

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

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.
2025-00002

DIRECT TESTIMONY OF
J. MICHAEL GEERS, P.E.
ON BEHALF OF
DUKE ENERGY KENTUCKY, INC.

January 28, 2025

TABLE OF CONTENTS

	<u>PAGE</u>
I. INTRODUCTION AND PURPOSE	1
II. ENVIRONMENTAL REGULATIONS IMPACTING DUKE ENERGY KENTUCKY'S EAST BEND GENERATING STATION.....	3
III. GENERAL DESCRIPTION OF ENVIRONMENTAL CONTROLS AT DUKE ENERGY KENTUCKY'S EAST BEND GENERATION STATION.....	10
IV. CONCLUSION	21

I. INTRODUCTION AND PURPOSE

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

2 A. My name is J. Michael Geers, and my business address is 139 East Fourth Street,
3 Cincinnati, Ohio 45202.

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

5 A. I am employed by Duke Energy Business Services LLC, a service company affiliate
6 of Duke Energy Kentucky, Inc. (Duke Energy Kentucky or Company) and a
7 subsidiary of Duke Energy Corporation (Duke Energy Corp.), as Manager of the
8 Environmental Health and Safety (EHS) Energy Transition Group.

9 **Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATION AND**
10 **PROFESSIONAL EXPERIENCE.**

11 A. I received a Bachelor's Degree in Chemical Engineering from the University of
12 Dayton in 1981, and a Master's of Business Administration from the University of
13 Cincinnati in 1995. I am also a Registered Professional Engineer in the State of
14 Ohio. After graduation, I joined The Cincinnati Gas & Electric Company (CG&E)
15 as an Assistant Engineer. I have held a number of positions in these organizations
16 of increasing responsibility in the power operations and environmental areas. Some
17 of those positions include Performance Engineer, and Senior Engineer at various
18 coal fired power plants, including the East Bend Station. In March 1997, I joined
19 Cinergy's Environmental Services Air Management Group and was promoted to
20 Principal Environmental Scientist. In April 2006, I was named as the Manager of
21 Duke Energy's Air Management Group within Corporate Environmental Health
22 and Safety Air Management Group. Subsequently I managed the Environmental

1 Programs Group. My current position is the Manager of the EHS Energy Transition
2 Group.

3 **Q. PLEASE BRIEFLY DESCRIBE YOUR DUTIES AND RESPONSIBILITIES**
4 **AS MANAGER OF THE EHS ENERGY TRANSITION GROUP.**

5 A. I lead the EHS Energy Transition Group, which has a number of subject matter
6 experts responsible for siting, licensing, and permitting activities for projects in the
7 renewables, natural gas, nuclear and new generation areas. Previously as the
8 manager of the Environmental Programs Group, my group was responsible for
9 reviewing new Federal and State regulations such as the Mercury and Air Toxics
10 Standard (MATS), the National Ambient Air Quality Standards (NAAQS) and
11 Cross State Air Pollution Rule (CSAPR), among others, and determining their
12 impact on our generating facilities.

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

15 A. The purpose of my testimony is to discuss the environmental requirements
16 applicable to Duke Energy Kentucky's operation of East Bend that specifically
17 relate to the Company's need to convert its lime-based wet flue gas desulfurization
18 process (WFGD) to a limestone-based system (Limestone Conversion Project) and
19 request for an amendment to Duke Energy Kentucky's Environmental Compliance
20 Plan (ECP) to include the construction and operation and maintenance activities
21 and recovery as part of the environmental surcharge mechanism (ESM). In doing
22 so, I provide an overview of the environmental controls that exist today at East
23 Bend and the regulations that require such controls, and any permits required to
24 perform this work. Finally, I sponsor Exhibits 3 and 4 to the Company's

1 Application, which provides three years of filterable PM (fPM) emissions data on
2 a 30-day rolling average basis for East Bend and Exhibit 4 which is the Company's
3 application for a minor air permit modification for the conversion process.

