

**COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION**

In the Matter of:

ELECTRONIC 2024 INTEGRATED RESOURCE)	
PLAN OF DUKE ENERGY KENTUCKY, INC.)	Case No. 2024-00197
)	
)	

SIERRA CLUB’S PUBLIC POST-HEARING COMMENTS

Sierra Club respectfully submits these post-hearing comments regarding Duke Energy Kentucky Inc.’s (“Duke” or “the Company”) proposed 2024 Integrated Resource Plan (“2024 IRP”). As demonstrated in our initial comments and herein, Duke claims that its 2024 IRP analysis supports its preferred plan to co-fire East Bend Unit 2, but a careful review of the analysis – including Duke’s own modeling – demonstrates that full gas conversion of East Bend is the least-cost option. Further, Duke’s modeling included the costs associated with the East Bend Unit 2 Limestone Conversion Project across every scenario and sensitivity modeled, but this assumption was wrong because this major capital project is avoidable under two alternatives—full conversion of East Bend Unit 2 or retirement and replacement of the unit. Sierra Club respectfully asks the Commission order Duke to adjust its preferred plan to include full gas conversion of East Bend Unit 2.

I. Duke Should Convert East Bend to Gas.

A. Gas conversion is the least-cost option—with or without 111(d) compliance requirement.

Duke justified the co-firing of East Bend Unit 2 because of the “cost competitiveness, flexibility for futures with and without the EPA CAA Section 111 Update, and the risk mitigation

it provides through increased fuel and fleet diversity and the moderate level of market purchases.”¹ But Duke clearly favored its chosen plan from the start as its modeling is focused around the co-firing of East Bend Unit 2, rather than testing alternatives to the same extent—as shown in Figure 1.²

Figure 1: Major Capital Projects at East Bend Unit 2, by portfolio³

Scenario	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
111(d) Co-fire '30	FGD UPGRADE					Co-fire								Retire	Replace		
111(d) Conversion '30						Convert											
111(d) Retire '32 - CC								Retire	Replace								
111(d) Co-fire '30 - CC							Co-fire								Retire	Replace	
111(d) Co-fire '30 - SMR							Co-fire								Retire	Replace	
111(d) Co-fire '30 - Retire '36							Co-fire					Retire	Replace				
111(d) Co-fire '30 - CC & Solar							Co-fire								Retire	Replace	
111(d) Retire '32									Retire	Replace							
111(d) Co-fire '30 - CC & Solar (High Fuels)							Co-fire								Retire	Replace	
111(d) Co-fire '30 - CC & Solar (Low Fuels)							Co-fire								Retire	Replace	
111(d) Co-fire '30 - CC & Solar (High Load)							Co-fire								Retire	Replace	
No 111(d) Co-fire '30							Co-fire								Retire	Replace	
No 111(d) Conversion '30							Convert										
No 111(d) Retire '36												Retire	Replace				
No 111(d) Co-fire '30 - CC							Co-fire								Retire	Replace	
No 111(d) Co-fire '30 - SMR							Co-fire								Retire	Replace	
No 111(d) Co-fire '30 - CC '36							Co-fire					Retire	Replace				
No 111(d) Co-fire '30 - CC & Solar							Co-fire								Retire	Replace	
No 111(d) Retire '36 - CC & Solar												Retire	Replace				
No 111(d) Retire '42 - SMR																	

Moreover, we find that co-firing of the unit is not the least-cost option. Based on our calculations, Duke’s modeling shows that East Bend’s 100% natural gas conversion is the lower-cost option and cheaper than co-firing or retirement—as shown in Table 1.⁴ This option is cheaper regardless of whether 111(d) compliance remains enforceable. This undermines the Company’s argument that co-firing is a reasonable path even if 111(d) compliance is no longer required.

¹ Company response to PUC 1-23c.

² Company response to SIERRA-DR-01-009, Attachments 1-20.

³ Company response to SIERRA-DR-01-009, Attachments 1-20.

⁴ Company response to SIERRA-DR-1-5, “SIERRA-DR-01-005_Attachment.xlsx”; Company response to SC-DR-2-2, “SIERRA-DR-02-002 CONF Attachment.xlsx”; Company supplemental response to SC-DR-1-3, Confidential Attachments 80 through 99.

