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BEFORE
THE PUBLIC SERVICE COMMISSION OF
SOUTH CAROLINA

DOCKET NOS. 2019-224-E and 2019-225-E

In the Matter of:	)
	)
South Carolina Energy Freedom Act (House Bill 3659) Proceeding Related to S.C. Code Ann. Section 58-37-40 and Integrated Resource Plans for Duke Energy Carolinas, LLC and Duke Energy Progress, LLC	)

SURREBUTTAL TESTIMONY OF KEVIN LUCAS

ON BEHALF OF

THE CAROLINAS CLEAN ENERGY BUSINESS ASSOCIATION

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I. INTRODUCTION AND SUMMARY

Q1. PLEASE STATE FOR THE RECORD YOUR NAME, POSITION, AND BUSINESS ADDRESS.

A1. My name is Kevin Lucas. I am the Director of Rate Design at the Solar Energy Industries Association (SEIA). My business address is 1425 K St. NW #1000, Washington, DC 20005.

Q2. ARE YOU THE SAME KEVIN LUCAS THAT SUBMITTED DIRECT TESTIMONY IN THIS PROCEEDING?

A2. Yes, I am.

Q3. WHAT IS THE PURPOSE OF YOUR SURREBUTTAL TESTIMONY?

A3. The purpose of my surrebuttal testimony is to respond to the rebuttal testimony Duke Energy Carolinas ("DEC") and Duke Energy Progress ("DEP") (collectively, "Duke" or "the Company") witnesses Glen Snider and Matthew Kalemba. I focus on three primary topics: (1) the importance of the Commission's decision in *this* proceeding; (2) modeling performed by Synapse Energy Economics, Inc. ("Synapse"), which further corroborates the points made in my direct testimony; and (3) the Company's natural gas forecast methodology. I also discuss several issues related to cost and operational assumptions used in the Company's modeling.

Q4. DOES YOUR LACK OF SURREBUTTAL TESTIMONY ON OTHER TOPICS INDICATE AGREEMENT WITH THE COMPANY'S OR OTHER PARTIES' POSITIONS ON THOSE MATTERS?

A4. No, it does not.

Q5. PLEASE SUMMARIZE YOUR SURREBUTTAL TESTIMONY.

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A5. The decision that the Commission issues in this case will set the precedent for Duke's IRPs under Act 62 and must be given proper weight. Duke's overall position is that its IRP, despite numerous questionable modeling assumptions and an insufficient risk analysis, is "good enough" and should be approved now and fixed later. Duke is essentially asking the Commission to approve this IRP not based on what was filed and litigated in this docket but to instead consider and incorporate potential future fixes that may or may not satisfactorily address the deficiencies. This is contrary to the standard of review established by Act 62, which requires the Commission to determine whether the proposed IRP "represents the most reasonable and prudent means of meeting the electrical utility's energy and capacity needs as of the time the plan is reviewed," based on the criteria established in the statute.[1] To ensure that a utility's IRP has met this standard, the Commission is further authorized to approve, deny, or modify a utility's proposed IRP.[2]

Duke also claims that the "priorities of operational reliability and customer affordability do not appear to be shared by the Advocacy Groups, which instead advocate for or against specific technologies, depending upon the mission of the organizations that they represent."[3] Putting aside Duke's own corporate incentives, Duke's assertion regarding other parties is unsupported and incorrect. It is also directly rebutted by modeling performed by Synapse, demonstrating that Duke's resource adequacy and hourly energy needs can be reliably met through a portfolio which does not require new natural gas generation, reduces greenhouse gas emissions 78% more than Duke's Base Case with

[1] S.C. Code Ann. § 58-37-40(C)(2).
[2] *Id.* § 58-37-40(C)(1).
[3] Snider Rebuttal at 8. The "Advocacy Groups" as defined by Duke include Carolinas Clean Energy Business Association, South Carolina Coastal Conservation League, Southern Alliance for Clean Energy, Upstate Forever, Sierra Club, Natural Resources Defense Council, and Vote Solar.

Carbon Policy scenario, and saves Duke's customers $7.2 billion over the modeling period.[4]

Duke offers little rebuttal to my testimony showing the significant impact of the Company's unreasonable natural gas forecast methodology on its IRP. Instead, Company witness Glen Snider focuses his rebuttal on historic avoided cost proceedings in North Carolina and claims that the purpose of my testimony is not to address the very real and important impacts of the natural gas forecast in the current IRP proceeding, but instead to surreptitiously attempt to position the solar industry for "significant monetary gains" based on hypothetical results of future dockets.[5] Aside from being mistaken about the purpose of my testimony, Mr. Snider fails to address the reality that an unreasonably-low natural gas price forecast could cause the model to favor new natural gas over other resources such as additional renewables and storage, placing the risk of stranded asset and fuel price changes squarely on the Company's customers while providing Duke's shareholders with a bloated capital investment plan for unnecessary fossil generation.

In addition to the three main issues above, my surrebuttal addresses the Company's flawed method of pricing 20-year PPAs in its modeling. I also respond to the Company's misinterpretation of my testimony regarding two-hour batteries, showing that two-hour storage can indeed be a valuable and cost-effective resource to meet important system peak needs. I also rebut the Company's response to my minimax analysis and show why the Company's preference for ORS's methodology does not best reflect the soundest scenario

[4] Exhibit KL-S-1, Surrebuttal Testimony of Rachel Wilson, Exhibit RW-2 "*Synapse Report: Clean, Affordable, Reliable: A Plan for Duke Energy's Future in the Carolinas*" ("Synapse Report").
[5] Snider Rebuttal at 68.

