SOUTHERN ENVIRONMENTAL LAW CENTER

601 West Rosemary Street, Suite 220
Chapel Hill, NC 27516

Telephone 919-967-1450
Facsimile 919-929-9421

September 21, 2022

VIA ELECTRONIC FILING

Ms. Shonta Dunston,
Chief Clerk
North Carolina Utilities Commission
4325 Mail Service Center
Raleigh, NC 27699-4300

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

Dear Ms. Dunston:

Pursuant to Ordering Paragraph 3 of the Commission's August 30, 2022 Order Establishing Expert Witness Hearing Procedures, enclosed for filing are the Summaries of Testimony of Tyler Fitch and Dr. Uday Varadarajan on behalf of the North Carolina Sustainable Energy Association, Southern Alliance for Clean Energy, Natural Resources Defense Council, and Sierra Club.

By copy of this letter, we are forwarding a copy to all parties of record by electronic delivery. Please do not hesitate to contact us should any questions arise in connection with this filing.

Sincerely,

s/ Gudrun Thompson
s/ David Neal
s/ Nicholas Jimenez

Enclosures
cc: Parties of Record

Summary of Testimony of Tyler Fitch on Behalf of North Carolina Sustainable Energy Association, Southern Alliance for Clean Energy, Sierra Club, and Natural Resources Defense Council

Docket No. E-100, Sub 179

My name is Tyler Fitch. I am a Senior Associate at Synapse Energy Economics, Inc. (Synapse). In this role I employ industry-standard electricity system models, such as EnCompass, to analyze the electricity system and consult and advise state consumer advocates, public utilities commission staff, attorneys general, state energy offices, environmental organizations, federal government agencies, and utilities on integrated resource planning; ratemaking and rate design; system resilience, and related topics.

The purpose of my testimony is to help inform the North Carolina Utilities Commission (Commission), by using modeling analysis, as to the near- and long-term actions necessary to achieve North Carolina's carbon-reduction requirements in a reliable and least-cost manner. Based on my team's reasonable revisions to Duke Energy's modeling inputs, the Synapse optimized portfolios better utilize solar, storage, and energy efficiency while requiring less near-term investment in new gas, small modular nuclear and hydrogen-dependent resources, all while maintaining Duke Energy's planning reserve margin, meeting load in all modeled hours and saving ratepayers billions of dollars by 2050.

In light of the significant changes to the energy landscape enacted by the Inflation Reduction Act, resource plans that maintain flexibility in the short term while capitalizing on cost-saving opportunities will be more adaptable to a

changing landscape. Solar and battery storage resources are modular, flexible resources for which the IRA makes tax credits available. Developing robust transmission planning processes, retiring coal-fired generation, and enabling greater wind deployment now will expand the resources options available in the future. Meanwhile, investing in gas and nuclear resources now would commit ratepayers to financially supporting these resources (and to the carbon emissions from gas generation) for decades to come, tying up capital that could be more effectively spent elsewhere.

The near-term actions laid out in Table 6 in my testimony, reproduced below, are informed by the capacity expansion and production cost modeling analysis Synapse completed, developing resource portfolios consistent with House Bill 951's emission reduction requirements for the combined Duke Energy system using the EnCompass platform. In focusing on a near-term action plan, this Commission will be able to defer decisions that would commit Duke Energy to a certain level of carbon emissions or would preclude the ability to invest in more cost-effective resources which are not necessary to be made at this time.

Table 6. Carbon Free by 2050 Short-Term Recommendations

RESOURCE	AMOUNT	PROPOSED NEAR-TERM ACTIONS
Proposed Resource Selections: In-Service through 2030		
Energy Efficiency	1.5 percent of retail load	• Expand utility energy efficiency savings targets to 1.5 percent of total retail load
Distributed Energy Resources	At least 1 GW by 2035	• Develop and support programs to empower customer-owned energy resources to accelerate contribution to grid needs
Additional Solar	7,200 MW	• Invest in transmission projects to unlock additional cost-effective solar power

		• Begin procurement of 4 GW of new solar 2022-2024 with target in-service dates of 2025-2028 • Develop interconnection methods that will be robust long-term
Battery Storage	5,600 MW	• Begin procurement for 4 GW of stand-alone storage with target in-service dates of 2025-2028 • Invest in operational capabilities for capitalizing on energy storage resources for grid services
Onshore Wind *(in-state)*	900 MW	• Engage with communities on onshore wind siting • Prepare for continued advancement of onshore wind, long-term
Onshore Wind *(Midwest)*	2,500 MW	• Engage in inter-regional coordination with PJM for facilitating power purchase • Integrate Midwest wind import into short-term transmission planning
Offshore Wind	800 MW	• Initiate development and permitting activities for 800 MW (or larger tranches if more cost-effective), with eye toward potential additional procurement long-term
Proposed Resource Selections: Options for Long-Term Cost-Effective Carbon Reductions		
Coal Retirement	--	• Develop retirement plans for coal units consistent with economic optimization
Transmission Planning	**--**	• Develop processes for long-term, prospective and regional transmission planning that can cost-effectively meet economic and carbon reduction requirements of HB 951
Pumped Storage Hydro	1,700 MW	• Conduct feasibility study, develop EPC strategy, and apply at FERC for re-licensing
Hydrogen Planning	--	• Develop more detailed hydrogen fuel cost planning methodology • Conduct studies of hydrogen transport, storage, and distribution • Integrate cost of production and distribution into resource planning

