

July 20, 2022

Via Electronic Filing

Ms. Shonta Dunston  
Chief Clerk  
North Carolina Utilities Commission  
430 North Salisbury Street  
Dobbs Building  
Raleigh, NC 27603-5918

RE: In the Matter of: Duke Energy Progress, LLC and Duke Energy Carolinas, LLC 2022 Biennial Integrated Resource Plans and Carbon Plan; **Docket No. E-100, Sub 179**

Dear Ms. Dunston:

Enclosed for filing in the referenced docket are the Supplemental Joint Comments of the North Carolina Sustainable Energy Association, Southern Alliance for Clean Energy, Sierra Club, and Natural Resources Defense Council.

Please note that the report from Synapse Energy Economics, Inc., *Carbon-Free by 2050: Pathways to Achieving North Carolina's Power-Sector Carbon Requirements at Least Cost to Ratepayers* (Synapse Report) and its Appendices A and D include confidential information, indicated by shading in the text of the report and appendices. Accordingly, the Synapse Report and its Appendices A and D are being filed in both public and confidential versions, **and the confidential versions should be filed under seal.**

By copy of this letter, I am serving a copy of the public/redacted comments and attachments on all parties of record. Copies of the confidential version will be provided to parties who have executed appropriate confidentiality agreements. Please let me know if you have any questions about this filing.

Sincerely,

s/ David Neal

Enclosures

cc: Parties of Record

**BEFORE THE NORTH CAROLINA UTILITIES COMMISSION  
DOCKET NO. E-100, SUB 179**

<b>In the Matter of:</b>	)	<b>SUPPLEMENTAL JOINT</b>
<b>Duke Energy Progress, LLC, and</b>	)	<b>COMMENTS OF THE NORTH</b>
<b>Duke Energy Carolinas, LLC, 2022</b>	)	<b>CAROLINA SUSTAINABLE</b>
<b>Biennial Integrated Resource Plans</b>	)	<b>ENERGY ASSOCIATION,</b>
<b>and Carbon Plan</b>	)	<b>SOUTHERN ALLIANCE FOR</b>
	)	<b>CLEAN ENERGY, SIERRA CLUB,</b>
	)	<b>AND NATURAL RESOURCES</b>
	)	<b>DEFENSE COUNCIL</b>

NOW COME the North Carolina Sustainable Energy Association (NCSEA), the Southern Alliance for Clean Energy (SACE), the Sierra Club, and the Natural Resources Defense Council (NRDC) (NCSEA, SACE, the Sierra Club, and NRDC, collectively, the Coalition of Low-Cost Energy And Net-Zero Intervenors or CLEAN Intervenors) pursuant to the *Order Requiring Filing of Carbon Plan and Procedural Deadlines* issued by the North Carolina Utilities Commission (NCUC or Commission) on November 19, 2021, as modified by the Commission’s November 29, 2021 *Order Granting Extension of Time* and the Commission’s July 14, 2022 *Order Granting SACE et al. and NCSEA a Three-Business Day Extension to File Synapse Report and Related Comments* to provide the following supplemental comments and expert analysis on the proposed Carbon Plan filed on May 16, 2022 by Duke Energy Carolinas, LLC (DEC) and Duke Energy Progress, LLC (DEP) (DEC and DEP, collectively, Duke or the Companies) and alternative carbon plan.

**I. SYNAPSE ENERGY ECONOMICS**

CLEAN Intervenors jointly retained Synapse Energy Economics, Inc. (Synapse) to review the modeling used to develop Duke’s proposed portfolios, to perform its own modeling using the same EnCompass capacity expansion and production cost modeling

software used by Duke, and to develop a report based on the results of its analysis. The report from Synapse, *Carbon-Free by 2050: Pathways to Achieving North Carolina's Power-Sector Carbon Requirements at Least Cost to Ratepayers* (Synapse Report) is being filed along with these Supplemental Joint Comments.

