STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH
DOCKET NO. E-100, SUB 165

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of	)	
2020 Biennial Integrated Resource	)	ATTORNEY GENERAL'S OFFICE
Plans and Related 2020 REPS	)	REPLY COMMENTS ON DUKE'S
Compliance Plans	)	INTEGRATED RESOURCE PLANS

The North Carolina Attorney General's Office ("AGO") respectfully submits these reply comments regarding the 2020 Integrated Resource Plans ("IRPs") for Duke Energy Carolinas and Duke Energy Progress (referenced together as "Duke").

I. INTRODUCTION

Drawing on the initial comments of the parties and analysis from the AGO's expert, Strategen Consulting, LLC (Strategen),[1] these reply comments will make the following three points about why Duke's plans for advancing clean energy goals need to be rejected, revised, and resubmitted for further consideration:

- Duke's lower-carbon portfolios do not reflect reasonable resource choices or cost estimates. *See* Part III, page 4.
- Duke's plans fail to adequately evaluate the earliest practicable retirement of coal units, and a more detailed assessment and plan is needed to

[1] 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. The AGO submits Strategen's Analysis of Parties' Initial Comments on Duke Energy's 2020 Integrated Resource Plans (Strategen Reply) for the Commission's consideration.

address the impact on transmission. *See* Part IV, page 11.

- Duke's assumptions regarding natural gas use and Energy Efficiency/Demand-Side Measures, as well as other factors affecting resource choices, are unreasonable and weaken the dependability of Duke's IRPs for planning purposes. *See* Part V, page 15.

In light of the shortcomings in Duke's 2020 plans, the AGO recommends that the Commission reject them and direct Duke to revise and resubmit them with alternative portfolios that offer reasonably supported proposals for advancing clean energy goals. Further, an evidentiary hearing may be necessary to determine disputes of fact that have been raised in the comments, studies, and reports submitted in the proceeding.

II. BACKGROUND

The IRP proceeding 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 over the next fifteen (15) years (the planning period).[2] One of the factors that must be taken into account in the investigation is the sensitivity of proposed plans to risks associated with environmental regulation.[3] Consistent with this requirement, least cost planning considers "not only the factors that are known and present at the time of the IRP," but also the potential changes to the electricity industry in the future, taking into account the "likelihood of

[2] N.C. Gen. Stat. §§ 62-2(a)(3a) (establishing, in quoted text, this policy of the State); 62-110.1(c) (calling for this proceeding).
[3] NCUC Rule R8-60(g).

occurrence and potential risk factors of pursuing a plan that does not account for these potential changes."[4]

Accordingly, the Commission has recognized that it is prudent for electric utilities to include scenarios that respond to carbon emission taxes or other regulations, even though a specific emission requirement has not yet been mandated by environmental regulators in North Carolina.[5]

Furthermore, long-term planning for constraints on carbon emissions has become essential based on Duke Energy Corporation's announced goal that it will achieve net zero carbon dioxide emissions by 2050 across its operating companies. The Commission has observed that meeting the 2050 goal will likely require an aggressive restructuring of the Companies' resource portfolios.[6]

Producing adequately detailed alternative proposals for long term planning purposes is also important because of State[7] and Federal goals for reducing greenhouse gases. Duke has participated in the State Clean Energy Plan stakeholder process in North Carolina, which is evaluating how to achieve a 70% reduction in greenhouse gas emissions from 2005 levels by 2030 and carbon

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[4] *See* Comments of the Public Staff on 2020 Biennial Integrated Resource Plans filed Feb. 26, 2021 (Public Staff) at 162-163.
[5] *See* Order Accepting Filing of 2019 Update Reports and Accepting 2019 REPS Compliance Plans in Docket No. E-100, Sub 157 issued April 6, 2020 (2019 IRP Order) at 7.
[6] *Id.* at 7-8.
[7] *See* Executive Order No. 80: North Carolina's Commitment to Address Climate Change and Transition to a Clean Energy Economy issued Oct. 29, 2018. https://files.nc.gov/governor/documents/files/EO80-%20NC%27s%20Commitment%20to%20Address%20Climate%20Change%20%26%20Transition%20to%20a%20Clean%20Energy%20Economy.pdf

neutrality by 2050 for the electric power sector.[8] The Federal goal announced by President Biden is to achieve a power sector that is carbon pollution-free by 2035.[9]

The Commission recognizes that Duke's assumption of a carbon tax in its portfolios is intended to serve as a placeholder for the potential that there will be carbon regulation of some form or other.[10] Increasingly, natural gas is also a focus of concern as policies develop to address methane emissions, another greenhouse gas that has a significant impact on climate change particularly in the near term.[11]

Given the importance of proper vetting of longer-term components of resource planning, the Commission has directed Duke to provide detailed alternative portfolios that offer proposals for advancing clean energy goals.[12] However, Duke's proposals fall far short of what is needed for planning purposes.

III. DUKE'S LOWER-CARBON PORTFOLIOS DO NOT REFLECT REASONABLE RESOURCE CHOICES OR COST ESTIMATES

A. Description Of Duke's Portfolios.

Duke submitted six portfolios for Duke Carolinas that propose combinations

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[8] *See* Duke Energy Carolinas Integrated Resource Plan 2020 Corrected filed Nov.6, 2020 (DEC Corrected IRP) at 6; Duke Energy Progress Integrated Resource Plan 2020 Corrected filed Nov. 6, 2020 (DEP Corrected IRP) at 6.