My testimony also highlights how making Midwest Wind PPA resources available for selection by the model achieved substantial additional savings.

Considering a broader range of transmission assumptions, such as increasing transmission capacity and allowing the utilities to buy and sell energy and capacity from neighbors over the planning horizon, will unlock lower-cost resource pathways. Decarbonization planning is incomplete without a consideration of transmission upgrades and regional coordination alternatives.

Duke Energy witnesses' testimony describes the results of a supplemental analysis conducted by the Companies to estimate the future reliability of several portfolios. The Companies found that the Synapse portfolio meets requirements through 2034, allowing the Commission to continue to check and adjust the plans as they evolve through the 2020s and 2030s.

In addition to presenting the results of Synapse's modeling of optimized resource portfolios developed with EnCompass, I offer my critique of Duke Energy's proposed portfolios and the methodology and assumptions used to develop them.

Publicly available and industry standard capital cost assumptions should be used to further ensure objectivity, in the absence of cost data from an all-source request for proposals. The cost estimates Duke Energy uses for solar, storage, and offshore wind resources are higher than industry benchmarks. The cost estimates used for small modular nuclear reactors and gas combined-cycle and combustion turbine units are lower than industry benchmarks. While reasonable cost forecasts may deviate, a pattern of cost assumptions that favor gas over renewable resources will drive the economic selection of such resources by the model.

In the future, Duke Energy's use of EnCompass should enable all parties to share an analytical foundation, but all parties must be committed to transparency in order to collaborate on problem-solving. Inconsistency between shared inputs and outputs, providing key additional inputs through discovery only, and conducting additional steps outside of EnCompass with little transparency of process created barriers to effective collaboration. By sharing model data at the outset of the planning process and over a longer timescale, proactively providing any inputs that are not derived from public sources prior to the discovery process, and making all out-of-model methodologies transparent, utilities and stakeholders should be able to validate future carbon plan iterations.

My testimony highlights how the manual changes Duke Energy made to its portfolios undermine the objective, resource-neutral, economic optimization performed by EnCompass. Capacity expansion models have a long-established resource adequacy regime that uses reserve margin studies and effective load carrying capabilities to ensure reliability across a portfolio of resources. I find that Duke Energy's manual over-rides are not appropriate or consistent with established resource adequacy practices. I also detail how Duke Energy's coal retirement methodology delays plant retirement dates in a manner that is inconsistent with least-cost planning and at ratepayer expense. While retiring coal capacity may create the need for replacement energy, capacity, and ancillary service resources, replacement resources can be appropriately accounted for in resource planning. Duke Energy's proposed

retirement dates are extended, by contrast without sufficient justification. To meet the economically optimal retirement schedule selected by EnCompass, Duke Energy should identify the specific transmission and generation requirements necessary for retiring those units selected to be retired within the next six years.

Synapse's EnCompass analysis also assumes an incremental energy efficient savings target that is in line with peer utilities. In contrast, Duke Energy's energy efficiency forecast falls below the savings realized by many of its peer utilities. The recent extension of the investment tax credit in the Inflation Reduction Act supports the use of Duke Energy's "High" rooftop solar adoption assumption. These assumptions are prudent for long-range planning with iterative opportunities to reconcile actual load reductions with planning projections, just as supply-side procurements will necessarily need to be adjusted to meet real-world dynamics.

Ultimately, Synapse modeling of Duke Energy's Portfolio 1-Alt, using revised inputs as outlined in my direct testimony, found that cost to ratepayers are likely to be significantly higher than projected by Duke Energy. Using the same set of inputs and assumptions that better reflect real-world conditions, Synapse's proposed portfolios would cost billions less over through 2050, as illustrated by Table 9 in my direct testimony, reproduced below.