Table 1: Comparison of PVRR Calculations for Duke Energy Kentucky’s modeling scenarios⁵ **CONFIDENTIAL**



At the hearing, Duke was not able to refute Sierra Club’s PVRR estimates; and while Witness Kalemba claimed at the hearing that Duke had asked discovery of Sierra Club in this case, the Company later contradicted that in a post-hearing data response, confirming that it had not, in fact, sought discovery from Sierra Club in this matter.⁶

Regardless, all of the PVRR results estimated by Duke and Sierra Club assume installation of the Limestone Conversion Project at East Bend,⁷ even though that \$125.8 million capital expense is unnecessary if the unit were to convert to gas. Thus, the savings of full conversion are likely higher if the Company avoided this unnecessary Limestone Conversion Project.

B. Duke never modeled a plan that did not include the FGD upgrade project.

Duke filed an application for a certificate of public convenience and necessity (CPCN) to install the Limestone Conversion Project at East Bend so that it can utilize limestone instead of quicklime. The filing was made because the costs of quicklime had increased such that Duke had found that continuing to operate the unit on quicklime was economically unsustainable.⁸ In this

⁵ Company response to SC-DR-1-5, “SIERRA-DR-01-005_Attachment.xlsx”; Company response to SC-DR-2-2, “SIERRA-DR-02-002 CONF Attachment.xlsx”; Company supplemental response to SC-DR-1-3, Confidential Attachments 80 through 99.

⁶ Company response to SIERRA-PHDR-01-008; Hearing Video Transcript of the Dec. 10, 2024 Hearing at 1:10:39.

⁷ Company response to OAG 2-13.

⁸ Case No. 2024-00152, Direct Testimony of John A. Verderame, p. 18, ll. 15-21. Duke voluntarily dismissed the case and subsequently refiled under Case No. 2025-00002. The Commission incorporated the record from Case No. 2024-00152 in Case No. 2025-00002.

IRP, as shown above in Figure 1, all of the modeling in this case embedded the capital cost of the Limestone Conversion Project into every scenario—albeit at a lower cost than what was requested in the CPCN.⁹ The cost of the project in the CPCN case is more than █ percent higher than what Duke used in its IRP modeling. Assuming this major capital project would occur in every modeling run was wrong because the project is avoidable under two alternatives—full conversion of East Bend Unit 2 or retirement and replacement of the unit. The Company could still use quicklime for several more years if it were ceasing coal operations at the unit in the near-term. Thus, Duke should have at least tested the exclusion of the \$125 million Limestone Conversion Project cost.

Further, the problem with assuming the limestone project in all of its modeling is compounded by the fact that the project may be unnecessary—regardless of the unit’s future life—because of a potential new long-term contract for quicklime.¹⁰ In Duke’s reply comments, it claims that the costs of gas conversion have since increased and quick lime costs have decreased compared to what is in the IRP.¹¹ But this does not answer the question of whether Duke and its customers would be better off paying for the quicklime in the short-term, avoiding the FGD upgrade, and converting the unit to gas. That is a reasonable pathway that the Company has simply failed to consider.

Duke’s handling of the limestone project and options for fuel at East Bend between the IRP and the CPCN are examples of flawed “piecemeal” planning. The Company has stated that gas conversion could take four to five years to implement due to the length of time necessary to hook up to existing gas pipelines.¹² But the Company could have decided to convert to gas sooner, when it first experienced or anticipated the rise in quicklime costs. Moreover, in the CPCN case

⁹ Company response to AG 2-13; Case No. 2024-00152, Company Application, p. 12.

¹⁰ Case No. 2024-00152, Company’s Motion for Stay of Proceeding.

¹¹ Duke Reply Comments, p. 11

¹² Company response to PUC 1-22.

where it was making the case for the limestone conversion, it only modeled through 2029 and did not consider any future decisions at the unit, or any bearing these would have on the limestone decision.¹³ Both situations constitute “piecemeal planning” where a project is looked at in isolation rather than considered along with the suite of other investment decisions that are upcoming.

Between the two dockets—the IRP and the CPCN—Duke treated two major resource decisions as unrelated when they are clearly inter-linked; it should have instead evaluated these future scenarios in one process in order to understand the cost implications for ratepayers and make an informed choice that reflects the least-cost option on the whole. Given the evidence, we recommend that Duke seek a five-year quicklime supply and start the process for gas conversion of East Bend 2 rather than sign a longer-term quicklime contract that would unnecessarily prolong the unit’s operation on coal.