[9] https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/#:~:text=Today%2C%20President%20Biden%20will%20announce,to%20tackle%20the%20climate%20crisis.

[10] 2019 IRP Order at 7.

[11] *See* Initial Comments of Tech Customers at 5 and fn12; Energy Transition Institute, "*Carbon Stranding: Climate Risk and Stranded Assets In Duke's Integrated Resource Plan*," presented as Attachment 3 to Vote Solar Initial Comments filed February 26, 2021.at vi; NC Warn and Center for Biological Diversity's Initial Comments on Duke's Integrated Resource Plans at 27.

[12] 2019 IRP Order at 7-8.

of resource additions to meet electric requirements, and six similar portfolios for Duke Progress.[13] Portfolio A proposes Duke's "no carbon policy base portfolio" and all of the other portfolios propose combinations of resource additions that assume a policy will apply to reduce carbon emissions.[14] Portfolio B proposes the "base portfolio with carbon policy" and is projected to reduce carbon emissions by more than 55% from 2005 to 2030. Portfolio C retires coal units based on Duke's "earliest practicable" analyses, and is projected to reduce carbon emissions by 64% by 2030. Portfolio D is Duke's proposal to meet a 70% reduction in carbon emissions by 2030 using a "high wind" scenario. Portfolio E also proposes to meet a 70% reduction in carbon emissions by 2030 using a "high SMR" (small modular reactor) scenario. Portfolio F is Duke's "no new gas generation" proposal and is projected to reduce carbon emissions by about 65% by 2030 and 70% by 2035.[15]

Despite Duke's longer term goal of achieving zero carbon emissions by 2050, all of the portfolios except Portfolio F assume that new natural gas generation will continue to be added.[16] Indeed, aside from Portfolio F, all of Duke's proposals rely heavily on building new gas generation.[17]

Looking across all of Duke's portfolios that address carbon policies, from the base case in B through the "no new gas" case in F, Duke's cost estimates suggest that it will be much more costly to meet the more aggressive emission reduction requirements, and that cost increases will be particularly burdensome if

[13] DEC Corrected IRP at 11-12; DEP Corrected IRP at 12.
[14] DEC Corrected IRP at 16-17; DEP Corrected IRP at 16-17.
[15] *Id*.
[16] Public Staff Tables 20 and 23 at 119 and 128.
[17] *Id*.

no new gas units are built.[18]

However, as will be discussed in III.B-III.D below, Duke's cost estimates have been discredited in comments of other parties.

B. The Synapse Model Challenges Duke's Portfolio B and Other Lower Carbon Portfolios.

Strikingly different cost estimates were produced in an alternative portfolio modeled by Synapse.[19] Synapse showed that Duke could achieve more carbon emission reductions at a lower cost without new gas generation by adding renewable resources and battery storage, and by stepping up energy efficiency measures.[20] Compared to Duke's lower carbon analyses in Portfolios D and E, Synapse's scenario met a 70% reduced carbon target sooner and at a much lower cost.[21] Likewise, the cost was much lower than Duke's "no gas" Portfolio F even though Synapse's scenario also added no new gas.

Synapse used the EnCompass model,[22] a well-regarded model that Duke plans to use in future IRPs.[23] First, Synapse modeled a scenario that mimicked

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[18] *See id*.; Tables A-17 in DEC Corrected IRP at 191 and DEP Corrected IRP at 190.
[19] Synapse Energy Economics, Inc., prepared its report *Clean, Affordable, and Reliable, A Plan for Duke Energy's Future in the Carolinas*, for the North Carolina Sustainable Energy Association, Carolinas Clean Energy Business Alliance, Sothern Alliance for Clean Energy, Natural Resources Defense Council and the Sierra Club and the report is attached as Exhibit A to the Partial Initial Comments of those parties (Joint NCSEA/ CCEBA/SACE Comments) filed March 1, 2021. The Synapse Report was corrected in filings submitted Mar. 22, 2021 and May 27, 2021, and all references here to the Corrected Synapse Report refer to the May 27 filing. *See* Corrected Synapse Report at 1. Also note that NCSEA and CCEBA also filed other comments and exhibits on May 1, 2021, referred to here as NCSEA/CCEBA Comments, and SACE, NRDC, and Sierra Club filed other comments and exhibits on March 1, 2021, referred to here as SACE Comments.
[20] *Id*.
[21] *Id*.
[22] *Id*.
[23] DEC Corrected IRP at 128; DEP Corrected at 129.