Table 9. Net Present Value Revenue Requirement Over Time by Scenario

Results (2022-2050)	*Duke Resources*	*Optimized*	*Regional Resources*
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

With its first Carbon Plan, the Commission is beginning a process that will transform North Carolina's energy economy, and it's critical that the Commission use the most accurate view of resource needs and options to ensure that our electricity system is maximizing the benefit for everyone. My testimony and the *Carbon-Free by 2050* report show the potential benefit to North Carolina ratepayers when more accurate assumptions are included and points the way toward a Carbon Plan in the public interest moving forward.

Summary of Testimony of Dr. Uday Varadarajan on Behalf of North Carolina Sustainable Energy Association, Southern Alliance for Clean Energy, Sierra Club, and Natural Resources Defense Council

Docket No. E-100, Sub 179

I am Dr. Uday Varadarajan, head of the Utility Transition Finance Group at RMI. I offer the following summary of my direct testimony.

As set forth in RMI's "Supplemental Report: Analyzing the Ratepayer Impacts of Duke Energy's Carbon Plan Proposal and Synapse's Alternative Scenarios," RMI conducted an analysis that compared the ratepayer financial impacts of Duke Energy's proposed Carbon Plan with the Optimized and Regional Resources scenarios modeled by Synapse Energy Economics. This analysis was offered to assist the North Carolina Utilities Commission in its selection of the least-cost path toward meeting the statutory requirements of HB 951.

Optimus allows RMI to provide a deeper analysis than the net present value revenue requirement estimates produced by EnCompass. Optimus estimates ratepayer impacts using the full revenue requirement, including all cost components of both existing assets and incremental resources added to the portfolio by EnCompass, as well as capital and operating costs associated with non-production assets. Importantly, Optimus allows RMI to conduct a forward-looking estimate of rates and bills differentiated by customer class for the various portfolios generated by EnCompass, taking into account Duke's cost of service methodologies. The key insights of this analysis are presented below:

1. The Optimized and Regional Resources scenarios are both more cost-effective than the Duke Resources scenario, driven by savings from avoided gas and nuclear investments.

2. Both alternatives to the Duke Resources scenario yield lower aggregate bills, with the Regional Resources scenario resulting in the greater bill reduction, even when disaggregated between DEC and DEP (the "Companies").

3. The Duke Resources scenario would exacerbate rate disparity between DEC and DEP customers, whereas the Optimized and Regional Resources scenarios would mitigate the rate disparity between the Companies and better distribute the ratepayer cost across the region.

4. The Duke Resources scenario is more vulnerable to execution risks, such as fuel price shocks, than the Optimized and Regional Resources scenarios.

RMI's Optimus analysis results indicate that Duke Energy's proposed Carbon Plan does not represent the least-cost path to North Carolina's emission reduction requirements. A portfolio that invests more aggressively in the near term in energy efficiency and zero-emitting resources—such as solar, wind, and battery storage—will better insulate ratepayers from the potential cost impacts of future fuel price spikes, performance-based regulation, and a future in which electricity demand is higher than anticipated.

The recently passed Inflation Reduction Act (IRA) has immediate and far-reaching consequences for the least-cost path toward North Carolina's carbon reduction requirements. The magnitude of the IRA—$370 billion in federal funding designed to deliver unprecedented cost savings for ratepayers while offering large-scale transition assistance for fossil energy workers and communities—has major implications for the results of capacity expansion and production cost modeling carried out before the legislation's passage. Although the IRA's precise impacts on potential carbon plan portfolios cannot be known without further analysis, the IRA is expected to make renewables and storage much more cost-competitive with gas in the near term. The IRA's tax credits and other provisions for wind, solar, and storage will bring down the costs of these market-ready and already cost-competitive resources, further reducing the cost of modeled portfolios that rely on clean energy resources relative to portfolios that include new gas and keep coal plants running past their economically optimal retirement dates.

Additionally, the IRA's Energy Infrastructure Reinvestment provision is available to provide up to $250 billion in low-cost, federally backed loans not only to refinance remaining balances for fossil assets (securitization), but also to reinvest in the fossil asset communities via replacement clean energy,

environmental remediation, and redevelopment of the site into other productive uses that spur local economic opportunities. This program represents a more cost-effective and holistic approach to securitization and transition than what was enabled by H951 (e.g. there are no limitations on asset types, and loans can represent greater than 100% of remaining balances.)

If the IRA is not accounted for, North Carolina is at risk of selecting a near-term strategy for reaching the statutory carbon requirements that locks in extra costs for ratepayers and leaves savings opportunities untapped. In the meantime, the Synapse portfolios, by relying more heavily on technologies that will be made more affordable by the IRA, is more likely to provide a roadmap to a no-regrets short-term execution plan than the portfolios port forward by Duke Energy. Any resource decisions, near-term execution plans, and relevant resource planning activity that occurs after the September 2022 Carbon Plan evidentiary hearing should include an analysis of the full scope of the IRA's cost implications.

This Concludes my summary.