C. Duke did not conduct true sensitivity analysis.

A valuable sensitivity analysis is a key component of a robust resource plan. When done properly, a sensitivity analysis is meant to show the range of possible outcomes *between* plans to better assess the risks inherent in each plan and make a more informed decision. A utility’s ultimate preferred plan should perform well under multiple, plausible futures, compared with the performance of alternative plans. However, such a comparison is not possible in this case because Duke has only tested the sensitivity of its pre-selected plan, including modeling this one plan under low fuel prices, high fuel prices, and high load. This is clearly putting the cart before the horse, because Duke is only testing a plan that it already chose.

¹³ Case No. 2024-00152, Company response to SIERRA-DR-01-072

The results of the Company’s limited sensitivity analysis add no value to the IRP and do not justify the preferred plan because no other plans were subjected to the same modeling. The results of modeling Duke’s one plan are unsurprising: 1) lower fuel prices [REDACTED] the costs of the preferred plan; 2) higher fuel costs [REDACTED] the costs of the preferred plan; and 3) higher load [REDACTED] costs of the preferred plan because more capacity additions are needed.¹⁴ These conclusions are easily predictable and add no useful information; and as a result the Company’s sensitivity analysis adds no value or validity to the preferred plan.

Duke’s analysis in this case is severely lacking because it does not afford the comparison of plans under different futures. Instead, the Company should have run all decision options under the same sensitivities and then compared the results to one another, within each future—this would have provided useful information and ensured ratepayers are not burdened with the cost of an unnecessary \$125 million project. Duke has conducted this type of analysis in other jurisdictions and should do so in Kentucky. Notably, Duke did not respond to this criticism in its reply comments.

D. East Bend has poor economics and negative energy margins on coal, while also being operated without regard to market prices.

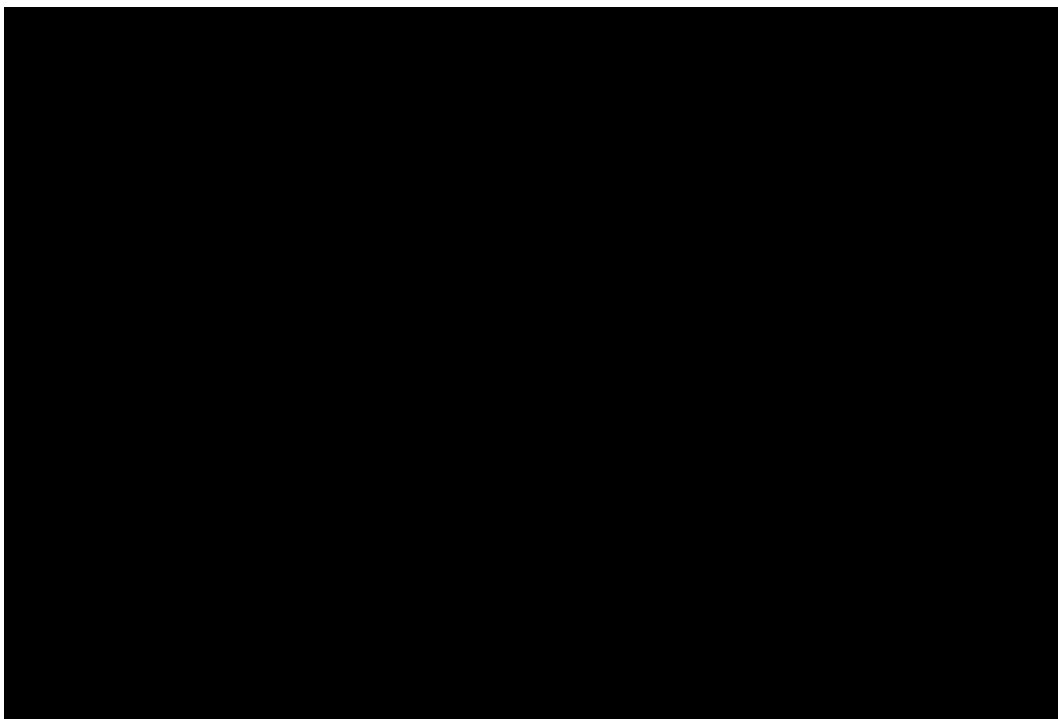
The economics of the unit are poor as shown by its performance on the PJM marketplace. Making a marginal profit from its energy sales is a necessary but not sufficient condition for a coal unit to be economic. In 2023 and 2024 (January to July—the latest provided by Duke), [REDACTED] [REDACTED] These cost figures are conservative because they do not include variable operation and maintenance costs (VOM) which Duke was unable to provide—yet these missing costs are also a part of the total variable or