A. SYNAPSE'S SCENARIOS

Synapse initially attempted to replicate the “Portfolio 1 – Alternative” (P1-Alt) scenario in Duke’s proposed Carbon Plan utilizing the EnCompass database that Duke provided to intervenors. Synapse based its analysis on the P1-Alt scenario because it comes closest to meeting the 2030 carbon reduction requirements in S.L. 2021-165 (“H951”) while also most accurately reflecting current real-world circumstances. As set forth in the July 8, 2022 *Informational Filing of SACE, Sierra Club, NRDC, and NCSEA*, Synapse was unable to replicate—also known as “validate” or “benchmark”—Duke’s results. Because of this setback, it was necessary for Synapse to “force” the generation selections made in Duke’s P1-Alt scenario in order to create the *Duke Resources* scenario set forth in its report, which was then used as a baseline for comparative analysis of different scenarios. Synapse then made revisions to some of Duke’s inputs to better reflect current and future real-world conditions.

Synapse then developed two additional scenarios: (1) the *Optimized* scenario, which allowed EnCompass to select an economically optimal portfolio based on revised model inputs and expanded availability of zero-carbon resources; and (2) the *Regional Resources* scenario, which built upon the *Optimized* scenario by also allowing the model to select imported Midwest wind resources via power purchase agreements (PPAs). Both of these scenarios meet H951 carbon reduction mandates, maintain system reliability, and

meet reserve margin requirements. In contrast to Duke’s proposals, Synapse’s modelling of the *Optimized* and *Regional Resources* scenarios did not involve forcing the selection of any particular resources within EnCompass.

Synapse found that both the *Optimized* and the *Regional Resources* scenarios were less expensive to ratepayers than the *Duke Resources* scenario, while at the same time increasing the amount of renewable energy generation. The *Optimized* and *Regional Resources* scenarios do not select any new gas plants and reduce future reliance on speculative hydrogen, advanced nuclear, and small modular reactor (SMR) nuclear generation.

Synapse’s modeling shows that its scenarios would create significant savings for North Carolinians when compared to the *Duke Resources* scenario. The net present value of revenue requirement (NPVRR) is reduced in comparison to the *Duke Resources* scenario across the board, with the *Optimized* scenario saving \$19.4 billion and the *Regional Resources* scenario saving \$24.6 billion by 2050.

**Table 1. Synapse’s NPVRR Results**

<b>Results (2022-2050)</b>	<i>Duke Resources</i>	<i>Optimized</i>	<i>Regional Resources</i>
2030 NPVRR (\$B)	\$36.7	\$36.0	\$34.3
2040 NPVRR (\$B)	\$77.7	\$69.8	\$65.8
2050 NPVRR (\$B)	\$121.2	\$103.5	\$98.1

In order to evaluate the effects of potential future conditions, Synapse modeled the *Duke Resources*, *Optimized*, and *Regional Resources* portfolios under three “sensitivities.” North Carolina joining the Regional Greenhouse Gas Initiative (RGGI)—a process currently underway—could be expected to cause quicker and deeper carbon dioxide emissions reductions. Furthermore, the revenue from the sale of emissions allowances

could cover much of the cost of investments in energy efficiency, resulting in significant overall savings. Under a high gas price sensitivity, the cost of the *Duke Resources* and *Optimized* portfolios each increases, but the cost of the *Optimized* portfolio increases less in each tested year and remains lower-cost. Finally, the *Optimized* portfolio remains cost-effective even if Duke achieves energy efficiency equivalent to only one percent of total retail load rather than 1.5 percent.

Regardless of the path chosen by the Commission, Synapse recommends the following near-term actions:

