STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-100, SUB 179

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-100, Sub 179	)	
	)	
In the Matter of:	)	COMMENTS OF
Duke Energy Progress, LLC, and	)	THE ATTORNEY GENERAL'S
Duke Energy Carolinas, LLC, 2022	)	OFFICE
Biennial Integrated Resource Plans	)	
and Carbon Plan	)	

The North Carolina Attorney General's Office (AGO) respectfully submits these initial comments regarding the Carbon Plan proposed by Duke Energy Progress, LLC (DEP) and Duke Energy Carolinas, LLC (DEC, together with DEP, Duke).

These comments discuss a number of concerns with the modeling process used to develop Duke's proposed Carbon Plan. Duke's use of EnCompass, a standard, objective computer model, is an improvement over many of Duke's past planning processes; however, Duke used a number of problematic modeling inputs and made unjustified changes to the modeling results. Together, these inputs and adjustments tended to favor reliance on additional natural gas generation in place of solar, battery, and onshore wind resources. As a result, the modeling and analysis Duke used to create the portfolios in the proposed Carbon Plan may not have resulted in the lowest cost mix of resources. The AGO recommends that the Commission order Duke to perform additional analysis to better understand the impact of these problems prior to including any of the portfolios in the

Commission's final Carbon Plan and that the Commission take other actions as recommended in these comments.

I. BACKGROUND AND INTRODUCTION.

On October 13, 2021, Governor Cooper signed into law Session Law 2021-165 (House Bill 951), which directed the Commission to "take all reasonable steps" to achieve a 70% reduction of the emissions of carbon dioxide in this State from electric generating facilities from 2005 levels by the year 2030 and carbon neutrality by the year 2050. House Bill 951 limited the applicability of this requirement to Duke. To achieve this requirement, the Commission is required to develop a plan (the Carbon Plan) by December 31, 2022 to achieve these emission reductions and to review the plan every two years thereafter. House Bill 951 requires that the Carbon Plan comply with "current law and practice with respect to least cost planning," pursuant to N.C.G.S. § 62-2(a)(3a).

On November 19, 2021, the Commission entered an *Order Requiring Filing of Carbon Plan and Establishing Procedural Deadlines* (Procedural Order) in the present docket. The Procedural Order required Duke to hold a minimum of three stakeholder meetings that would "take into account and shall reflect the collaborative work and the outputs of the stakeholder efforts associated with the 2019 North Carolina Clean Energy Plan and the 2020 IRPs and shall build off of the consensus achieved and resources expended during those stakeholder efforts." Duke subsequently held stakeholder meetings on January 25, 2022, February 25, 2022, and March 22, 2022. In addition, Duke held three technical subgroup meetings on February 18, 2022.

The Procedural Order required Duke to file a proposed Carbon Plan no later than April 1, 2022 that complies with the requirements of Section 1 of House Bill 951. On November 24, 2021, Duke filed a motion for a 45-day extension to file its proposed Carbon Plan to "adequately engage with stakeholders and conduct modeling necessary to developing the Carbon Plan." The Commission granted that extension request on November 29, 2021, giving Duke until May 16, 2022 to file its proposed Carbon Plan. Under this revised schedule, the Public Staff and any other intervenor are permitted to file a plan, report, or comments on Duke's proposed Carbon Plan on or before July 15, 2022.

On May 16, 2022, Duke filed a Verified Petition for Approval of Carbon Plan and its proposed Carbon Plan, including twenty appendices and four attachments. In its proposed Carbon Plan, Duke presented four different portfolios that it believes would accomplish the goals of House Bill 951. Each portfolio outlines a different composition of supply-side resources (i.e., generation and storage) that meet Duke's anticipated needs between now and 2050. Duke's analyses indicate that the portfolios all achieve carbon neutrality by 2050, but they do not all achieve 70% carbon reductions by 2030. The portfolios share many commonalities, including the addition of small modular reactors by 2035, the same levels of energy efficiency and demand-side management savings, the same levels or net energy metering penetration, and the same amounts of onshore wind addition. However, there are some key differences as summarized in the chart below:

Portfolio[1]	Year of 70% Carbon Reduction	Millions of Tons of Carbon Reduction by 2050 Relative to P3	Utility-Scale Solar Additions by 2030 (MW)	Offshore Wind Additions by 2030 (MW)	Natural Gas Additions by 2030 (MW)	Retirement of Roxboro Coal Units
1	2030	69	5,400	800	3,558	2027
2	2032	32	3,525	800	2,430	2031
3	2034	0	3,750	0	2,430	2033
4	2034	2	3,750	0	2,430	2033

In its Verified Petition, Duke asks the Commission to determine that the Carbon Plan is "reasonable for planning purposes and presents a reasonable plan for achieving HB 951's" carbon reduction targets. Duke also seeks approval of a set of near-term development activities that are "generally consistent with all four portfolios presented," including: (1) procurement of 3,100 MWs of solar generation, 1,600 MWs of battery storage, 600 MWs of onshore wind, 800 MWs of natural gas combustion turbines, and 1,200 MWs of natural gas combined cycles; and (2) initial development activities to support future additions of offshore wind, small modular reactors, and new pumped hydro storage. In addition, Duke seeks a determination that undertaking the above activities is a reasonable and prudent decision, and requests authorization to defer the costs of those activities for recovery in a future rate case with assurances that any development costs will be recoverable if later determined to be unnecessary.

[1] Compiled from Duke Carbon Plan, Chapter 3, Table 3-3, and Duke Carbon Plan, Appendix E, Tables E-61, E-62, E-63, E-64, E-65, E-66, E-67, E-68, and E-74.