¹⁴ Company response to SC-DR-1-5, “SIERRA-DR-01-005_Attachment.xlsx”; Company response to SC-DR-2-2, “SIERRA-DR-02-002 CONF Attachment.xlsx”; Company supplemental response to SC-DR-1-3, Confidential Attachments 80 through 99

marginal costs of running East Bend.¹⁵ A coal unit can still make a marginal profit on energy but be uneconomic given the magnitude of its forward-going fixed costs, such as typical fixed O&M, capital expenditures (capex), and future compliance costs. [REDACTED]

[REDACTED] even without accounting for fixed and capital expenses and other variable operating and maintenance costs.

Figure 2: East Bend fuel costs and energy revenues CONFIDENTIAL¹⁶



The Company accused Sierra Club of cherry-picking data by showing only the most recent performance,¹⁷ but we were focused on recent performance because it is most relevant. The poor performance, high variable costs (including the quicklime) and need for capital projects should have made the Company take a harder look at whether continued coal operation made sense.

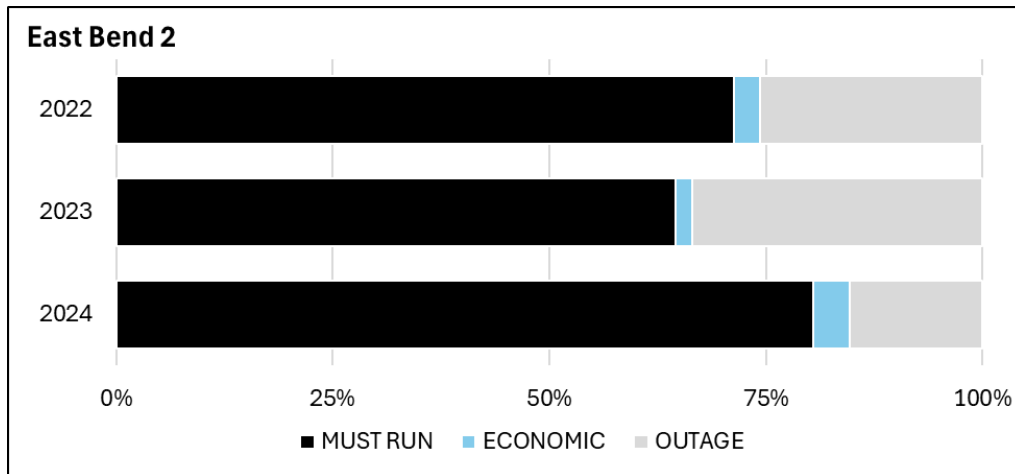
¹⁵ Company response to Sierra Club Data Request 1-10.

¹⁶ Company response KSES-DR-01-002 CONF Attachment 2.xlsx

¹⁷ Duke reply comments, p. 15.

Moreover, compounding the overall negative economics, the East Bend unit would likely perform better on the energy market if it were allowed to commit on an “economic” basis by PJM. But instead Duke often forces the unit to operate by “self-commitment” or submittal as a “must-run” offer in PJM. Thus the Company tells PJM that the unit will be on-line at a certain minimum capacity (also called “economic minimum”) the next day and PJM can then decide to operate the unit further if it is cost-optimal (i.e., dispatch it at a higher output). Duke does this for almost every hour of the year—as shown below in Figure 3.

Figure 3: Commitment Status for East Bend 2



Duke is forcing the unit to operate even at hours where its variable costs fall below the market price offered by PJM, leading Duke to lose additional money for operating a costly unit. PJM offers “make-whole” payments which ensure that there are no net monetary losses on daily basis—*but only if the unit is economically committed*. Duke is unwisely foregoing these payments by committing the unit as must-run. Regardless of the commitment status, the Company should have considered early retirement and replacement given the unit’s poor performance.

E. Full gas conversion is a ‘no regrets’ strategy to reduce compliance risk.

Converting the East Bend coal unit to gas is not only the lowest-cost option under Duke’s own modeling, it represents a ‘no regrets’ business strategy for mitigating risk and transitioning Duke’s generation fleet to be more well-adapted to changes in the PJM grid.