Duke's base case with carbon policy (Duke's Portfolio B) using similar assumptions and produced a similar estimated cost.[24] Then Synapse modified several assumptions and allowed the model to freely select most resource additions economically.[25] One notable modification was that Synapse did not allow any new gas generation. Synapse also modified other assumptions, including several to substitute well-recognized indices in place of Duke's estimates, and to assume that more energy efficiency savings would be achieved. Synapse assumed that energy efficiency savings would increase by 0.15% of retail sales per year starting in 2022 until they reach 1.5% per year and stay at that level through 2035.[26] Duke's Earliest Practicable dates were used for coal retirements.[27] More details about the assumptions in both scenarios are provided in Strategen's Reply.[28]

When the Reasonable Assumptions scenario was run, the model selected 17.8 gigawatts of new utility-scale solar, 2.5 gigawatts of new on-shore wind, 750 megawatts of new off-shore wind, and 11.8 gigawatts of new battery storage by 2035 as least cost resources to meet new electric needs, replace retiring coal capacity, and maintain a 17% reserve margin.[29] Pumped hydro storage and small modular reactors were not selected. [30]

The cost estimate for Synapse's modified portfolio was lower than the cost estimate based on Duke's Portfolio B: the Present Value Revenue Requirement

[24] Compare Corrected Synapse Report at 11-12, 20 and DEC Corrected IRP at 16-17; DEP Corrected IRP at 16-17.
[25] Corrected Synapse Report at 15.
[26] Corrected Synapse Report at A-1.
[27] Corrected Synapse Report at 14.
[28] Strategen Reply at 4-10.
[29] Corrected Synapse Report at 1, 19.
[30] Corrected Synapse Report at 1, 19.

(PVRR) for the Mimic Duke scenario was $77.4 billion, and the PVRR for the Reasonable Assumptions scenario was $70.0 billion, over $7 billion less than Duke's estimate.[31] Further, emissions were reduced sufficiently in the modified portfolio to meet a 70% carbon reduction target before 2030, whereas Duke's Portfolio B does not meet that goal by the end of the planning period in 2035.[32]

Strategen has reviewed Synapse's analyses and concludes that the Reasonable Assumptions portfolio makes reasonable modifications and demonstrates an approach that is appropriate to use for planning purposes.[33] The modeling performed by Synapse is considerably more appropriate than Duke's method of forcing-in alternative clean energy resources without regard to their cost.[34] Furthermore, the selection of renewable and battery storage resources by the model in the Reasonable Assumptions scenario is consistent with the increasing competitiveness of those resources due to falling capital costs and the low operating costs of those resources.[35]

Strategen recognized that the recent grid outages in Texas highlight the concern that utility system operations should plan to ensure they are able to meet peak load across a range of extreme weather conditions. To that end, Strategen suggests that simulations may be run to provide a more granular, hour-by-hour view of how resources in a proposed portfolio would be expected to perform.[36]

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[31] *See* Table 5 Corrected Synapse at 20.
[32] *See* Figure 6 in Corrected Synapse at 20.
[33] *See* Strategen Reply at 4-10.
[34] See Strategen Reply at 6.
[35] Corrected Synapse at 20.
[36] Strategen Reply at 10.

Notably, Synapse's Reasonable Assumptions portfolio did not alter some assumptions that would likely yield further cost reductions. For instance, Synapse relied on Duke's 17% reserve margin even though the need for such a high reserve has been debated.[37] Other examples of further modifications that would reduce the cost of a lower carbon scenario are detailed in Strategen's analysis and discussed later in these comments.

The bottom line is that there is a striking disparity between resource choices and cost estimates produced by Duke and Synapse that cannot be ignored in this proceeding. The Synapse Report demonstrates that Duke's portfolios do not provide reasonable information that is necessary for the Commission to vet portfolio proposals for advancing long-term clean energy goals.[38]

C. As Noted By The Public Staff, Portfolios C Through F Are Not Reasonable For Planning Purposes.

The Public Staff found that most of Duke's alternative portfolios (Portfolios C, D, E, and F) are not reasonable for planning purposes primarily because various resources were forced into Duke's model to meet the carbon constraint without analysis to select more economic resources.[39] This distorts the overall cost of the portfolios, particularly in D, E, and F.[40] For example, Duke forced in substantial amounts of higher cost resources including pumped hydro storage, offshore wind, and small modular reactors in one or more portfolios in order to reduce carbon

[37] Synapse Corrected Report at 14; Strategen at 23; NCSEA/CCEBA Comments at 42.
[38] Criticisms of the resource choices and cost estimates were also described in the Review of Duke's IRPs by William Powers, P.E, submitted as Attachment 1 to comments filed by NC Warn and Center for Biological Diversity.
[39] Comments of the Public Staff at 154-155.
[40] Strategen Reply at 5.

emissions, but did not model the economy of the selected resources as compared to other alternatives.[41] High transmission costs were also assumed in some cases.[42] In response to those assumptions, Public Staff questioned DEC's decision to force pumped hydro storage into DEC's Portfolio D, E, and F, given that the resource "is very expensive."[43] Similarly, Synapse found that DEP's Portfolio F (No New Gas) included a significant amount of off-shore wind with very high associated transmission costs.[44] Likewise Strategen observed that small modular reactors are currently one of the most costly resources available.[45] None of Duke's high carbon reduction portfolios modeled the cost of a scenario that relied primarily on additions of solar, on-shore wind, and storage resources.[46]

Taken together, Duke's analyses provided unreasonable portfolio choices and an inflated view of the costs to advance clean energy targets.