These initial comments discuss concerns about Duke's Carbon Plan, which have been identified by the AGO's expert, Strategen Consulting, LLC (Strategen),[2] and are discussed in more detail below. Based on these concerns, the AGO recommends that the Commission decline to adopt Duke's proposed Carbon Plan without first reviewing the impact of problems in Duke's modeling and post-modeling changes. To that end, the Commission should conduct an evidentiary hearing to consider the impact of problems in Duke's modeling inputs and of the "out of model" adjustments that were used to develop Duke's proposed plan. As part of the testimony and exhibits prepared for the evidentiary hearing, Duke should be directed to develop additional scenarios based on EnCompass model runs that reflect revised modeling inputs and that eliminate or significantly reduce the number of "out of model adjustments" as described herein. Other parties should also have the opportunity to perform comparable modeling. Further, the Commission's final Carbon Plan should comply with the statutory requirements and public policies set forth in HB 951.The Commission should also consider the merits of comments and alternative portfolios submitted by other parties. Finally, for reasons discussed in these comments, the Commission should not approve Duke's short-term action plan in its current form, or provide the assurances Duke requests in this proceeding relating to initial development activities for possible offshore wind, small modular reactor, and pumped hydro storage projects.

[2] Strategen, a California firm, is comprised of a team of well-respected leaders with technical, regulatory, product, and organizational expertise in energy markets, who have decades of experience working closely with governments, utilities, research institutions, technology providers, project developers, and large energy users to evaluate, analyze, and implement strong regulatory and policy strategies. Strategen prepared a memorandum analyzing Duke's Carbon Plan, which has been attached as Attachment 1.

II. STANDARD OF REVIEW.

In its Procedural Order the Commission held that it will "look to, but will not strictly adhere to, Rule R8-60 in establishing the initial procedures" and "generally will employ the same review process as set forth in Rule R8-60(k)[.]" That Rule sets out the integrated resource planning (IRP) process, in which the Commission investigates utility proposals for planning to use "the least cost mix of generation and demand-reduction measures" to meet electric power requirements in North Carolina.[3] Under Rule R8-60, all "potential resource options and combinations of resource options to serve its system needs" must be considered.[4] Furthermore, utility proposals "should take into account, as applicable, system operations, environmental impacts, and other qualitative factors."[5]

While House Bill 951 requires that the Commission comply with principles of least cost planning, Rule R8-60 clarifies those principles. Specifically, Rule R8-60(g) clarifies that the "least cost combination" of reliable resource options for meeting anticipated needs of the system shall be determined through integrated planning that considers and compares "a comprehensive set of potential resource options, including both demand-side and supply-side options." Rule R8-60(g) also states that the "least cost combination" is determined "on a long-term basis." Finally, Rule R8-60(g) highlights important considerations the Commission shall take into account when evaluating whether a plan is the "least cost combination," including "the risks associated with wholesale markets, fuel costs,

[3] See N.C.G.S. §§ 62-2(a)(3a) (setting forth the policy of least cost planning) and 62-110.1(c) (requiring the Commission to undertake the IRP process).
[4] NCUC Rule R8-60(g).
[5] Id.

construction/implementation costs, transmission and distribution costs, and costs of complying with environmental regulation."

As is the case in other proceedings, the policy declarations set forth in N.C.G.S. § 62-2(a) inform the Commission's review. These express statutory policies include, but are not limited to, the following: (1) promoting "adequate, reliable, and economical utility service to the general public"; (2) assuring that the "resources necessary to meet future growth . . . include use of the entire spectrum of demand-side options"; and (3) encouraging and promoting "harmony between public utilities, their users and the environment."[6]

III. DUKE HAS FAILED TO SHOW THAT PORTFOLIOS 2, 3, AND 4 SATISFY THE REQUIREMENTS OF HOUSE BILL 951.

The purpose of House Bill 951 is clear—this Commission must develop a plan to substantially reduce the carbon dioxide emissions attributable to electric generating facilities in this state. The title of the act emphasizes this point:

> AN ACT TO AUTHORIZE THE UTILITIES COMMISSION TO . . . TAKE ALL REASONABLE STEPS TO ACHIEVE A SEVENTY PERCENT REDUCTION IN EMISSIONS OF CARBON DIOXIDE FROM ELECTRIC PUBLIC UTILITIES FROM 2005 LEVELS BY THE YEAR 2030 AND CARBON NEUTRALITY BY THE YEAR 2050.

Part I, Section I of the act provides:

> The Utilities Commission shall take all reasonable steps to achieve a seventy percent (70%) reduction in emissions of carbon dioxide (CO2) emitted in the State from electric generating facilities owned or operated by electric public utilities from 2005 levels by the year 2030 and carbon neutrality by the year 2050.

[6] N.C.G.S. § 62-2(a)(3), (3a), (5).

Nevertheless, Duke has proposed four portfolios, of which only one meets the statute's target of 70% reduction by 2030.

Part I, Section I, Subsection (4) of House Bill 951 provides the Commission with discretion to "determine optimal timing and generation and resource-mix to achieve the least cost path to compliance with the authorized carbon reduction goals[.]" This discretion is not, however, unlimited. Instead, House Bill 951 specifically describes the ways in which the Commission may exercise its discretion:

> [The Commission has] discretion in achieving the authorized carbon reduction goals by the dates specified in order to allow for implementation of solutions that would have a more significant and material impact on carbon reduction; provided, however, the Commission shall not exceed the dates specified to achieve the authorized carbon reduction goals by more than two years, except in the event the Commission authorizes construction of a nuclear facility or wind energy facility that would require additional time for completion due to technical, legal, logistical, or other factors beyond the control of the electric public utility, or in the event necessary to maintain the adequacy and reliability of the existing grid.