First, final federal regulations like the Good Neighbor Plan and GHG standards are likely to make the cost of operating East Bend on coal prohibitively expensive. And even if GHG standards are delayed or relaxed by the current federal administration, there is still likely to be additional environmental pressure on coal units, adding risk to the continued reliance on coal. Downwind states on the East Coast are likely to remain concerned about Kentucky coal-burning plants’ impact on ozone attainment in their states, regardless of federal action. Converting East Bend to gas positions Duke well to achieve compliance with current regulations and will provide flexibility to address future regulations.

Second, by ceasing coal-burning at East Bend, Duke would avoid the cost of compliance with the leachate requirements of the Effluent Limitation Guidelines. These final regulations require Duke to eliminate the discharge of coal residual leachate. Duke could entirely avoid this \$7.5 million in Effluent Limitations Guidelines compliance costs by ceasing coal-burning (either through gas conversion or retirement) by 2034.¹⁸

Last, regardless of environmental regulations, the PJM grid is poised to add tens of gigawatts of wind and solar generation over the next several years. As the PJM grid adds more zero-fuel, low-cost intermittent resources there is an increasing need for flexible, dispatchable resources. When available, these zero-fuel cost resources will always be called on before fuel-burning resources in the PJM energy market, assuming economics-based commitment and

¹⁸ Company response to SIERRA-PHDR-01-002(a) and (b).

dispatch. In turn, integrating flexible, dispatchable resources that quick-start and fast-ramp will be paramount as penetration of renewable resources increases. Gas-burning generation is more flexible than the coal-burning unit at East Bend, with a lower cycling cost.¹⁹ Operated on gas, Duke would be more able to commit the unit economically, instead of as “must-run”, and therefore save customers money.

Fourth, coal supply is dwindling in Appalachia and Illinois, which presents an increasing risk in terms of both reliability of supply and cost. Duke expects a continued downward trend in coal supply over the next several years.²⁰ States like Illinois and Pennsylvania, where utilities currently burn coal from these basins, are likely to continue to reduce reliance on coal regardless of federal action, due to their own state’s goals. As the number of firms and mines engaged in thermal coal supply decreases, the availability of coal will become an increasing reliability risk. Further, as competition in the thermal coal supply market decreases, the ability of individual mines to use market power to increase prices will increase. For these reasons also, the full conversion of East Bend mitigates customers’ risks.

II. Conversion of East Bend Would Pass Muster Under Kentucky’s Coal Retirement Law.

As Sierra Club explained in our initial Comments in this docket,²¹ Duke’s IRP process is particularly important to resource planning given recently-adopted Kentucky legislation that requires utilities to apply to the Commission for approval of electric generating unit retirements.²² Critically, this new law, including the definitions set out in K.R.S. § 278.862 and the “rebuttable

¹⁹ Hearing Video Transcript of the Dec. 10, 2024 Hearing at 4:53:00.

²⁰ Company Response to KSES-DR-01-014. (“As domestic coal generating capacity is expected to continue to retire over the next several years, the Company anticipates coal supply will continue to follow a similar downward trend in response to lower domestic demand.”).

²¹ Sierra Club, Comments at 5, 20.

²² K.R.S. § 278.862 (definitions), K.R.S. § 278.864 (retirement standards). Kentucky law now also includes review by a newly-created Energy Planning and Inventory Commission. K.R.S. § 164.2807.

presumption” against “retirement” set out in K.R.S. § 278.864, does not preclude the Commission’s consideration of a scenario in which East Bend converts to run 100% on natural gas. Consistent with the statute’s mandate that any such retirement “not harm the utility’s ratepayers,”²³ Sierra Club has advocated here that Duke consider full conversion of East Bend on equal footing with other alternatives precisely because it is the least-cost option for Duke and its ratepayers. Although Duke suggests the new law may present a roadblock,²⁴ it stops short of asserting that it is an insurmountable hurdle, nor does Duke deny that the IRP process is the appropriate time to consider long-term resource planning decisions such as the potential conversion of a coal-fired generating unit to operate fully on natural gas.

K.R.S. § 278.264 creates a “rebuttable presumption against the retirement of a fossil fuel-fired electric generating unit,” which can be overcome by a showing that:²⁵

²³ K.R.S. 278.264(b).