II. **ENVIRONMENTAL REGULATIONS IMPACTING DUKE ENERGY**
KENTUCKY'S EAST BEND GENERATING STATION

4 **Q. WHAT ARE THE MOST SIGNIFICANT ENVIRONMENTAL**
5 **REGULATIONS CURRENTLY IMPACTING DUKE ENERGY**
6 **KENTUCKY'S EAST BEND STATION?**

7 A. There are several programs promulgated by the U.S. EPA under the Clean Air Act
8 (CAA) that impact all of the Company's generating stations, and particularly East
9 Bend. These regulations are the primary drivers of Duke Energy Kentucky's
10 compliance strategies for its plants in general and specifically the conversion of
11 East Bend's wet flue gas desulfurization (WFGD) system to Limestone. They are
12 as follows: the New Source Performance Standards for Greenhouse Gas Emissions
13 from New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating
14 Units, the Mercury and Air Toxics Standard (MATS Rule) and the Cross State Air
15 Pollution Rule (CSAPR) including the U.S. EPA's March 2023 Good Neighbor
16 Plan which further revised CSAPR.

17 Additionally, although not relevant to the Company's request for approval
18 of the Limestone Conversion Project in this Application, East Bend is also subject
19 to the following rules: 1) the Coal Combustion Residuals (CCR) Final Rule; 2) the
20 Steam Electric Effluent Limitation Guidelines (ELG Final Rule); as well as other
21 emerging regulations under the Clean Water Act (CWA).

1 **Q. PLEASE BRIEFLY DESCRIBE THE CAA.**

2 A. The CAA is the comprehensive federal law that regulates air emissions from
3 stationary and mobile sources. Among other things, this law authorizes EPA to
4 establish a number of programs to regulate air emissions so as to protect public
5 health and public welfare. Many of these programs overlap and at times regulate
6 the same pollutants.

7 **Q. CAN YOU PROVIDE A BRIEF SUMMARY OF THE MATS RULE?**

8 A. The MATS Rule regulates mercury and other toxic air pollutant emissions from
9 new and existing coal- and oil-fired steam electric generating units (EGUs) that are
10 greater than 25 MWs in capacity. It is a command-and-control program that
11 imposes unit-by-unit restrictions on emissions of mercury, acid gases such as
12 hydrogen chloride, and certain non-mercury metals, including arsenic, chromium,
13 nickel, and selenium. The MATS Rule allows EGUs, as one option, to demonstrate
14 compliance by measuring mercury, hydrogen chloride, and non-mercury metal
15 emissions directly. It also allows the EGUs the option of demonstrating compliance
16 by measuring surrogates for acid gases and for non-mercury metals. In April 2024,
17 EPA finalized a revision to the MATS rule which will require compliance by July
18 2027. Among other things, this rule update includes stricter pollution limits for
19 mercury and filterable particulate matter (fPM) through: 1) imposition of a standard
20 of 0.010 lb/MMBtu, resulting in a 67 percent strengthening from the current
21 standard of standard of 0.030 lb/MMBtu that was established in the 20102 MATS;
22 2) requires the use of continuous emissions monitoring systems to show how much

1 pollution is coming from power plants; and 3) eliminates the previous rule
2 exception that allowed facilities to exceed emission limits when they started up.¹

3 **Q. DOES EAST BEND CURRENTLY COMPLY WITH THE MATS RULE?**

4 A. East Bend began complying with MATS Rule promulgated in April 2015. The
5 Company has evaluated the changes EPA finalized with the April 2024 rule, and
6 while these changes have only limited impact on East Bend, this is due to the
7 Company's decision to seek approval of the Limestone Conversion, which among
8 its benefits, includes upgrading equipment in the WFGD absorbers and sprayers
9 that will allow the Company to meet the new MATS standard for fPM embodied in
10 the April 2024 revision.

11 **Q. PLEASE EXPLAIN THE NEW MATS STANDARD FOR fPM INCLUDED**
12 **IN THE APRIL 2024 REVISION AND HOW IT IS DIFFERENT THAN THE**
13 **PREVIOUS STANDARD.**

14 A. The 2012 MATS rule established a fPM standard of 0.030 lbs./MMBtu. In 2024
15 EPA revised the fPM standard downward by two thirds to 0.010 lbs./MMBtu.
16 Compliance with the existing standard and the revised standard is based on a 30-
17 day rolling average and PM CEMS are used to demonstrate compliance.