D. Comments From Other Parties Also Challenged The Reasonableness Of Duke's Plans For Meeting Clean Energy Goals.

In addition to the comments of other parties analyzed in Strategen's analysis, detailed comments describing criticisms of Duke's resource choices and cost estimates were also filed by others, including NC Warn and Center for Biological Diversity, [47] Apple Inc., Facebook, Inc., and Google LLC (collectively,

[41] *See* Public Staff Tables 20 and 23 showing DEC and DEP Economic-Selected Resources and Resources Added After Modeling, Public Staff at 119 and 128.
[42] Corrected Synapse Report at 21.
[43] Public Staff at 120.
[44] Corrected Synapse Report at 22; Strategen Reply at 5.
[45] Strategen Reply at 5.
[46] Strategen Reply at 5.
[47] NC Warn and Center for Biological Diversity submitted a Review of Duke's IRPs by William E. Powers

"Tech Customers"), and Vote Solar.[48] Further, Raleigh, Charlotte, Asheville, Buncombe County and multiple other local governments, members of the General Assembly, a group of commercial and industrial customers, North Carolina Interfaith Power & Light, and hundreds of public witnesses filed comments or testified in support of clean energy policies.

In short, given the goals that have been targeted by Duke and State and Federal policies, Duke's IRPs should be rejected and revised so that they model alternative resources for the optimal economic solution and provide adequate information for planning purposes. Further, there are important issues of fact unresolved by Duke's revised plans that will likely require vetting in an evidentiary hearing.

IV. DUKE'S PLANS FAIL TO ADEQUATELY EVALUATE THE EARLIEST PRACTICABLE RETIREMENT OF COAL UNITS, AND A MORE DETAILED ASSESSMENT AND PLAN IS NEEDED TO ADDRESS THE IMPACT ON TRANSMISSION

Duke's analysis of economic and practical considerations affecting the early retirement of coal units is pivotal for planning purposes for a couple of reasons. First, the North Carolina Clean Energy Plan focuses on early retirement of coal plants as a key way to reduce carbon emissions.[49] Second, the economic efficiency of continuing to operate Duke's coal units has been questioned given their low capacity factors at many sites.[50] Relevant to these considerations, the

[48] Vote Solar submitted conclusions and recommendations of Mr. Tyler Fitch in testimony prepared on Duke's plans in the Carolinas.

[49] NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY, STATE ENERGY OFFICE, NORTH CAROLINA CLEAN ENERGY PLAN (2019) at 55, https://files.nc.gov/ncdeq/climate-change/clean-energy-plan/NC_Clean_Energy_Plan_OCT_2019_.pdf

[50] *Id.*; *see* Order Accepting Integrated Resource Plans and REPS Compliance Plans,

Commission has directed Duke to perform one or more alternative resource portfolios that reflect retirement of existing coal units by the most economic and the earliest practicable dates, applying the rigorous IRP process, and basing the dates on "reasonable assumptions and best available current knowledge concerning . . . implementation considerations and challenges . . .."[51]

However, as discussed below, the AGO, Public Staff, and other parties have raised significant concerns about the reasonableness of the methods and assumptions Duke used to evaluate the earliest practical retirement of coal units.[52]

A. More Analysis Is Needed About The Impact Of Early Retirements On Transmission.

One critical point made by the Public Staff concerns the need for an analysis of transmission impacts. Public Staff recommended that Duke be directed to file "a more detailed plan with refined cost estimates, including timelines of required activities and potential synergies with future grid improvement plans, to aid in the transition and system production cost estimates with the proposed replacement generation source."[53] Strategen strongly agrees that more detailed information will help inform the Commission about the reasonableness of Duke's forecasts of needed upgrades. Strategen has serious concerns that Duke's forecasts may be overstated in some instances.[54] The AGO supports the recommendation that more details are needed about these critical and complex considerations. Further,

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Scheduling Oral Argument, and Requiring Additional Analyses in Docket No. E-100, Sub 157 issued August 27, 2019 (2018 IRP Order) at 90.

[51] 2019 IRP Order at 8.

[52] *See* Corrected AGO Initial Comments at 8-18.

[53] Public Staff at 108.

[54] Strategen Reply at 12.

Duke should be directed to address this promptly because the assessment informs the coal retirement analysis which, in turn, affects other IRP resource decisions.[55]

B. Endogenous Modeling Should Be Used.

The Public Staff also expressed concern that Duke's coal retirement analysis may not reflect accurate cost savings because it relies on a combustion turbine as the replacement resource for its sequential planning evaluation.[56] Similarly, NCSEA/CCEBA/SACE commented that Duke's methodology was "insufficiently robust" and inadequate to address the Commission's complex questions regarding the economic and earliest practicable retirement dates for coal-fired units.[57] Public Staff observed that a different resource might be selected, if allowed.[58] Public Staff suggested that an endogenous approach be used.[59] That concern was also voiced in the AGO's initial comments. Duke's approach fails to account for the changes in resource needs or additions that will be occurring in parallel with coal retirements.[60] Strategen observes that Duke's decision *not* to evaluate retirements endogenously in Portfolios A and B is problematic for reasons similar to the problems with Duke's decision to force resources into its Portfolios C, D, E, and F rather than model for optimal selections. Duke's approach essentially forces in coal resources.[61]

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[55] *See id*.
[56] Public Staff at 103.
[57] See Joint NCSEA/CCEBA/SACE Comments at 20-23.
[58] Public Staff at 103.
[59] *Id*. at 110.
[60] Strategen Reply at 11.
[61] Strategen Reply at 14-15.