**Table 2. Short-Term Execution Plan**

RESOURCE	AMOUNT	PROPOSED NEAR-TERM ACTIONS
<b>Proposed Resource Selections: In-Service through 2030</b>		
<b>Energy Efficiency</b>	1.5 percent of retail load	<ul style="list-style-type: none"> <li>Expand utility energy efficiency savings targets to 1.5 percent of total retail load</li> </ul>
<b>Distributed Energy Resources</b>	At least 1 GW by 2035	<ul style="list-style-type: none"> <li>Develop and support programs to empower customer-owned energy resources to accelerate contribution to grid needs</li> </ul>
<b>Additional Solar</b>	7,200 MW	<ul style="list-style-type: none"> <li>Invest in transmission projects to unlock additional cost-effective solar power</li> <li>Begin procurement of 4 GW of new solar 2022-2024 with target in-service dates of 2025-2028</li> <li>Develop interconnection methods that will be robust long-term</li> </ul>
<b>Battery Storage</b>	5,600 MW	<ul style="list-style-type: none"> <li>Begin procurement for 4 GW of stand-alone storage with target in-service dates of 2025-2028</li> <li>Invest in operational capabilities for capitalizing on energy storage resources for grid services</li> </ul>
<b>Onshore Wind (in-state)</b>	900 MW	<ul style="list-style-type: none"> <li>Engage with communities on onshore wind siting</li> <li>Prepare for continued advancement of onshore wind, long-term</li> </ul>
<b>Onshore Wind (Midwest)</b>	2,500 MW	<ul style="list-style-type: none"> <li>Engage in inter-regional coordination with PJM for facilitating power purchase</li> <li>Integrate Midwest wind import into short-term transmission planning</li> </ul>
<b>Offshore Wind</b>	800 MW	<ul style="list-style-type: none"> <li>Initiate development and permitting activities for 800 MW, with eye toward potential additional procurement long-term</li> </ul>
<b>Proposed Resource Selections: Options for Long-Term Cost-Effective Carbon Reductions</b>		
<b>Coal Retirement</b>	--	<ul style="list-style-type: none"> <li>Develop retirement plans for coal units consistent with economic optimization</li> </ul>
<b>Transmission Planning</b>	--	<ul style="list-style-type: none"> <li>Develop processes for long-term, prospective and regional transmission planning that can cost-effectively meet economic and carbon reduction requirements of HB 951</li> </ul>

<b>Pumped Storage Hydro</b>	1,700 MW	<ul style="list-style-type: none"> <li>• Conduct feasibility study, develop EPC strategy, and apply at FERC for re-licensing</li> </ul>
<b>Hydrogen Planning</b>	--	<ul style="list-style-type: none"> <li>• Develop more detailed hydrogen fuel cost planning methodology</li> <li>• Conduct studies of hydrogen transport, storage, and distribution</li> <li>• Integrate cost of production and distribution into resource planning</li> </ul>

CLEAN Intervenors' short-term execution plan represents a no-regrets pathway, informed by the *Optimized* and *Regional Resources* portfolios analyzed by Synapse. This no-regrets pathway would avoid the unnecessary risk of relying on new fossil-fuel plants or speculative and unproven technologies for meeting the law's compliance requirements.

#### B. SYNAPSE'S ANALYSIS OF DUKE'S MODELING AND INPUTS

Rather than taking full advantage of EnCompass's analytical capabilities, Duke chose to restrain generation choices and even override EnCompass's selections by "forcing" it to make certain resource choices. Specifically, Duke chose to manually identify retirement years for coal generating units outside the EnCompass model, replaced battery storage with gas-fired combustion turbines (CTs) in post-processing, and added additional SMRs and CTs based on flawed assessments of reliability and resource adequacy, respectively. The cumulative effect of these changes was to force in nearly 1 GW of new nuclear generation and nearly 2 GW of new gas generation while removing roughly 2 GW of battery storage from the generation mix.

Reliance on either SMRs or 100% hydrogen generation present significant risks to Duke's ratepayers, who ultimately bear the cost of constructing and fueling these resources. Nonetheless, Duke proposed around 10 GW of new nuclear resources over the next 20 years and 11 to 16 GW of new and retrofitted hydrogen generation. While both of these technologies are currently being researched and developed, neither has reached commercial

viability. The unnecessary addition of gas generation in the short term would expose ratepayers to greater risks of fuel price shocks. In addition, relying on new gas plants in the hopes that those generating facilities could later burn zero-carbon hydrogen exposes customers to both financial and compliance risks. If the infrastructure for green hydrogen does not reach commercial viability or if it is technically infeasible to convert those plants and their supporting infrastructure to use 100% hydrogen, Duke will be ill-equipped to meet the H951 carbon reduction mandates and will be stuck with stranded assets.

C. DUKE'S PROPOSED CARBON PLAN DOES NOT USE MODELING BEST PRACTICES

As Synapse's analysis shows, Duke's use of the EnCompass model to generate its multiple portfolio pathways cannot be validated by independent experts using the same tools and inputs provided by Duke. At root, this means that Duke has made various inscrutable changes to the model in black boxes that cannot be confirmed or analyzed, leaving the Commission without a reliable way to evaluate its multiple portfolios of proposed Carbon Plan options. In addition, Duke manipulated the EnCompass model by artificially limiting battery storage, forcing uneconomic delayed coal retirements, and not allowing for the optimization of resource adequacy. Certain manual changes were made to Duke's modeling to override the economically optimal results endogenously produced by the EnCompass software. One such deviation from model-produced outputs is seen in Duke's schedule of coal plant retirements. Duke's actions resulted in coal generation staying online in its analysis for as much as six years longer than is necessary, reducing the value to ratepayers of securitizing those assets.