This provision lays out three circumstances where the Commission may exercise the discretion to delay "achieving the authorized carbon reduction goals[.]" First, The Commission may delay compliance by up to two years "in order to allow for implementation of solutions that would have a more significant and material impact on carbon reduction." Second, the Commission may delay compliance by more than two years if "the Commission authorizes construction of a nuclear facility or wind energy facility" and additional time is necessary to complete that facility "due to technical, legal, logistical, or other factors beyond the control of the electric public utility[.]" Third, the Commission may delay compliance

by more than two years "in the event necessary to maintain the adequacy and reliability of the existing grid."

Addressing now Duke's Carbon Plan portfolio options, Portfolio 1 is within the Commission's discretion to include because that portfolio achieves 70% carbon reductions by 2030. However, Duke has failed to show that the remaining portfolios are within the Commission's discretion to include in its final Carbon Plan, as discussed below.

A. Portfolios 2, 3, and 4 do not achieve 70% carbon reductions within the compliance deadline, and Duke has not shown that the portfolio would result in a "more significant and material impact on carbon reduction."

As described above, the Commission may only include a portfolio that delays compliance with the statutory deadline in its final Carbon Plan if it determines that it provides "more significant and material impact on carbon reduction" than Portfolio 1. Duke has not shown that this is the case for Portfolios 2, 3, and 4. In fact, Duke's Carbon Plan shows that the opposite is true—Duke's Carbon Plan shows that Portfolio 1 provides the most annual carbon reductions in nearly all years prior to 2050 and the most cumulative carbon emissions by 2050.[7] Because Duke has not shown that these portfolios would result in a "more significant and material impact on carbon reduction," it is not appropriate for the Commission to rely on those portfolios in its final Carbon Plan.

[7] Duke Carbon Plan, Appendix E, Figure E-15 and Table E-74, and for the Alternative Fuel Supply Scenario, Figure E-16 and Table 88.

B. Portfolios 3 and 4 do not fall within the Commission's limited discretion to exceed the compliance deadlines by more than two years.

The Commission cannot include Portfolios 3 and 4 in its final Carbon Plan. These portfolios do not achieve a 70% carbon reduction within two years of 2030. Further, at this time: (1) the Commission has not "authorize[d] construction of a nuclear facility or wind energy facility" that "would require additional time for completion due to technical, legal, logistical, or other factors beyond the control of the electric public utility;" and (2) exceeding the statutory deadline is not "necessary to maintain the adequacy and reliability of the existing grid."

i. The Commission will not authorize the construction of a wind or nuclear facility until 2024 at the earliest.

Under a plain reading of the statute, the Commission may exceed the statutory deadline by more than two years only if factors beyond the control of the public utility necessitate additional time for completion of a previously authorized wind or nuclear facility.[8] The AGO believes that this provision was meant to provide a "safety valve" in the event that—having undertaken a path towards meeting the statutory deadlines—intervening events make achievement of the statutory deadlines impossible. More specifically, the provision provides for a safety valve that allows delay of the compliance date by more than two years to address factors beyond the utility's control *if construction of a nuclear or wind facility is authorized*. Duke's Portfolios 3 and 4 propose delaying the 2030 compliance date by more than two years even though construction of nuclear or wind facilities have not yet

[8] The plain meaning of a statute controls as long as the statute is clear and unambiguous. State v. Jackson, 353 N.C. 495, 501, 546 S.E.2d 570, 574 (2001).

been authorized. In fact, Duke has asked the Commission to develop an initial Carbon Plan that does not specify which longer term projects will be constructed until more details are provided in the Carbon Plan update in 2024.[9] These circumstances do not fit the exception that allows a delay for an authorized nuclear or wind facility. Therefore, the AGO does not believe this is discretion that the Commission can exercise at this time, but may exercise later.

ii. Duke has not shown the delay of any wind or nuclear facility is due to a factor beyond its control.

Once construction of such a facility is authorized, the Commission may only exceed the compliance deadlines if a "technical, legal, logistical, or other factors beyond the control of the electric public utility" causes a delay. In reading House Bill 951, the Commission should consider "the language of the statute or ordinance, the spirit of the act and what the act seeks to accomplish." Hayes v. Fowler, 123 N.C. App. 400, 404–05, 473 S.E.2d 442, 445 (1996) (citation omitted). The legislative intent behind House Bill 951 was to rapidly reduce our state's carbon emissions.

Reading House Bill 951 in line with this legislative intent supports a determination that the Commission cannot exceed the statutory deadline by more than two years unless the delay is due to an unforeseen event beyond the control of the public utility related to the construction of a wind or nuclear facility. Recognizing the immense complexity involved with the construction of offshore

[9] Duke Verified Petition at 16; Duke Carbon Plan, Chapter 4 at 18-21; Carbon Plan, Executive Summary at 24 ("The Companies are not at this time requesting selection of these resources for the purposes of HB 951 . . . such selection would be premature at this time[.]").

wind and nuclear facilities, the General Assembly included a safe harbor provision to allow the Commission and Duke to avoid the scenario where they are required by law to accomplish the impossible. The Commission cannot, as Duke proposes, prospectively plan to fail to meet the statutory deadlines by more than two years. This safe harbor provision should not be used to avoid the legal requirements of the act. To interpret the provision as Duke argues would disregard the statutory deadline now and in subsequent carbon plan updates.

iii. The Commission can meet the carbon reduction compliance deadline and maintain the adequacy and reliability of the grid.

The third circumstance in which the Commission has discretion to delay the compliance deadline by more than two years is "in the event necessary to maintain the adequacy and reliability of the existing grid." The AGO believes that this provision was also meant to provide a "safety valve" in the event a delay of more than two years becomes necessary. Duke does not argue that adoption of Portfolios 3 and 4 are necessary to maintain the adequacy and reliability of the existing grid at this time—nor could it.[10] The existence of Portfolios 1 and 2, both of which satisfied Duke's tests for adequacy and reliability, shows that a delay of more than two years is not necessary. Additional examples may be offered by other intervenors that show it is possible to maintain adequacy and reliability within the statutory deadlines. It is not reasonable to delay the 2030 compliance date in the initial plan developed by the Commission based on this provision.