¹ See e.g., www.epa.gov/system/files/documents/2024-04/presentation_mats_final-2024-4-24-2024.pdf

1 **Q. PLEASE PROVIDE A SHORT DESCRIPTION OF THE HISTORY AND**
2 **STATUS OF THE CLEAN AIR INTERSTATE RULE (CAIR) AND CSAPR.**

3 A. On August 8, 2011, the EPA published the final CSAPR rule to replace CAIR,
4 which was vacated and remanded by the Court of Appeals for the District of
5 Columbia Circuit (D.C. Circuit) in July 2008. CSAPR established new state-level
6 annual SO₂ and NO_x budgets and ozone-season NO_x budgets. The rule was initially
7 scheduled to take effect January 1, 2012; however, due to litigation, the CSAPR
8 deadlines were tolled by three years and CSPAR went into effect on January 1,
9 2015. In October 2016, the U.S. EPA finalized the CSAPR Update Rule, which
10 significantly reduced the ozone season NO_x emission budgets for 22 eastern states
11 from those promulgated in the original CSAPR. These budgets, including for
12 Kentucky, took effect on May 1, 2017. This change significantly reduced the
13 number of ozone season NO_x allowances for East Bend. As a result of further
14 litigation the U.S. EPA has published further revisions to CSAPR on April 30,
15 2021. Then on March 15, 2023, EPA finalized the Good Neighbor Plan for the 2025
16 Ozone NAAQS (Good Neighbor Plan). Their effect has been to restrict the total
17 number of emission allowances available to East Bend and institute additional
18 changes and restrictions on the national allowance trading program. These new
19 rules are also under litigation. Specifically, due to litigation, EPA is not
20 implementing the Good Neighbor Plan in Kentucky.

21 **Q. HOW HAS CSAPR'S IMPLEMENTATION IMPACTED EAST BEND?**

22 A. Because it has a well performing WFGD system and a selective catalytic reduction
23 control (SCR), East Bend has, to date, been able to comply with CSAPR and its
24 revisions without the installation of additional controls. This is also the case with

1 the most recent Revised CSAPR Update Rules, the latest of which went into effect
2 in Kentucky for the ozone season beginning May 1, 2021. Because of the
3 restrictions on trading within a small group of states and the more limited state
4 allowance budgets for ozone season NO_x, the allowance prices under the Revised
5 CSAPR Update Rule are significantly higher than they were under the previous
6 versions of the rule. The East Bend SCR design is expected to be robust enough to
7 comply with the Good Neighbor Plan were it to be reinstated in Kentucky. Under
8 these various programs, and if it is economically prudent, East Bend could also opt
9 to buy or sell allowances on the market.

10 **Q. PLEASE DESCRIBE THE MAJOR EFFORTS TO REGULATE**
11 **GREENHOUSE GASES THAT RELATE TO ELECTRIC GENERATING**
12 **UNITS.**

13 A. In 2007, the U.S. Supreme Court ruled in *Massachusetts v. EPA*² that greenhouse
14 gases are a pollutant subject to regulation under the CAA. Subsequently, the U.S.
15 EPA has undertaken a number of rulemakings targeting greenhouse gas emissions
16 from EGUs. On June 18, 2014, EPA proposed a rule, known as the Clean Power
17 Plan (CPP) to regulate CO₂ emissions from existing fossil fuel-fired EGUs which
18 was finalized on October 23, 2015. Numerous petitions for review were filed with
19 the D.C. Circuit challenging the legal status of the CPP. On February 9, 2016, the
20 U.S Supreme Court granted a stay of the CPP effective until its legal status is
21 resolved.

² *Massachusetts v. Environmental Protection Agency*, 549 U.S. 497 (2007).

1 On April 4, 2017, the U.S. EPA announced in the Federal Register that it is
2 conducting a review of the CPP, in accordance with an Executive Order by the
3 President issued on March 28, 2017. The EPA indicated that it “if appropriate, will
4 as soon as practicable and consistent with law, initiate proceedings to suspend,
5 revise or rescind this rule.” On April 28, 2017, the D.C. Circuit issued an order
6 temporarily suspending the litigation while it considers EPA’s motion to stay the
7 litigation while the Agency reviews the rule.

8 On July 8, 2019, the EPA finalized the Affordable Clean Energy (ACE)
9 rule, and in a separate but related rule repealed the Clean Power Plan and
10 established a process to develop CO₂ emission standards for existing coal-fired
11 power plants.

12 On February 12, 2021, and with a change in administration, the EPA filed
13 a motion with the D.C. Circuit asking the court to vacate the ACE rule but to stay
14 the issuance of the mandate for the vacatur of the CPP repeal until EPA can respond
15 to the court remand in a new rulemaking regulating CO₂ emissions from existing
16 coal-fired power plants. In a declaration and memorandum accompanying U.S.
17 EPA’s motion, the agency explains that it interprets the court’s decision to have the
18 effect of removing the ACE Rule but not reinstating the CPP. On February 22,
19 2021, the D.C. Circuit granted this motion.