To speed up an analysis that evaluates retirements endogenously, Strategen suggests that it would be possible for Duke to rerun its System Optimizer model with endogenous retirement as an option.[62] That would avoid delaying the analysis until Duke completes its transition to the EnCompass model.

Another related concern that Public Staff expressed about Duke's retirement analysis was the stranded investment risk of building new natural gas generation assets given the likelihood that future carbon policies will ultimately constrain use of natural gas.[63] The AGO shares this concern, as will be described further in Part IV. Strategen also notes that some coal retirements will be delayed in Duke's analysis due to the limited availability of gas at some coal stations.[64] Other resource options, like battery storage, would not have that constraint on early retirement of coal.

C. More Review Is Needed Regarding Storage As A Resource.

Public Staff also addressed the potential that storage and other such inverter-based resources will be used to fill the niche now served by coal units and other generating resources. Public Staff recommended that the Commission open a rulemaking to evaluate whether and in what circumstances approval should be required prior to construction of battery storage facilities. The AGO agrees that a rulemaking is warranted, and recommends that the proceeding also consider the extent to which batteries will assist in addressing grid stability issues. Strategen

[62] Strategen Reply at 10.
[63] Public Staff at 109-110.
[64] Strategen Reply at 12-13.

suggests that standards or incentives could be adopted in a rulemaking to enhance the value of battery resources for grid stability.[65]

In addition, the Public Staff's initial assessment of customer bill impacts from early retirement of coal plants poses questions that require more study, as is noted in Strategen's questions about the Roxboro and Mayo coal plants.[66]

In sum, Duke's analysis of the earliest practicable dates for coal plant retirements is affected by faulty assumptions and is not sufficiently detailed with respect to the grid impacts as units retire. In particular, detailed analysis of grid impacts is important to the planning process as clean energy portfolios are proposed.

V. DUKE'S ASSUMPTIONS REGARDING NATURAL GAS USE AND ENERGY EFFICIENCY/DEMAND-SIDE MEASURES, AS WELL AS OTHER FACTORS AFFECTING RESOURCE CHOICES, ARE UNREASONABLE AND WEAKEN THE DEPENDABILITY OF DUKE'S IRPS FOR PLANNING PURPOSES

A. Duke's Expanded Reliance On Natural Gas Generation Is Risky.

Duke has not adequately addressed the risks associated with its plans for extensive build-out of natural gas generation. NCSEA/CCEBA explained that Duke's ability to arrange delivery of gas into North Carolina for power generation is limited by constraints on pipeline capacity and the abandoned or stalled efforts to increase that capacity.[67] Public Staff described similar risks and explained the impact on Duke's assumptions that it will be able to obtain relatively low-cost supply.[68] Further, the volatility of natural gas commodity prices makes forecasts of

[65] Strategen Reply at 13-14.
[66] Strategen Reply at 11-12.
[67] NCSEA/CCEBA Comments at 19.
[68] Strategen Reply at 15-16; Public Staff at 13-14.

future costs more uncertain, particularly for operation of peak units and at times when severe weather causes disruptions and extreme prices. Confidential details about these concerns were explained in Public Staff comments and are discussed in Strategen's analysis.

In addition, Duke has not squared its heavy reliance on gas generation with its stated goal of achieving zero carbon emissions by 2050 across Duke Energy Corporation's operating companies or with State and Federal climate change goals to reduce greenhouse gas emissions.[69] As the Public Staff pointed out, "None of Duke's plans meet the carbon neutrality goal by 2050."[70] Natural gas is not a zero carbon emission resource. Indeed, the policy goal of reducing carbon emissions to slow climate change is not well served when coal is replaced by natural gas, since our increased reliance on natural gas drives up methane emissions (another significant greenhouse gas).[71] Duke's plans for new investment in natural gas generation are risky given these goals and State and Federal policies that could accelerate clean energy requirements and shorten the lives of these fossil-fired assets. These risks further weaken the economics of building new natural gas plants.[72]

By comparison, renewables do not carry these same risks. They are zero marginal cost resources; they will most likely continue to be supported by favorable

[69] Strategen Reply at 17.
[70] Public Staff at 6.
[71] Strategen Reply at 17.
[72] Vote Solar estimates that Duke's plans to continue operating 15 GW of "carbon-emitting capacity" through 2050 could expose Duke's ratepayers to $4.8 billion in stranded asset costs should carbon policies require early shut down of the plants. Vote Solar Comments at 9.

policies and incentives; and there is reason to believe that they will be used for the full estimated lives of the assets.[73]

B. Duke's IRPs Understate The Savings Achievable From EE/DSM Resources.

Duke's analysis of energy efficiency/demand-side management (EE/DSM) measures likely underestimates the potential savings that could be achieved.[74] The following factors indicate that a greater incremental annual savings is achievable, as assumed in Synapse's alternative scenario:[75]

1. The Commission recently approved a different screening test as the primary test to estimate the economic potential of EE/DSM measures. [76] The new screening test better reflects the benefits of measures and is likely to increase estimates of the economically achievable savings potential.[77] The primary cost screening test that Nexant (Duke's consultant) used in the market potential study for this proceeding was the Total Resource Cost test (TRC),[78] but Nexant also ran a sensitivity for the Utility Cost Test (UCT) [79] (which will be the primary test going