[10] See Webster's Dictionary (defining "necessary" as "absolutely needed," "of an inevitable nature," or "logically unavoidable.").

The Commission is required to develop a Carbon Plan to "achieve the least cost path *to compliance with the authorized carbon reduction goals*." The carbon reduction goals include not only the carbon reduction amounts, but the timing of those reductions as well. As described above, the purpose of House Bill 951 is to reduce the carbon dioxide produced by our State's electric generating facilities. Duke's own analysis recognizes that Portfolio 1 results in drastically less carbon dioxide being produced by 2050 while meeting the 70% target.[11] In passing House Bill 951, the General Assembly—representing the will of the people of North Carolina—recognized that the cost of failing to address climate change was far higher than taking action.[12] It is not the role of this Commission to second guess that decision, but to faithfully implement those statutory mandates.[13]

For these reasons, the Commission should not include Portfolios 2, 3, and 4 of Duke's proposed Carbon Plan.

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[11] Duke Carbon Plan, Appendix E at 88-89.

[12] See e.g. Van Houtven, et al., *Climate Change and North Carolina: Near-term Impacts on Society and Recommended Actions*, RTI International (Oct. 2020), https://coastalreview.org/wp-content/uploads/2020/12/NC_Costs_of_Inaction.pdf; Kunkel, et al., *North Carolina Climate Science Report*, North Carolina Institute for Climate Studies (Sept. 2020), https://ncics.org/nccsr; Megan Fencil, *The High Cost of Climate Change in North Carolina*, Sustain Charlotte (July 10, 2019), https://www.sustaincharlotte.org/the_high_costs_of_climate_change_in_north_carolina (quoting NC Board of Transportation's Vice-Chair Nina Szlosberg-Landis who stated that the NC Department of Transportation's costs for storm cleanup have increased by over $150 million per year as a result of climate change).

[13] See Hutton v. Webb, 126 N.C. 897, 907, 36 S.E. 341, 344 (1900) ("[T]here [is no] indication that the wisdom of the courts is so far superior to the will of the people, expressed through the lawmaking body, that the judiciary shall *virtue officii* supervise and correct legislation, whether wise or unwise (in its estimation), when such legislation is enacted within the limits not forbidden to the general assembly by the constitution.").

IV. THE COMMISSION SHOULD DIRECT DUKE TO CONDUCT ADDITIONAL MODELING, AND ALLOW OTHER PARTIES TO DO THE SAME, IN ORDER TO EVALUATE THE IMPACT OF PROLEMATIC MODELING INPUTS AND POST-MODELING CHANGES ON DUKE'S PROPOSED PLAN.

Duke's use of EnCompass, a standard, objective computer model, is an improvement to Duke's planning processes. However, a model is only as good as the information that is put into it. Strategen identified a number of problematic inputs that Duke inserted into the EnCompass modeling that are discussed in detail in the attached memorandum, including:

- Annual constraints on solar additions;
- Postponement of the first year of solar additions until 2027;
- Annual constraints on onshore wind additions;
- Cumulative limits on onshore wind additions;
- Postponement of the first year of wind additions until 2029;
- Cumulative limits on solar plus storage additions;
- Limited configurations of solar plus storage additions;
- Using natural gas prices that do not match real-world conditions;
- Using unrealistic assumptions regarding natural gas supply;
- Allowing limited natural gas combined cycle configurations;
- Using unrealistic Effective Load Carrying Capacity (ELCC) values for natural gas generation; and
- Speculative assumptions regarding the transition to green hydrogen.

Equally worrying, Duke inserted additional "out of model" changes to its modeling results to develop its proposed Carbon Plan and did not rely on modeling for some items. Strategen identified a number of these out-of-model items that are discussed in more detail in the attached memorandum, including:

- Delaying retirement of coal generating facilities;
- Setting a fixed solar plus storage output profile;
- Replacing standalone batteries with additional natural gas generation;
- Setting a fixed level of demand-side management and energy efficiency resources (DSM/EE);
- Proposing to shift to a less accurate method of accounting for DSM/EE savings; and
- Setting a fixed level of residential rooftop solar.

These "out of model" changes are both subjective and difficult to analyze. Together, these concerns about Duke's modeling process call into question the resource mix selected for use in the portfolios that make up Duke's proposed Carbon Plan. The Commission should evaluate these concerns in an evidentiary hearing prior to developing a final Carbon Plan. To facilitate that evidentiary hearing, Duke should be required to conduct sufficient modeling to develop scenarios that reflect the changes described in these comments. Developing scenarios that isolate each change individually can help the Commission understand the impact of each; however, Duke should also be required to conduct a modeling scenario that corrects all of the issues identified. These scenarios should be filed when Duke files its testimony and exhibits for the evidentiary hearing.

Below are high level summaries of several of the problems identified by Strategen. Additional concerns and details are provided in the attached memorandum.

A. Duke's modeling relies on overly optimistic assumptions related to natural gas generation.

There are downsides to increasing reliance on natural gas generation that are not adequately factored into Duke's modeling assumptions. The assumptions used to evaluate increased reliance on natural gas generation must be reasonable, and overly optimistic assumptions in Duke's modeling pose concerns about whether the mix of resources selected by Duke's model reflect the least cost alternatives.

Natural gas does have some positive attributes. Natural gas generation can be dispatched quickly on demand; it compliments intermittent renewable resources; and is generally less damaging to the environment than coal. Nonetheless, Duke's use of modeling assumptions that are overly optimistic may cause Duke's model to select uneconomical natural gas units instead of more economical resources. Moreover, ratepayers might be faced with inordinately high rates when Duke's higher natural gas costs are reflected in rates if Duke's assumptions are off, as described in greater detail below.