1 **Q. HAS THERE BEEN ANY RECENT CHANGES TO THE U.S. EPA'S**
2 **REGULATION OF GREENHOUSE GASES UNDER THE CAA THAT**
3 **WILL IMPACT THE OPERATIONS AND ASSET LIFE OF EAST BEND?**
4 **PLEASE EXPLAIN.**

5 A. On May 11, 2023, EPA issued proposed CAA emission limits and guidelines for
6 carbon dioxide (CO2) from new and existing fossil fuel-fired power plants based
7 on cost-effective and available control technologies. The CAA Section 111 directs
8 U.S. EPA to use different approaches for new and existing sources of greenhouse
9 gas emissions (GHG). For new sources of GHG emissions, CAA 111(b) requires
10 the U.S. EPA to set federal standards for new, modified, and reconstructed sources.
11 For existing sources, under CAA 111(d), states submit plans for existing sources
12 containing standards consistent with federal guidelines. On May 9, 2024, EPA
13 published New Source Performance Standards for Greenhouse Gas Emissions from
14 New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units
15 including requirements under Section 111(d) for existing coal fired EGUs.

16 **Q. WHAT ARE THE CAA 111(d) PROVISIONS THAT ARE APPLICABLE**
17 **TO EXISTING SOURCE COAL FIRED GENERATION THAT WILL**
18 **LIKELY LIMIT EAST BEND'S OPERATIONS GOING FORWARD?**

19 A. The U.S. EPA has proposed three alternatives for coal-fired generation that include
20 two subcategories for coal-fired units that continue operating, and a third,
21 retirement-based option: 1) Long Term Coal-Fired Steam Generating Units
22 installing and operating carbon capture and sequestration beginning in 2032 with
23 88.4 percent reduction from baseline may operate indefinitely; 2) Medium Term
24 Coal-Fired Steam Generating Units that elect to cease operations before January 1,

1 2039, and by January 1, 2030 co-fire 40 percent natural gas that results in a 16
2 percent reduction in emission rate compared to their baseline; and 3) Units that elect
3 to cease operations (retire) before January 1, 2032. In addition, if a coal unit
4 converts to firing 100 percent natural gas and intends to run past 2039, it must
5 convert by January 1, 2030. These new requirements will impact East Bend and
6 will be implemented as part of a State Plan submitted to EPA for its approval.
7 However, litigation of this new rule has already begun.

III. GENERAL DESCRIPTION OF ENVIRONMENTAL CONTROLS
AT DUKE ENERGY KENTUCKY'S EAST
BEND GENERATION STATION

8 **Q. PLEASE DESCRIBE THE ENVIRONMENTAL CONTROLS AT EAST**
9 **BEND.**

10 A. The major environmental and pollution control features at East Bend are a
11 mechanical draft cooling tower, a high-efficiency hot side electrostatic precipitator,
12 a lime-based WFGD system, low nitrogen oxide (NO_x) burners and a selective
13 catalytic reduction (SCR) system. The SCR is designed to reduce NO_x emissions
14 by approximately 85 percent. The WFGD system was upgraded in 2005 to increase
15 the sulfur dioxide (SO₂) emissions removal capability to about 97 percent.

16 **Q. ARE THE ENVIRONMENTAL CONTROLS AT EAST BEND TYPICAL**
17 **FOR A COAL-FIRED GENERATING UNIT THAT WAS PLACED IN**
18 **SERVICE IN THE EARLY 1980's?**

19 A. The controls currently installed at East Bend are more advanced than was typical
20 for units placed in service in the early 1980's. At the time of East Bend's
21 commissioning, its fPM limit was 0.10 lb/MMBtu and the New Source
22 Performance Standards for SO₂, and NO_x were 1.2 lb/MMBtu and 0.7 lb/MMBtu

1 respectively. It was originally equipped with the WFGD, hot side precipitator, and
2 low-NOx burners. At that time, ESPs were very common, while low NOx burners
3 and WFGD were nascent technologies. Over the years Duke Energy Kentucky has
4 upgraded the performance of the WFGD system which now is capable of a 97%
5 SO₂ removal in addition to removing other materials such as acid gases necessary
6 for MATS compliance. East Bend has refurbished and upgraded its ESP
7 precipitator. It also installed an SCR that is capable of an additional 85% NOx
8 reduction and a dry sorbent injection necessary to mitigate the additional sulfuric
9 acid mist produced by the SCR. The sorbent is injected in two places, one at the
10 boiler outlet and the other downstream of the ESP prior to the air pre-heater.