[73] Strategen Reply at 17-18.
[74] Strategen Reply at 18-23.
[75] *See* Corrected Synapse Report at A-1.
[76] *See* SACE Comments at 10-13; *Order Approving Revisions to Demand-Side Management and Energy Efficiency Cost Recovery Mechanisms*, in the Matter of Application of Duke Energy Progress, LLC for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider Pursuant to N.C.G.S. §§ 62-133.9 and Commission Rule R8-69 and the Matter of Application of Duke Energy Carolinas, LLC, for Approval of New Cost Recovery Mechanism and Portfolio of Demand-Side Management and Energy Efficiency Programs, issued 20 October 2020 in Docket Nos. E-2, Sub 931, E-7, Sub 1032.
[77] SACE Comments at 10-11.
[78] The TRC "compares the program benefits of avoided supply costs to costs for administering a program and the cost of upgrading equipment." https://www.cadmusgroup.com/wp-content/uploads/2012/11/TRC_UCT-Paper_12DEC11.pdf.
[79] The UCT "measures cost-effectiveness from the viewpoint of the sponsoring utility or program administrator. If avoided supply costs exceed costs incurred by the program

forward). The sensitivity analysis found that the UCT results "indicate an increase of economic potential by 37%, 46%, and 15% for the residential, commercial, and industrial sectors in DEC" and an "increase of economic potential by 51%, 51%, and 8% for the residential, commercial, and industrial sectors in DEP."[80] This suggests that Duke's EE/DSM assumptions in the IRPs may be underrepresented by a corresponding amount.[81]

2. Duke omitted measures from its Market Potential Studies. As the Public Staff pointed out, "a more comprehensive list of measures … can contribute and provide a more accurate picture of North Carolina's Achievable [EE/DSM] Potential."[82] SACE's expert observed that Duke's studies omitted at least 19 categories of known measures.[83] Strategen also suggests that a broader and more comprehensive set of measures could be offered to customers by considering the cost-effectiveness of the overall portfolio and allowing certain measures to be included although they that do not pass an initial screening step.[84] That would provide more options when customers inquire, and greater flexibility and synergies in administration of programs.[85]

3. Some EE programs related to building envelopes have been limited

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administrator, average costs decrease." https://www.cadmusgroup.com/wp-content/uploads/2012/11/TRC_UCT-Paper_12DEC11.pdf.

[80] Nexant, Duke Energy North Carolina EE/DSM Market Potential Study filed June 17, 2020 by Duke at 72, https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=34db6294-2777-45bb-b177-87fdfae3f6b7.

[81] Strategen Reply at 21-22.

[82] Public Staff at 60.

[83] *See* Figure 1 in the "Review of DEC and DEP Market Potential Studies - Underestimation of Energy Efficiency and Demand Side Management" (the Grevatt Report) prepared by Energy Futures Group and filed as Attachment 1 to the SACE Comments filed Mar. 1, 2021, pg. 7.

[84] Strategen Reply at 18.

[85] *Id*.

in North Carolina by a concern that they create adverse conditions for natural gas utilities. The AGO agrees with the Public Staff's suggestion that "[g]reater efficiency could be achieved through comprehensive EE programs that encompass all utility sectors, specifically electricity and gas efficiencies."[86]

4. Duke's estimate of the savings potential was overly conservative because it did not consider emerging energy efficient technologies in its analysis.[87]

5. Duke recently completed a study of Winter DSM potential that was not reflected in the IRPs, and this potential could reduce peak demand substantially.[88]

6. As explained by Public Staff, Duke's achievable potential in the market study reflects historical program participation data, but, more typically, market studies rely on market research "to gauge customer awareness and a customer's willingness to adopt EE measures in the future."[89] It stands to reason that more achievable potential would have been identified had Duke used market research.[90]

7. Customers will have an increased ability to track their energy usage and obtain granular insights into their energy consumption using data from Advanced Meter Infrastructure (AMI).[91] The development of more advanced rate designs that reflect time of use and real-time pricing options will encourage

[86] Public Staff at 51.
[87] SACE Comments at 9-10; Grevatt Report at 5.
[88] Strategen Reply at 22.
[89] Public Staff at 59.
[90] *Id*.
[91] Public Staff at 53.

customers to unlock savings.[92] Further, with increased access to customer data available to customers and authorized third party providers, new and innovative EE/DSM opportunities could open up more opportunities in North Carolina.[93]

8. The adoption of an Energy Efficiency Resource Standard (EERS) would likely increase the level of effort to achieve robust EE/DSM savings.[94]

Taking these factors together, it is not unreasonable to find that the achievable potential from EE/DSM will increase to roughly 1.5%, the percentage assumed in the Synapse Report.

C. Other Assumptions Weaken The Appropriateness Of Duke's IRP's For Planning Purposes.

There are other specific assumptions made by Duke that affected the plans and reduced the appropriateness of the resource choices and cost estimates.

1. A careful examination of imports and exports between DEC, DEP, and their neighbors and regional coordination would likely identify opportunities for cost-saving alternatives to the high reserve margin used by Duke.

Duke's proposed 17% reserve margin is high and costly, and Duke's resource adequacy studies do not adequately investigate the benefits of neighbor assistance. The AGO has recommended that Duke be directed to analyze potential imports and exports as a cost-saving alternative to the high reserve margin adopted under an islanded scenario.[95] Along these lines, Public Staff recognized that a significantly higher reserve margin is required because DEC and

[92] Strategen Reply at 20.
[93] *Id*.
[94] *Id*.
[95] Corrected AGO Initial Comments at 18-25.