Duke's plan was developed before the recent and significant increase in natural gas prices. In May 2022, the Henry Hub natural gas spot price was $8.14/MMBTU. This price exceeds Duke's base projection through the year 2050 and the price in Duke's "High Gas Price" scenario in 2039. Duke did not re-optimize the resource selection under each gas price sensitivity case. Instead, these

sensitivity cases relied on the same resources selected in the base case but modified the cost. Further, the risks related to fluctuations in natural gas prices largely run in one direction. The potential increases in the present value of revenue requirement (PVRR) associated with high gas prices are more than twice the potential savings associated with low gas prices.[14] This shows the risk to ratepayers if gas prices remain high is not offset by an equal gain if gas prices end up lower than anticipated.

Duke's fuel expenditures are passed directly to customers through the annual fuel rider proceeding. Therefore, customers—not Duke—bear the risk of inaccurate natural gas price forecasts. In order to protect customers from this risk, the Commission should minimize the amount of new natural gas that is added under the plan—especially new combined cycle (CC) additions, due to their high capacity factors.

While the cost concerns are troubling, perhaps equally troubling is the fact that all four portfolios fail to meet the 70% carbon reduction goal by 2030 when evaluated under the "High Gas Price" scenario.[15] The reason for this is that, as natural gas prices increase, the model dispatches additional coal units in place of the uneconomic natural gas units. Under the "High Gas Price" scenario, the emissions increase such that carbon reductions are forecasted to decrease by between 6.2% and 8.4% in the interim target years (i.e. in 2030 for Portfolio 1, 2032 for Portfolio 2, and 2034 for Portfolios 3 and 4).[16] In order to address the

[14] See Duke Carbon Plan, Appendix E, Tables E-94 and E-96.
[15] Duke Carbon Plan, Appendix E, Table E-96.
[16] See id. "Interim target year" refers to the year that the portfolio was originally anticipated to reach 70% carbon reduction. Duke's Carbon Plan did not contain a comparison of the

impact of these concerns on the least cost mix of resources, the Carbon Plan should be developed by modeling a scenario that uses the "High Gas Price" scenario to select resources for use as a contingency plan.

The inaccurate assumptions related to natural gas are not limited to fuel prices themselves. Duke's Carbon Plan also used risky fuel supply assumptions. Duke assumed that it will be able to obtain sufficient firm transportation service to supply its existing CC generating units as well as a limited amount of new CC generating units with low-cost Appalachian natural gas. The reliance on Appalachian natural gas introduces significant reliability risk in the event of severe cold weather events if Duke is unable to secure new firm gas transportation service, which has been difficult to achieve in the Carolinas in recent years.

Duke also modeled an "Alternate Fuel Supply Sensitivity" for each portfolio that relies on higher-cost natural gas from the Henry Hub. To ensure adequate reliability, the Commission should consider the Alternate Fuel Supply Sensitivity as the primary scenario for each portfolio.

The impact on resource selection was not insignificant. When the more conservative approach was modeled using the Alternate Fuel Supply Sensitivity, fewer CC generating units were selected, and instead more CT generating units, batteries, onshore wind, and solar resources were selected.[17]

Duke's modeling also assumed a 35-year lifetime for new natural gas units; therefore, any new natural gas plants added under the Carbon Plan will operate

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carbon reduction impacts of the "High Gas Price" on the various portfolios in the same years.

[17] Duke Carbon Plan, Appendix E, Table E-83.

beyond the 2050 deadline to achieve carbon neutrality. Duke addresses this concern by planning for all natural gas units to operate on 100% green hydrogen by 2050. However, the plan to operate all natural gas units using green hydrogen is speculative.

Green hydrogen has not been produced, transported, or used for electric generation at a utility-scale. There is a real possibility that if any of these steps fail to materialize, many of Duke's natural gas generating units would need to retire early. It does not appear that Duke rigorously examined this possibility. For example, Duke has not accounted for the increased carbon-free generation necessary to produce the green hydrogen necessary to supply its natural gas units.[18] Because green hydrogen is a linchpin to Duke's plan to use its natural gas units beyond the 2050 net zero date (and thus its entire Carbon Plan), there is a significant risk that these gas units will become stranded assets and that Duke will not be able to meet House Bill 951's 2050 deadline.

Because green hydrogen is still a nascent technology, Duke's cost assumptions are also speculative. Duke's modeling used cost assumptions related to the operation of natural gas unit with hydrogen that are speculative and risky. Because green hydrogen is still a nascent technology, Duke's cost assumptions are highly theoretical estimates.[19]

[18] Duke Response to AGO Data Requests 4-13.
[19] See Duke Confidential Response to Public Staff Data Request 8-20.

B. Duke's modeling placed arbitrary limits on solar plus storage configurations.

Duke's modeling placed constraints on solar plus storage additions that limit the model's ability to select them as least cost resources. First, Duke modeled solar plus storage resources with a fixed storage output profile instead of letting the model flexibly dispatch the storage component. This means that the discharge of energy storage was uniform and predetermined through a separate analysis. EnCompass was not allowed to make modifications even if the modeled grid conditions would suggest it should do otherwise. By decreasing the storage component's flexibility, these resources are less able to contribute to resource adequacy. Using a fixed storage output profile also diminished the value of each additional solar plus storage resource that the model might add. Removing this arbitrary constraint would likely increase the amount of solar plus storage that is selected by the model.