11 **Q. PLEASE EXPLAIN WHAT A HOT-SIDE ELECTROSTATIC**
12 **PRECIPITATOR IS AND WHY ITS DESIGN AND OPERATIONAL**
13 **CHARACTERISTICS ARE DIFFERENT THAN OTHER**
14 **PRECIPITATORS FOR COAL-FIRED GENERATING STATIONS.**

15 A. Electrostatic precipitators in utility applications are classified according to the
16 temperature of the flue gas that enters the ESP. A cold-side ESPs are used when the
17 inlet flue gas temperatures are about 400°F or less, while hot-side ESPs have inlet
18 flue gas temperatures greater than about 575°F. A cold-side ESP is located in the
19 flue gas path after the air preheater, where a hot-side ESP is located before the air
20 preheater. In the original design of a generating unit, the choice between a hot-side
21 and cold-side ESP is made based on economics, anticipated fuel types, the amount
22 and characteristics of the fly-ash generated and other factors. In practice hot-side
23 ESPs are far less common in utility applications than cold-side ESPs.

1 **Q. PLEASE EXPLAIN HOW THE WET LIME SCRUBBING TECHNOLOGY**
2 **CURRENTLY USED AT EAST BEND WORKS AND IS REQUIRED BY**
3 **ENVIRONMENTAL REGULATIONS.**

4 A. Lime plays a key role in many air pollution control applications. Lime is used to
5 remove acidic gases, particularly SO₂ and hydrogen chloride (HCl), from flue
6 gases. WFGD technology (using lime or limestone) in conjunction with SCR
7 technology is also capable of reducing mercury emissions. SO₂ removal
8 efficiencies using lime based wet scrubbers range from 95 to 99 percent at electric
9 generating plants. HCl removal efficiencies using lime also range from 95 to 99.
10 There are two main methods for cleaning flue gases from coal combustion at
11 electric generating stations: dry scrubbing and wet scrubbing which both can
12 utilize lime as its reagent. Limestone is also used in wet scrubbing and actually
13 constitutes the largest fraction of installed capacity.

14 In wet lime scrubbing, lime is added to water and the resulting slurry is
15 sprayed into a flue gas scrubber. In a typical system, the gas to be cleaned enters
16 the bottom of a cylinder-like tower and flows upward through a shower of lime
17 slurry. The sulfur dioxide is absorbed into the spray and then precipitated as wet
18 calcium sulfite. The sulfite can be converted to gypsum, a salable by-product or
19 converted to a stable product that can be landfilled. Wet scrubbing can treat high-,
20 medium-, and low-sulfur fuels where it is required to have a high-efficiency sulfur
21 dioxide removal. Wet scrubbing used at East Bend uses magnesium-enhanced lime
22 (containing 3-8% magnesium oxide) because it provides high alkalinity to increase
23 the SO₂ removal capacity and reduce scaling potential while utilizing a lower ratio

1 of liquid to flue-gas. WFGD systems also have the ability to remove filterable
2 particulate material from the flue-gas.

3 **Q. PLEASE DESCRIBE HOW ASH IS CURRENTLY HANDLED AT EAST**
4 **BEND.**

5 A. Duke Energy Kentucky currently operates a landfill at East Bend that is used for
6 the disposal of materials and ash resulting from the Company's WFGD process and
7 other CCR-producing processes.

8 The original or "East" Landfill was comprised of approximately 162 acres
9 and has been in place since East Bend was constructed in 1981. The East Landfill's
10 original construction pre-dated the CCR rule's effective date. The East Landfill now
11 was closed in a manner that complies with the CCR rule.

12 The newer or "West" Landfill, once all phases are completed, will consist
13 of approximately 200 acres of lined landfill that is designed to accept approximately
14 30 years of CCR waste from the East Bend Station and other permitted sources, as
15 needed, to make fixated scrubber sludge. Duke Energy Kentucky received CPCN
16 approval to construct the first cell of the West Landfill in Case No. 2015-00089 and
17 the second cell of the West Landfill in Case No. 2018-00156. As part of the
18 approval in Case No. 2015-00089, the Commission directed the Company to file a
19 new CPCN request prior to commencing construction of each additional phase or
20 cell.