Intervenors disagree with the Companies that manually adjusting the coal retirement dates selected by EnCompass is necessary to optimize scheduled unit retirement

dates.<sup>1</sup> The benefit of EnCompass is that it is objective. The software is also capable of maintaining a reserve margin and ensuring load is served in all hours to ensure system adequacy and reliability. Without using reproducible results, the Commission cannot be assured that the timeline of coal-plant retirements reflected in Duke's Carbon Plan is the most economically optimal. Duke's Carbon Plan also relies on capital costs calculated outside of EnCompass, which resulted in opaque capital expenditure and economic carrying cost values and an output dataset that cannot be reproduced using the Companies' EnCompass input files.

## **II. SUPPLEMENTAL REQUESTS FOR RELIEF**

Based on the Synapse report, and as reserved in the *Joint Initial Comments of the North Carolina Sustainable Energy Association, Southern Alliance for Clean Energy, Sierra Club, and Natural Resources Defense Council* (Joint Initial Comments) filed in this docket on July 15, 2022, the CLEAN Intervenors also respectfully request that the Commission grant each of the following requests for relief:

- Deny Duke's request to find its proposed Carbon Plan portfolios to be reasonable for planning purposes because of the inability to validate Duke's portfolios and the manual changes made by Duke to override EnCompass's modeling;
- Conduct a regionalization study and investigate the role that importing clean energy into Duke's system would have on the cost of compliance with H951's carbon reduction requirements;

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<sup>1</sup> Appendix E at 48. "To optimize unit retirement dates based availability of new capacity additions while also ensuring the Companies meet the statutory requirement to maintain or improve upon the adequacy and reliability of the system when accounting for retirement of these resources, the Companies made minor adjustments to the coal retirement dates for certain units to allow for more orderly and executable retirement schedules".

- Include regional imports of clean energy in the Commission’s own modeling to develop its Carbon Plan;
- Require Duke to use a more accurate gas price forecast, as was used in Synapse’s modeling;
- Use the modified inputs from the Synapse Report in the Commission’s modeling to develop its Carbon Plan to better reflect real-world conditions.
- Include in the Commission’s modeling to develop its Carbon Plan a sensitivity analysis for North Carolina joining the Regional Greenhouse Gas Initiative (RGGI), including evaluating the benefits of investing the resulting revenue, and, if the Commission finds advantages to ratepayers from RGGI in its analysis, open a docket on North Carolina’s participation in RGGI, and ask the Environmental Management Commission to finalize RGGI rules expeditiously.

### **III. SUPPLEMENTAL ISSUES FOR EVIDENTIARY HEARING**

In its April 1, 2022 *Order Establishing Additional Procedures and Requiring Issues Report*, the Commission directed “intervenor parties to identify in their July 15, 2022 filings the substantive issues, if any, that should be the subject of an expert witness hearing.” As outlined in the Joint Initial Comments, the Commission could dispense with holding an evidentiary hearing altogether and focus instead on developing its own Carbon Plan. In the event the Commission moves forward with an evidentiary hearing, CLEAN Intervenors submit the following additional issue for consideration:

1. Whether the modeling input sources that Duke identified or those used by Synapse better reflect real-world conditions and should be used by the Commission in developing its Carbon Plan.

2. Whether the manual changes made by Duke to override the endogenous selection of optimized resources in EnCompass was reasonable.

#### IV. CONCLUSION

The CLEAN Intervenors respectfully request that the Commission take these supplemental comments and the Synapse Report into consideration in its deliberations when developing its Carbon Plan.

Respectfully submitted, this the 20th day of July 2022.

/s/ Taylor M. Jones

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**CERTIFICATE OF SERVICE**

I hereby certify that all parties have been served with the public version of the foregoing filing, and in addition Duke and parties of record on the service list who have confirmed they have signed a confidentiality agreement with Duke have been served with a CONFIDENTIAL VERSION of the Synapse Report by hand delivery, first class mail deposited in the U.S. mail, postage pre-paid, or by email transmission with the party's consent.

This the 20th day of July 2022.

/s/ David L. Neal