DEP are treated as islands.[96] Public Staff also suggested that future IRPs improve the way that costs for required imports and exports are assigned to each portfolio to accommodate the resource mix.[97] Public Staff also recognized several improvements in Duke's resource adequacy study resulted from feedback provided in the stakeholder process. Strategen recommends continuing the stakeholder process to bring about similar improvements, and emphasizes the need for transparency.[98]

2. Weather data underlying Duke's Resource Adequacy study may be skewed.

NCSEA/CCEBA described two concerns with the weather data underlying the Resource Adequacy study. First, Duke relied upon weather data from 1980 through 2019, which is longer than the 30-year period meteorological studies typically use to assess temperature or climatic trends and may be skewed by the data from the 1980s.[99] The AGO supports the approach taken by NCSEA/CCEBA's expert (Justin Sharp), whose approach gives the 1980s weather data less weight than Duke's.[100] The AGO also agrees with NCSEA/CCEBA's point that Duke's use of synthetic load data[101] may cause Duke's model to over-predict

[96] Public Staff at 73-75.
[97] Public Staff at 125; See more discussion in the Strategen Reply at 22-23.
[98] Strategen Reply at 25.
[99] Strategen Reply at 25-26.
[100] *Id.*; "Duke Energy IRP Resource Adequacy Comments" (the Sharp Report) prepared by Justin Sharpe, Ph.D. Meteorologist, was Exhibit 4 to NCSEA/CCEBA Comments filed Mar. 1, 2021. See Sharp at 2.
[101] Duke's model appears to algebraically extrapolate historic energy demand or load based on reported weather in years where there is no demand data. This is based on the assumption that energy demand is closely tied to heating and cooling needs, which will vary with differing temperatures. See NCSEA/CCEBA Comments at 26-27.

cold temperature loads, and it is better to rely on actual load data as much as possible.[102]

3. Duke's use of static ELCC values tends to undervalue contributions from solar and storage resources.

The AGO agrees with NCSEA/CCEBA that Duke's calculations of Effective Load Carrying Capacity (a measure used to value the reliable contribution of intermittent resources) tend to undervalue solar and storage by not assessing the combined benefit of diverse resources and how the benefits might evolve over time.[103] For example, the value of a standalone solar resource could increase over time as winter DSM efforts succeed in decreasing the peak demand on cold winter mornings (when the sun is not out) and shift the peak need back to summer afternoons (when the sun *is* out.)[104] The AGO and Strategen agree that the combined effect and synergies should be evaluated as they may significantly impact the portfolio of resources.

4. Duke did not conduct an adequate risk analysis.

The AGO agrees with NCSEA/CCEBA that Duke's plans fail to conduct an adequate risk analysis as part of its assessment of least cost resources.[105] When a reasonable risk analysis is performed to examine the sensitivity of significant assumptions quantitatively, it may significantly impact which resources are selected.[106] Strategen recommends that, going forward, Duke should assess the sensitivity of its portfolios to risks using a similar method to that explained in the

[102] Strategen Reply at 26.
[103] NCSEA/CCEBA Comments at 32.
[104] Strategen Reply at 26.
[105] NCSEA/CCEBA Comments at 10-14.
[106] *Id.*

Lucas Report submitted by NCSEA/CCEBA.[107] Another option suggested by Public Staff would use a stochastic approach. Strategen suggests that, whatever approach is used, other deficiencies in Duke's analysis of portfolio costs need to be addressed for the evaluation to be meaningful.[108]

5. Duke made flawed assumptions about the value, costs, and difficulty of adding renewable energy and storage.

The AGO's initial comments recommended several revisions to Duke's assumptions relating to renewable energy and storage, and other parties did likewise. One flaw that the AGO pointed out was that 2-hour batteries are well-suited to Duke's reliability needs but were excluded from Duke's study on effective load carrying capability value.[109] NCSEA/CCEBA agreed that Duke should update its model to include 2-hour batteries as a resource option.[110] The AGO also agrees with NCSEA/CCEBA's Lucas Report that Duke's assumption for battery storage costs were too high and a publicly available benchmark should be used instead.[111] Further, NCSEA/CCEBA and the Lucas Report pointed out that Duke artificially limited the annual rate of additions of solar resources, a flaw also discussed in the Strategen attachment to the AGO's initial comments.[112] Another assumption that Duke should revisit concerns its reliance on fixed-tilt solar systems. According to the Lucas Report, the trend since the mid- 2010s is toward reliance on single-axis trackers, and more than 80% of the solar capacity completed in the Carolinas in

[107] Strategen Reply at 26;
[108] Strategen Reply at 26.
[109] Corrected AGO Initial Comments at 25-26.
[110] NCSEA/CCEBA Comments at 20.
[111] Lucas Report at 20; NCSEA/CCEBA Comments at 37.
[112] *See* AGO Initial Comments - Strategen memorandum at 14-15; NCSEA/CCEBA Comments at 15-16; Lucas Report at 33-34.

2019 used single-axis or dual-axis trackers[113]. This trend needs to be reflected in Duke's assumptions.