21 The Landfill is permitted to receive various forms of CCR waste, including,
22 but not limited to, WFGD waste, fly ash and bottom ash (Generator Waste), from a
23 number of generating sources, including those generating stations currently owned
24 and/or operated by Duke Energy Kentucky and from generating stations owned by

1 other Kentucky utilities and Ohio-based electric generators. Dry fly ash is
2 combined into a mixture of WFGD solids, fly ash, and lime, and forms a substance
3 called Poz-o-Tec, which sets up much like concrete, and is placed in the Landfills.
4 Depending upon generation output, East Bend produces approximately 1 million
5 tons of Poz-o-Tec, including approximately 156,000 tons of fly ash annually. In
6 addition, the landfills receive CCR material referred to as bottom ash. The bottom
7 ash had historically been treated in an ash pond (Pond) located on site at East Bend.
8 Duke Energy Kentucky converted its East Bend bottom ash handling system to a
9 complete dry ash system and has completed closing the pond as approved by the
10 Commission in Case No's 2016-00268 and in Case No. 2016-00398.

11 The presence of the landfills and former Pond has permitted Duke Energy
12 Kentucky to manage its costs of environmental compliance by eliminating the need
13 to transport and pay for sending Generator Waste to commercial landfills.

14 **Q. PLEASE EXPLAIN WHY THE COMPANY'S PROPOSAL TO CHANGE**
15 **FROM A MAGNESIUM-ENHANCED LIME-BASED SCRUBBING**
16 **TECHNOLOGY TO A LIMESTONE BASED SCRUBBING PROCESS IS**
17 **NECESSARY FOR CONTINUED COMPLIANCE WITH**
18 **ENVIRONMENTAL REGULATIONS?**

19 **A.** The Limestone Conversion is necessary due to a lack of a competitive market for
20 the magnesium-enhanced lime (MEL) reagent possessing the correct chemical
21 content (magnesium oxide) required to continue operating the WFGD. Without the
22 necessary reagent, the WFGD system cannot operate properly and achieve the
23 necessary SO₂ reduction. As a result, East Bend will be unable to operate in
24 compliance with existing and applicable environmental regulations thereby

1 requiring premature shutdown. As I previously mentioned, the Limestone
2 Conversion necessitates upgrading existing equipment in the East Bend WFGD
3 reagent handling system. These upgrades include replacement of the absorber
4 system and new spray equipment that is designed to address the finer particulate
5 created by using limestone-based reagents. These upgrades have the added benefit
6 of allowing the Company to meet the newly enacted MATS revision with a stricter
7 standard for fPM. Put another way, if the Company did not pursue the Limestone
8 Conversion Project, a significant portion of the conversion work scope would still
9 need to occur to meet this new MATS Rule fPM standard.

10 **Q. WHAT IS THE CURRENT LEVEL OF fPM FOR THE CURRENT MEL**
11 **PROCESS AS IT RELATES TO EXISTING MATS COMPLIANCE AT**
12 **EAST BEND AND WHY IT WILL NOT MEET THE NEW MATS**
13 **STANDARD?**

14 A. Exhibit 3 of the Application provides the daily 30-day rolling fPM averages from
15 July 2021 through June 2024. Over this three-year period the 30-day rolling
16 averages complied with the existing MATS rule's 0.03 lb/MMBtu fPM limit with
17 good margin and no exceedances. However, compared to the new MATS standard
18 of 0.01 lb/MMBtu, the station's 30-day rolling average exceeded the new limit
19 about one quarter of the time and about one tenth of the time the average was 50%
20 greater than the new standard or higher. This data uses PM CEMS certification
21 procedures specified in the MATS rule, but these procedures will change under the
22 new rule. The new procedures and the magnitude of the new standard severely
23 challenge the limits of PM CEMS monitoring technology. As a result, it will be
24 harder to certify and maintain monitors and variability in the readings which in turn

1 translate into needing sufficient compliance margin to maintain continuous
2 compliance.

3 **Q. PLEASE EXPLAIN HOW EAST BEND CREATED fPM AND HOW THE**
4 **LIMESTONE CONVERSION PROJECT SCOPE INCLUDES**
5 **ENHANCEMENTS THAT WILL ALLOW THE COMPANY TO MEET**
6 **THE NEW MATS STANDARD.**

7 A. East Bend creates fPM in three primary ways. First it generates fly ash and other
8 products of combustion of coal it uses for fuel. The vast majority of this material
9 is captured by the hot-side ESP, however some small amount continues to pass
10 downstream ultimately to the WFGD which provides additional particulate capture.
11 Second the operation of the SCR and the post SCR sorbent injection used for
12 sulfuric acid mist mitigation create additional particulate. Since the SCR is
13 downstream of the hot-side ESP, the WFGD again would provide particulate
14 capture. Finally the WFGD system itself contains a scrubber slurry that is high in
15 dissolved solids and any carry over in the flue gas from the WFGD system could
16 carry additional fPM into the stack.