Second, Duke's modeling only included two possible configurations for solar plus storage additions: (1) 75 MWs of solar paired with 20 MWs of 4-hour batteries (a 50% battery ratio) and (2) 75 MWs of solar pair with 40 MWs of 2-hour storage (a 25% battery ratio). These limited options do not represent the full ranges of solar plus storage configurations that are available to Duke, nor do they represent the configurations that are likely to maximize value into the future. This is especially true considering the interconnection limits that Duke is facing. Larger and longer-lasting batteries have the potential to maximize the availability value of interconnected solar capacity. Duke indicated that it did not include larger or longer-lasting batteries because it "believed that the incremental capital cost for

the larger battery would not have yielded a high enough energy output to justify the added expense."[20] The proper approach would be to input these resource options into the model—with their appropriate capital costs and energy output characteristics—and allow the model to determine whether the added expense is justified. As detailed in Strategen's memorandum, these solar plus storage resources have proven to be very valuable in other jurisdictions.

Third, Duke's modeling applied cumulative limits for the 50% battery ratio solar plus storage configuration: 450 MW for DEC and 750 MW for DEP. Yet, the model reached this limit for DEP by approximately 2030.[21] Duke claims that this limit is necessary to address reliability concerns. However, EnCompass is able to resolve reliability concerns without Duke inserting modifications based on subjective beliefs about the outcome.

Together, these arbitrary limits on solar plus storage additions likely impacted the resources select by EnCompass and may have significantly decreased the amount of solar plus storage that would have otherwise been selected. Therefore, the AGO recommends that Duke be directed to model a scenario that allows storage resources to be dispatched flexibly, includes additional solar plus storage configurations with larger batteries, and has no cumulative limit on the amount of solar plus storage that can be selected.

C. Duke placed arbitrary limits on onshore wind.

[20] Duke Response to AGO Data Request 3-5.

[21] Duke Confidential Response to North Carolina Sustainable Energy Association (NCSEA), Southern Alliance for Clean Energy (SACE), Sierra Club, and Natural Resources Defense Council (NRDC) (collectively NCSEA and SACE, et al.) Data Request 3-36.

Duke placed limits on onshore wind that may not be justified. Onshore wind is a mature, low-cost, zero carbon resource that is already widely used around the country and the world. Nevertheless, in its modeling, Duke did not allow new onshore wind resources to be added until 2029. Given wind project development timelines are often 2-3 years, this timeline seems unnecessary. In addition, Duke placed an annual limit of 300 MWs of new onshore wind resources. Neither of these limitations are sufficiently explained.[22]

These limitations likely had a material impact on the outcomes of the Carbon Plan. Duke's EnCompass model selected the maximum amount of wind resources available the first four years it was allowed to be selected. Earlier and more significant wind procurements have the potential to delay or eliminate the need for additional natural gas generation. The AGO recommends that Duke be directed to model a scenario that allows onshore wind resources to be selected as soon as 2026 and that has a more reasonable annual limitation on onshore wind additions.

D. Duke placed arbitrary limits on energy efficiency and demand-side management resources.

Duke assumed a savings of 1% of eligible retail load annually from energy efficiency and demand-side management (EE/DSM) programs under the Carbon Plan. Duke claimed that this is a "very ambitious target;"[23] however, utilities elsewhere in the country are already exceeding this target.[24] In addition, Duke

[22] See Duke Response to AGO Data Request 3-13.
[23] Duke Carbon Plan, Appendix G at 5, 8.
[24] See Energy Efficiency Resource Standards, American Council for an Energy-Efficient Economy, https://database.aceee.org/state/energy-efficiency-resource-standards.

proposes moving to an “as found” baseline, allowing Duke to claim credit for savings otherwise attributable to advances in efficiency, which would make this target more attainable without contributing more energy efficiency. The AGO does not support the proposal for moving to an “as found” baseline for reasons explained in Strategen’s memorandum.

The EE/DSM savings amount was embedded in Duke’s load forecast prior to being fed into the EnCompass model. EE/DSM programs have the potential to be cost-effective means of offsetting additional generation. Instead of assuming a set level of EE/DSM savings, it is possible for EE/DSM to serve as a selectable resource in EnCompass. Therefore, in future Carbon Plan filings, Duke should allow increased levels of EE/DSM savings to be selected by the EnCompass model.

E. Duke placed arbitrary limits on residential rooftop solar.

Similar to how it treated EE/DSM savings, Duke considered residential rooftop solar resources that are enrolled in net energy metering (NEM) to be a fixed input into the load forecast rather than a selectable resource in the EnCompass model. Instead, it makes sense to model this resource, including rooftop solar installed with behind-the-meter storage, in the future to evaluate how it could contribute to the Carbon Plan. Many North Carolinians are interested in installing distributed generation on their homes, despite the sizable personal investment required. In the next Carbon Plan filing, Duke should analyze differing

levels of residential rooftop solar adoption and how they are impacted by varying incentives.

F. Duke failed to appropriately recognize the risk that small modular reactors may fail to materialize within the expected timeframe or budget.

Duke did not fairly recognize the risk that small modular reactors (SMRs) may fail to materialize. Duke's plan relies on the construction of SMRs in all four of its portfolios. SMRs have not been deployed at utility-scale anywhere in the world. In addition, cost overruns and stalled development have been common among recent nuclear projects in the United States and in our region. To address these concerns, any Carbon Plan adopted by the Commission should have a modeled contingency plan in the event that these resources are unable to be developed within the anticipated timeframe.

G. Duke made "out of model" changes to the modeling results that are difficult to evaluate and were not appropriately explained.

After the EnCompass model selected the optimal resource mix, Duke performed "out of model" changes to the modeling results. "Out of model" changes undermine the usefulness of using a standard, objective model like EnCompass by potentially injecting biases into the process. Strategen identified a number of these changes, which could have significantly impacted the mix of resources selected for Duke's portfolios. The Commission should not approve any portfolio that relies on these "out of model" changes unless they are appropriately vetted

through an evidentiary hearing. Below is an overview of two key "out of model" changes identified by Strategen.

i. Duke adjusted the retirement dates of coal generating facilities to be later than what the model selected.