²⁴ Duke Reply Comments at 25-28.

²⁵ K.R.S. § 278.264(2).

- (a) The utility will replace the retired electric generating unit with new electric generating capacity that:
 - 1. Is dispatchable by either the utility or the regional transmission organization or independent system operator responsible for balancing load within the utility's service area;
 - 2. Maintains or improves the reliability and resilience of the electric transmission grid;
 - 3. Maintains the minimum reserve capacity requirement established by the utility's reliability coordinator; and
 - 4. Has the same or higher capacity value and net capability, unless the utility can demonstrate that such capacity value and net capability is not necessary to provide reliable service;
- (b) The retirement will not harm the utility's ratepayers by causing the utility to incur any net incremental costs to be recovered from ratepayers that could be avoided by continuing to operate the electric generating unit proposed for retirement in compliance with applicable law;
- (c) The decision to retire the fossil fuel-fired electric generating unit is not the result of any financial incentives or benefits offered by any federal agency; and
- (d) The utility shall not commence retirement or decommissioning of the electric generating unit until the replacement generating capacity meeting the requirements of paragraph (a) of this subsection is fully constructed, permitted, and in operation, unless the utility can demonstrate that it is necessary under the circumstances to commence retirement or decommissioning of the existing unit earlier.

While Duke's reply comments assert the law would apply in a coal-to-gas conversion scenario, Duke failed to address two critical aspects of the law. First, Duke does not address the definition of "retirement," which the statute defines as "the closure or the complete and permanent cessation of operations at an electric generating unit."²⁶ Duke offers no argument that converting a fossil coal plant to operate on gas somehow equates to "the complete and permanent cessation of operations" necessary to trigger the required review under the statute. Unless that "retirement" threshold is met – and here it would not be – then as a threshold matter the newly-enacted Kentucky law around fossil plant retirements simply does not apply.

²⁶ K.R.S. 278.262.

Second, even if the statute’s terms apply, Duke offers no argument that the substantive standards set out in K.R.S. 278.264(2)(a)(1)-(4) could not be met were East Bend to convert to operate on gas. Duke offers no argument, for example, that converting East Bend to operate on gas would not qualify as “dispatchable” (K.R.S. 278.264(a)(1)), not “maintain[] or improve[]” grid reliability (K.R.S. 278.264(a)(2)), run afoul of a “minimum reserve capacity requirement” (K.R.S. 278.264(a)(3)), or present a “capacity value and net capability” issue (K.R.S. 278.264(a)(4)).²⁷ Indeed, with respect to the first requirement, in responses to post-hearing information requests, Duke confirmed that “if East Bend were to convert to natural gas or to co-firing of natural gas and coal, the unit would be dispatchable.”²⁸

Based on these factors, conversion of East Bend from operating on coal to operating on gas would not be precluded under Kentucky statutes.

III. East Bend Burns Mostly Out-of-State Coal.

If East Bend were to convert to natural gas, there may be a misconception that this would harm the Kentucky coal mining industry. This is not the case. Ninety percent of the of the coal burned at East Bend comes from out-of-state, with the highest share coming from Illinois.²⁹ Duke has six coal fuel supply contracts and all of them are located outside the state of Kentucky.³⁰ Thus, it does not make economic sense for this Commission to require Duke’s electric customers to pay higher costs to keep East Bend in operation on coal, solely to subsidize these out-of-state coal suppliers.

²⁷ Duke Reply Comments at 25-28.

²⁸ Company response to SIERRA-PHDC-01-007.

²⁹ EIA Form 923 for 2023, available at <https://www.eia.gov/electricity/data/eia923/>.

³⁰ Hearing Video Transcript of the Dec. 10, 2024 Hearing at 8:00:16 to 8:00:48.

IV. Conclusion

For the reasons stated in our initial comments and herein, Sierra Club respectfully asks the Commission order Duke to adjust its preferred plan to include full gas conversion of East Bend Unit 2.

Dated: February 20, 2025

Respectfully submitted,

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CERTIFICATE OF SERVICE

This is to certify that the foregoing copy of Sierra Club's Post-Hearing Comments in this action is being electronically transmitted to the Commission on February 20, 2025, and that there are currently no parties that the Commission has excused from participation by electronic means in this proceeding.

/s/ Joe F. Childers
JOE F. CHILDERS