17 **Q. WAS EAST BEND PREVIOUSLY IDENTIFIED BY THE UNITED STATES**
18 **EPA AS NOT REQUIRING UPGRADES TO ACHIEVE COMPLIANCE**
19 **WITH THE NEW MATS STANDARD?**

20 A. In its data analysis, EPA did not identify East Bend as requiring, but its analysis
21 inaccurately characterized East Bend's performance leading to an incorrect
22 conclusion.

1 **Q. PLEASE EXPLAIN WHY THE US EPA’S CHARACTERIZATION OF**
2 **EAST BEND’S ABILITY TO COMPLY WITH THE NEW MATS**
3 **STANDARD IS INACCURATE.**

4 A. EPA’s characterization is inaccurate for multiple reasons. First of all, when EPA
5 conducted its technology review, it stated that it selectively choose a limited data
6 set to evaluate the impact of different potential emissions limits on the regulated
7 EGUs. Specifically stated “*We assessed summary statistics of the lowest quarter’s*
8 *fPM rate to evaluate the most representative metric to describe baseline fPM*
9 *emissions.*”³ This is inappropriate because East Bend like all EGUs must operate in
10 continuous compliance with the regulations. Choosing such a narrow data set does
11 not properly reflect the full range of fuel, load, CEMS monitor operation and other
12 conditions which cause fPM emission rates to fluctuate. Even so EPA indicated
13 that from this narrow data set that the 99th percentile value was 0.009 lb/MMBtu
14 which is just below the new standard but allows no compliance margin.

15 **Q. IS IT POSSIBLE FOR THE COMPANY TO TAKE NO ACTION AT EAST**
16 **BEND TO ADDRESS THE NEW MATS STANDARD AND CONTINUE TO**
17 **COMPLY?**

18 A. No. While the unit’s fPM emissions are comfortably in compliance with the 2012
19 standard of 0.030 lbs./MMBtu based on historical data, they do regularly exceed
20 the value of revised 0.010 lbs./MMBtu standard contained in the 2024 revised
21 MATS rule. Exhibit 3 of the Application provides the daily 30-day rolling fPM
22 averages from July 2021 through June 2024. The amount of fPM capture is limited

³ Pg.3 2023 Technology Review for the Coal- and Oil-Fired EGU Source Category, memo to Docket No: EPA-HQ-OAR-2018-0794, Sarah Benish, Nick Hutson, Erich Eschmann, U.S. EPA/OAR, January 2023.

1 by the design of the currently installed equipment and there are no available
2 operational changes that would reduce emissions below the new MATS standard.
3 As a result, the company must take further action to operate in compliance with the
4 new standard.

5 **Q. CAN THE COMPANY JUST UPGRADE ITS HOTSIDE ELECTROSTATIC**
6 **PRECIPITATOR AND MEET THE NEW MATS STANDARD?**

7 A. No. As stated previously, the hot-side electrostatic precipitator is not the last air
8 pollution control device through which the flue gas passes on its way to the stack.
9 In addition, as mentioned previously, some of the dry sorbent injected into the flue-
10 gas to mitigate sulfuric acid mist generated by the SCR needs to be injected
11 downstream of the ESP. This additional particulate is captured by the WFGD
12 system. Even without this additional particulate, the current performance of the
13 WFGD is not sufficient to achieve the new MATS fPM limit.

14 **Q. PLEASE EXPLAIN IF THERE ARE ANY ALTERNATIVES TO THE**
15 **LIMESTONE CONVERSION TO CONTINUE TO MEET**
16 **ENVIRONMENTAL REGULATIONS, INCLUDING THE NEW MATS**
17 **STANDARD FOR fPM.**

18 A. Company Witness Verderame discusses alternatives evaluated, including long term
19 contracts for lime in his testimony. The Company also considered a process where
20 a standard quicklime product was procured and mixed with magnesium hydroxide
21 slurry on-site as an alternative to the current lime process. For the reasons Witness
22 Verderame explained, that strategy was determined unreasonable. Additionally,
23 these alternatives do not have the added benefit of allowing East Bend to comply

1 with the new MATS fPM standard, and a separate MATS compliance project to
2 upgrade the East Bend WFGD absorbers and sprayer equipment.

