning analysis at this time would not provide this Commission with additional actionable information. Removing the Limestone Conversion project from the Natural Gas Conversion case *might* improve the PVRR of that case, but it would certainly increase reliance on the PJM market beginning in the 2027 timeframe which would add more evidence for not pursuing the NGC alternative. Accelerating renewables in the NGC case, when the model is not selecting more than 50 MW of renewables over the planning horizon in that case to begin with may slightly reduce reliance on the market, but it would certainly increase the cost of the portfolio. Finally, future operating costs and investments at East Bend are already included in the IRP and those investments are both incorporated in the PVRR and vary between the NGC, DFO, and early retirement cases. Additional resource planning analysis would not lead to additional meaningful information in this docket.

III. CONCLUSION

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes

VERIFICATION

STATE OF NORTH CAROLINA)
)
COUNTY OF MECKLENBURG)

SS:

The undersigned, Matt Kalemba, Vice President Integrated Resource Planning, being duly sworn, deposes and says that he has personal knowledge of the matters set forth in the foregoing rebuttal testimony and that it is true and correct to the best of his knowledge, information and belief.

Matt Kalemba Affiant

Subscribed and sworn to before me by Matt Kalemba on this 21 day of November 2024.

Sheila Lemoine
NOTARY PUBLIC

SHEILA LEMOINE
Notary Public, North Carolina
Lincoln County
My Commission Expires
July 21, 2029

My Commission Expires: July 21, 2029