In Duke's last IRP proceeding, the Commission ordered that in future IRPs and in this proceeding Duke must "[l]everag[e] the full capability of the EnCompass cost modeling and capacity expansion tools" and "present an alternative coal unit retirement schedule using the capabilities of the EnCompass model to select the optimum retirement dates endogenously."[25] Nevertheless, Duke delayed the retirement of many of their coal generating facilities beyond what the EnCompass model selected. Duke explained some of these changes as "minor adjustments and limited engineering judgments."[26] However, the retirements of some of the units were delayed by as much as six years. To address these concerns, additional scenarios should be evaluated using economic retirement dates.

ii. Duke replaced standalone batteries with additional CT units.

The Encompass model initially selected between 2,800 and 5,500 MWs of additional standalone batteries by 2035. Duke then performed a "Battery-CT Optimization" that resulted in between 1,600 and 2,000 MWs of batteries being replaced with 1,500 to 1,900 MWs of CT units. Duke stated that the "typical day" load shape used by EnCompass over-valued short duration storage. To address the concern, Duke made adjustments outside the model which are difficult to

[25] *Order Accepting Integrated Resource Plans, REPS and CPRE Program Plans with Conditions and Providing Further Direction for Future Planning*, Docket No. E-100, Sub 165 at 12 (Nov. 19, 2021).
[26] Duke Confidential Response to NCSEA and SACE, et al. Data Request 3-39(k).

analyze. The better approach would have been to construct a more typical daily load shape for use in the modeling and allow the model to select the mix of resources.

V. THE COMMISSION SHOULD NOT APPROVE DUKE'S SHORT-TERM ACTION PLAN IN ITS CURRENT FORM.

In addition to describing its proposed Carbon Plan, Duke's petition seeks Commission approval of a suite of near-term development activities.[27] As described above, Duke's modeling contained a number of problematic inputs and "out of model" changes. The results of Duke's modeling are the foundation for Duke's proposed near-term action plan. Therefore, the Commission should not approve the entirety of Duke's proposed near-term actions without further analysis to address the problematic inputs and changes.

There are, however, a few items that can safely be pursued in the interim.

The first item that can safely be pursued is the procurement of at least 3,100 MWs of utility-scale solar with targeted in service dates of 2026-2028. This amount of utility-scale solar will be required under any of the provided portfolios. It is highly unlikely that any of the modeling changes that have been recommended herein would result in less utility-scale solar resources. In fact, accelerating this procurement would help leverage the federal solar investment tax credit (ITC) before it is phased out. Therefore, 3,100 MWs of utility-scale solar represents a least regrets procurement.[28]

[27] Duke Verified Petition at 8.

[28] A least regrets approach to planning recognizes that there are many potential future outcomes; therefore, you should prioritize additions that are most likely to be useful in the future.

The second item in Duke's near-term proposal that can safely be pursued is the procurement of at least 1,000 MWs of new standalone storage and 600 MW of solar paired with storage. These amounts of storage resources are required under each of the provided portfolios. It is highly unlikely that any of the modeling changes that have been recommended herein would result in less storage resources being added. In addition, by placing these newly acquired storage resources at the site of retiring coal facilities, Duke can avoid transmission upgrade requirements and advance economic retirement of those facilities earlier than anticipated. Therefore, the addition of a combined 1,600 MWs of new storage is a least regrets option.

The third item that can safely be pursued is the procurement of at least 600 MWs of new onshore wind resources; however, the Commission should approve an accelerated target in-service of 2026-2027.

VI. DUKE'S REQUESTS FOR COMMISSION APPROVAL OF PLANS TO PURSUE INITIAL DEVELOPMENT ACTIVITIES AND TO ASSURE COST RECOVERY FOR SUCH ACTIVITIES RELATING TO POSSIBLE OFFSHORE WIND, SMALL MODULAR REACTORS, AND PUMPED HYDRO STORAGE PROJECTS SHOULD NOT BE ADDRESSED IN THIS PROCEEDING.

In connection with the proposed Carbon Plan, Duke has petitioned for assurances from the Commission about its plans to pursue initial development activities to support the future availability of offshore wind, SMR, and pumped hydro storage projects. Duke seeks approval of its plans to pursue the development activities. In addition, Duke seeks assurances that special accounting will apply to the development costs associated with such projects and that the costs will be recoverable in rates even for projects that are later found to

be unnecessary to meet the requirements of House Bill 951.[29] These requests should not be addressed in this proceeding for the following reasons.

First, it is premature to provide assurances about development of these projects because, as discussed in more detail above, more scrutiny of portfolio alternatives needs to occur before the Commission considers the reasonableness and prudence of pursuing the development of particular projects and offers assurances that related costs will be recoverable. The Commission will be more informed about how and when such longer-term resources may fit into the mix following a hearing on various modeling scenarios and portfolio alternatives.

Second, the Commission's review of a decision to pursue development of one or more projects requires the consideration of complex information and documentation supporting the decision and must take into account the potential that the costs will be very high to ratepayers. The Commission cannot undertake an adequate review in this proceeding, particularly where specific project proposals have not been detailed.