3 **Q. WHAT WILL HAPPEN IF THE COMPANY CAN NO LONGER OPERATE**
4 **ITS WFGD OR DOES NOT MEET THE MATS REVISION COMPLIANCE**
5 **TIMELINE?**

6 A. If the Company cannot secure the necessary reagents to operate the WFGD and/or
7 cannot meet the July 2027 MATs compliance timeline, East Bend will be unable to
8 comply with required environmental regulations and be forced to shut down
9 prematurely and possibly permanently.

10 **Q. WILL THE CONVERSION TO A LIMESTONE BASED REAGENT**
11 **SCRUBBING PROCESS IMPACT THE OPERATION OF THE EAST**
12 **BEND LANDFILL?**

13 A. The conversion to a limestone-based reagent will improve the dewatering
14 properties of the calcium sulfite solids produced by the WFGD system. In the
15 current system, these solids are filtered to remove excess water and then significant
16 quantities of fly ash and lime are added produce a stable product (Poz-o-Tec)
17 suitable for disposal in the landfill. With the conversion to limestone chemistry, the
18 improved dewatering properties of the calcium sulfite solids will result in much
19 drier filter cake with a lower water content, and reduced fixation lime requirements.
20 This will reduce the total mass transported to the landfill.

1 **Q. WILL THE COMPANY NEED TO AMEND ANY OF ITS EXISTING**
2 **ENVIRONMENTAL PERMITS TO COMPLETE THE LIMESTONE**
3 **CONVERSION PROJECT?**

4 A. As discussed below, the project only required minor air source permitting. The
5 Company filed the necessary application on July 11, 2024. The Company was
6 authorized to commence construction 60 days later. The Company then submitted
7 a revised application to the KDAQ on Jan 9, 2025. The application was revised to
8 reflect a change in the limestone handling equipment and the associated emissions
9 control equipment. KDAQ has 60 days to determine if the application is complete.
10 If KDAQ does not respond within 60 days (by March 10, 2025) the application is
11 deemed complete and East Bend is authorized to construct. A true and accurate
12 copy of this revised application is included as Exhibit 4 to the Company's
13 Application in this proceeding.

14 **Q. PLEASE DESCRIBE DUKE ENERGY KENTUCKY'S PROPOSAL TO**
15 **AMEND ITS ECP.**

16 A. Duke Energy Kentucky is requesting authorization to amend its ECP to include the
17 construction and ongoing operation and maintenance of the Limestone Conversion
18 Project. Witnesses Verderame and Lawler discuss this further in their respective
19 testimonies.

20 **Q. HAS DUKE ENERGY KENTUCKY RECEIVED THE NECESSARY**
21 **PERMITS FOR THE LIMESTONE CONVERSION PROJECT?**

22 A. Much of the existing equipment will be reused and will not require re-permitting of
23 the air emissions sources. The Company filed a minor air source permit application
24 on July 17, 2024, that covers the needed changes. It does not foresee any permitting

1 issues that would impact construction. For a minor air permit, the Kentucky DAQ
2 has 60 days to determine if the application is complete. Construction can commence
3 once the application is determined to be complete.

IV. CONCLUSION

4 **Q. WERE EXHIBIT 3 AND EXHIBIT 4 OF THE COMPANY'S**
5 **APPLICATION PREPARED BY YOU OR AT YOUR DIRECTION AND**
6 **UNDER YOUR CONTROL?**

7 A. Yes.

8 **Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?**

9 A. Yes.

VERIFICATION

STATE OF OHIO)
) SS:
COUNTY OF HAMILTON)

The undersigned, J. Michael Geers, Manager, EHS Energy Transition Group, being duly sworn, deposes and says that he has personal knowledge of the matters set forth in the foregoing testimony, and that the information contained therein is true and correct to the best of his knowledge, information, and belief.

J. Michael Geers

J. Michael Geers, Affiant

Subscribed and sworn to before me by J. Michael Geers on this 23rd day of January, 2025.

Emilie Sunderman

NOTARY PUBLIC

My Commission Expires: July 8, 2027



EMILIE SUNDERMAN
Notary Public
State of Ohio
My Comm. Expires
July 8, 2027