6. Duke's proposal to add new pumped hydro storage cannot be completed in time to meet the plan and is too costly.

As the Lucas report (filed by NCSEA/CCEBA) points out, Duke's proposal to deploy about 1,600 MW of new pumped hydro capacity by 2034 does not jibe with Duke's own analysis that projects a 13-year timeline for each new pumped hydro station.[114] The high cost of construction also makes the proposal impractical.[115]

7. Duke's suggestion that hydrogen is a potential fueling option for new combustion turbines is too speculative.

Strategen notes that Duke refers to hydrogen as a potential future option for fuel but observes that the potential is too speculative to bolster the plans to rely on gas generation. Duke has not developed a considered proposal for hydrogen, and fundamental questions are not answerable at this point.[116]

8. The extension of the Federal Investment Tax Credit for solar resources was not reflected in Duke's modeling assumptions.

The ITC was included in the December 2020 omnibus spending bill and effects a material change to planning.[117] Strategen recently updated for the change in ITC assumption in modeling another utility's resource plan in EnCompass, and noted a significant increase in solar and solar plus storage deployments through

[113] Lucas Report at 34.
[114] Lucas Report at 35-36.
[115] Strategen Reply at 5, 28-29.
[116] *See* Strategen Reply at 29.
[117] *Id*.

the mid-2020s. [118] Duke's plans were filed in September 2020 and need to be updated.

9. Duke's assumption that Electric Vehicle (EV) charging will contribute to the winter morning peak should be revisited.

Duke assumed that EVs will contribute to the winter morning peak, but the contribution can easily be reduced if vehicles are charged at off peak times. The "V1G" approach uses time-of-use rates and off-peak charging rebates to encourage this.[119] Strategen also describes the "V2G" strategy whereby EVs discharge to the grid to contribute during peak demand times. There are not many V2G capable vehicles on the road, yet, but manufacturers have announced that this feature will be included in future EV models.[120] That capability could reverse the impact of EVs on the grid at peak times, essentially doubling the impact. Accordingly, Duke's analysis of the EV impact on peak demand should be revisited.

VI. CONCLUSION

The AGO's reaffirms its Initial Comments as corrected, and, for reasons discussed in those initial comments and expanded in these reply comments, the AGO respectfully recommends that the Commission reject Duke's IRPs. Duke's IRPs do not propose resource portfolios that are reasonable and adequate for planning purposes regarding clean energy goals. Further, Duke should be directed to:

1. Revise and resubmit plans with alternative portfolios that offer reasonable

[118] Strategen Reply at 29.
[119] Strategen Reply at 30.
[120] *Id*.

proposals for advancing clean energy goals with adequate analytical support.

2. Present revised plans that simultaneously model resource additions and retirements and also include updated input assumptions as discussed here and in the AGO's Initial Comments.
3. File a more detailed plan addressing the impact of early unit retirements on transmission, including refined cost estimates and timelines and identifying potential synergies with grid improvement plans.
4. Analyze reliability in greater detail, use a Production Cost Model simulation that provides a more granular, hour-by-hour view of how the resources in a portfolio would be expected to perform in order to identify potential gaps or shortfalls at any point in time as discussed herein.
5. In the next cycle, continue the stakeholder process for resource adequacy and analyze alternative portfolios proposed by stakeholders using the same model and methodology used by Duke.
6. Conduct more extensive studies into increased neighbor assistance and identify such options that would decrease the need to add fossil plants.
7. Perform an adequate risk analysis of portfolio assumptions for use in evaluating least cost alternatives.

In addition, the AGO recommends that the Commission initiate a rulemaking to evaluate whether, and under what circumstances, a public utility or other electric supplier should be required to receive Commission approval prior to construction of a battery energy storage facility, and to set technical standards for certain grid functionalities that new storage resources must provide.

Finally, there are disputes about certain critical facts, and the AGO believes the Commission would benefit from an evidentiary hearing to consider issues identified by Strategen including:

A. Gas forecast assumptions, especially firm delivery costs
B. Reasonableness of adding gas resources given clean energy goals and the risk of stranded investment
C. Transmission impacts and costs associated with coal retirements
D. Earliest practicable dates and economic dates for coal retirements
E. Annual limits on wind/solar additions
F. Reasonableness of "forcing in" certain resources for Duke and reasonableness of alternative analyses (*i.e.*, Synapse)

G. Reasonableness of excluding 2-hr battery storage
H. Reasonableness of renewable, storage, and other cost forecast assumptions
I. EE/DSM potential estimates

Respectfully submitted this the 28th day of May, 2021.

JOSHUA H. STEIN
ATTORNEY GENERAL

/s/
Margaret A. Force
Special Deputy Attorney General
N.C. Department of Justice
Post Office Box 629
Raleigh, NC 27602
Telephone: (919) 716-6053
Facsimile: (919) 716-6050
pforce@ncdoj.gov

CERTIFICATE OF SERVICE

The undersigned certifies that she has served a copy of the foregoing ATTORNEY GENERAL'S OFFICE REPLY COMMENTS ON DUKE'S INTEGRATED RESOURCE PLANS upon the parties of record in this proceeding by email or by depositing a copy of the same in the United States Mail, postage prepaid, this the 28th day of May, 2021.

/s/
Margaret A. Force
Special Deputy Attorney General