This point is illustrated by the complexity and high costs associated with DEC's development of the Lee nuclear project.[30] In DEC's general rate case in Docket No. E-7, Sub 1146, the Commission allowed the Lee nuclear project to be cancelled. The final order in that case describes extensive Commission proceedings that occurred between 2006 and the end of 2017 when the project

[29] See Duke Verified Petition at 15-16, requested actions described in paragraphs (2)(b) and (c).
[30] See the extensive discussion in the *Order Accepting Stipulation, Deciding Contested Issues, and Requiring Revenue Reduction,* Docket No. E-7, Sub 1146, et al. (June 22, 2018) at 150-163.

was abandoned.[31] During that period, the project was deferred more than once as the need for base load energy was pushed back but was continued for some time to keep the option available. Ultimately the project was not supported as a least cost resource, and the risks and uncertainties of beginning construction were so great that cancellation was found to be in the best interest of customers.[32] By the time that the project was finally abandoned, over $500 million in development costs, including Allowance for Funds Used During Construction (AFUDC), had already been incurred that are still being recovered from ratepayers.[33]

Duke's proposal for assurances sought in its petition in this proceeding are broader than the assurances provided for the Lee project. Duke requests assurances for multiple types of resources without specifics or documentation about a particular protect. The Commission should not write a blank check for development of these potential resources.

Third, Duke's request for review of its decision to incur project development costs and for assurance of cost recovery asks the Commission to exercise discretion that is not consistent with more limited authority provided by statute. To some extent Duke's request draws from the statutory provision that allows Duke to request such a review for a potential nuclear generating facility. N.C.G.S. § 62-110.7 authorizes the Commission to review the prudence and reasonableness of such a request, and Rule R8-61(h) allows that review upon the filing of an application supported by relevant testimony. However, Duke's request does not

[31] Id. at 150-163.
[32] Id. at 160.
[33] Id. at 152, 156.

seek authority for a specific project. Duke may seek review of a decision to incur project development costs for a proposed SMR project by following the process set out in the statute and rule. If the application is approved and the specific activities and costs are reasonable and prudent, then the costs may be recoverable even if the project is cancelled. However, it is important for the Commission first to evaluate information and documentation to determine whether the utility has demonstrated the reasonableness and prudence of incurring such costs for a proposed project, as the costs may be substantial, the need for the project may not materialize, and the burden on ratepayers of such assurances shifts considerable risk from the utility to its ratepayers.

Moreover, while N.C.G.S. § 62-110.7 provides a process for obtaining assurances about the decision to pursue project development of nuclear facilities and to obtain some assurances about cost recovery, that statute does not extend to projects for offshore wind or pumped hydro storage. There is not an analogous statute for offshore wind or pumped hydro storage and the Commission's authority to give such assurances of cost recovery is more circumscribed.

Finally, Duke may apply for an order from the Commission allowing the use of special accounting for project development costs.[34] Special accounting raises issues of fairness for the ratepayers who may be required to pay the deferred amounts in later periods, as well for investors who would benefit from the requested relief.[35] Further, the need and justification for special accounting are

[34] NCUC Rule R8-27.

[35] See *Order Denying Request to Implement Rate Rider and Scheduling Hearing to Consider Request for Creation of Regulatory Asset Account* issued June 2, 2008, In the Matter of Application of Duke Energy Carolinas, LLC, for Approval of Rate Rider to Allow

complex issues and significant costs may result for ratepayers from projects that are later abandoned. Proposals for special accounting treatment should be well supported by specific information and documentation to demonstrate the reasonableness and prudence of the project, and the justness and reasonableness of the impact to investors and ratepayers of the accounting treatment sought.

VII. CONCLUSION.

For the reasons discussed in these comments, the AGO respectfully recommends that the Commission do the following:

1. Order Duke to model individual scenarios reflecting each of the modifications to inputs and the elimination of out of model adjustments described in these comments.
2. Order Duke to model a single scenario reflecting all of the modifications to inputs and the elimination of out of model adjustments described in these comments.
3. Order Duke to file the modified scenarios described above when it files testimony and exhibits for the evidentiary hearing.
4. In its final Carbon Plan developed prior to December 31, 2022:
    a. Include only portfolios that comply with the legal requirements of House Bill 951;

Prompt Recovery of Costs Related to Purchases of Capacity Due to Drought Conditions, Docket No. E-7, Sub 849, (2008 Order) at 21-23; also see State ex rel. Utils. Comm'n v. Stein, 375 N.C. 870, 851 S.E.2d 237 (2020) (Holding that, when the Commission exercised discretion to allow extraordinary cost recovery, it acted pursuant to N.C. Gen. Stat. § 62-133(d), and was required to consider all of the material facts of record that would enable it to determine reasonable and just rates, including whether costs should be shared equitably by the utility's shareholders and ratepayers.).

b. Include only portfolios that support the public policy goals of House Bill 951;

c. Evaluate the risks of additional natural gas generation;

d. Include a contingency plan portfolio that uses the "High Gas Price" scenario to select resources;

e. Include contingency plan portfolios for nascent technologies such as small modular reactors and green hydrogen generation;

f. Include a portfolio that uses a 20-year useful life for all natural gas additions;

g. Include only portfolios developed without arbitrary limits on solar plus storage additions; and

h. Include only portfolios that do not have "out of model" changes incorporated, unless those changes are found appropriate after being sufficiently examined in the evidentiary hearing.

5. Order Duke to do the following in its future Carbon Plan filings:

   a. Model EE/DSM resources as selectable resources in EnCompass; and

   b. Study and propose a monetary incentive for the residential rooftop solar sufficient to offset additional supply-side resources.

6. Decline to adopt Duke's entire near-term action plan in its current form.

7. Decline to consider Duke's request for assurances about initial development activities for possible small modular reactors, offshore wind, and hydro pumped storage projects in this proceeding.

Respectfully submitted this the 15th of July, 2022.

JOSHUA H. STEIN
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CERTIFICATE OF SERVICE

The undersigned certifies that he has served a copy of the foregoing COMMENTS OF THE ATTORNEY GENERAL'S OFFICE upon the parties of record in this proceeding by email, this the 15th day of July, 2022.

/s/ Tirrill Moore
Assistant Attorney General