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planning approach. Finally, I respond to the Company's rebuttal testimony on battery and solar cost and operational assumptions.

Q6. WHAT ARE THE OVERALL RECOMMENDATIONS OF YOUR SURREBUTTAL TESTIMONY?

A6. My overall recommendations are the same as the ones I made in my direct testimony. First, and foremost, as noted above, the Commission is required by law to determine whether Duke has presented the "most reasonable and prudent" means for meeting its resource needs. The statutory language clearly and unequivocally contemplates and requires the selection of a single plan that meets this standard. Duke has presented six different resource plans to the Commission without clearly indicating which of the six it considers to be the "most reasonable and prudent," although in response to an ORS discovery request Duke now seems to suggest that it believes its Base Case without Carbon resource plan should be deemed "the most appropriate plan" in the absence of a requirement to select a single "most reasonable and prudent plan."[6]

Even if the Commission determines that Duke is not required to state which of its six plans it considers to be most reasonable and prudent, the Commission itself may not abdicate making that decision. I continue to believe that the Commission requires additional information to make this required decision in an informed manner and that Duke's current modeling incorporates fundamentally flawed inputs that cannot produce reasonable results, but to the extent that the Commission's decision is made on the current record, I believe for the reasons stated in my testimony that of the options presented by Duke the Base Case with Carbon is the most reasonable and prudent plan.

[6] Snider Rebuttal at 39.

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1 Generally speaking, the most prudent resource planning path for Duke to follow is
2 to transition to zero carbon emissions as rapidly as possible to enable the broader
3 decarbonization of the economy. Duke agrees at the corporate level and has set an
4 enterprise-wide goal of net-zero emissions by 2050, but this timeline is out of step with the
5 urgency of the situation and increasingly misaligned with public policy proposals.[7]
6 Unfortunately, Duke's IRP, if approved, would lock ratepayers into a gas-heavy generation
7 track as "the most reasonable and prudent" plan, despite the overwhelming financial and
8 regulatory risks associated with this approach. As discussed below, Duke's responsive
9 testimony only confirms that it has underestimated the costs of its gas-build plans.
10 In addition, I continue to recommend that the Commission rule on the Company's
11 IRP based on the requirements established by Act 62 and reject Duke's arguments that
12 issues can and should be instead kicked down the road. As Duke would have it, there are
13 no consequences that flow from the Commission's decision on its IRP, which Duke views
14 as simply a "snapshot in time" in an ongoing and endless planning process. Nothing could
15 be further from the truth. It is critically important that this Commission have accurate
16 resource planning information now so that it can make important decisions about the state's
17 energy future, including whether and how to exercise its statutory authority to require
18 additional renewables procurement by Duke. Duke clearly does not welcome being subject
19 to such direction by the Commission, and therefore seeks to make it difficult if not
20 impossible for the Commission to carry out its statutory responsibilities.
21 Importantly, the 2021 IRP Update may not be reviewed in a fully litigated
22 proceeding, because, under Act 62, it is only intended to be an update to a utility's base

[7] See, e.g., President Biden's proposal to decarbonize the electricity sector by 2035 and the entire economy by 2050. https://www.eenews.net/stories/1063728877

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planning assumptions. By default, Act 62 does not provide the comprehensive process applicable to this proceeding to review IRP Updates, but relies primarily on ORS to review and report on the results of any base planning adjustments. Although the Commission could order additional review of an IRP Update, it has not stated its intention to subject Duke's next IRP Update to such procedures. Duke's next full IRP is not required to be filed under Act 62 until Fall 2023, putting any decision in that docket into Summer 2024.[8] This in turn means procurement decisions supported by the outcome of that IRP will not likely occur before 2025, with projects not coming online until 2026 or later – five years from now. This is simply too long for Duke to proceed under an approved IRP that wrongly assumes that a massive buildout of new gas generation is the most reasonable and prudent approach for South Carolina businesses and residents.

II. THE COMMISSION MUST DETERMINE WHETHER DUKE'S IRP AS FILED IS THE MOST REASONABLE AND PRUDENT PLAN.

Q7. WHAT IS DUKE'S GENERAL RESPONSE TO INTERVENORS' RECOMMENDATIONS CALLING FOR CHANGES IN THE COMPANY'S IRP IN THIS PROCEEDING?

A7. I would classify the Company's position as claiming its filing is "good enough" to be approved and fixed later. As Company witness Glen Snider states, "[a]djustments to the Companies' IRPs can much more readily and cost-effectively be made on a going-forward basis."[9] Mr. Snider continues:

> The Companies are in the midst of an unprecedented, long-term transition from a legacy fleet that included coal generation towards a new mix of cleaner generation, including renewables, battery storage systems and

[8] Duke has indicated that it will follow North Carolina's current two-year IRP schedule in South Carolina as well. However, there are legislative activities in North Carolina that may have implications to this schedule. The only requirement under South Carolina statute is the three-year cadence in Act 62.
[9] Snider Rebuttal at 7.

> efficient natural gas across the Companies' systems. While this is the Companies' first IRP proceeding under Act 62, this transition is necessarily a marathon, not a sprint, and the Companies and the Commission must prudently and judiciously plan for and execute this transition in a way that protects system reliability and customer affordability. Every portfolio and every resource carries risk, and only the Companies' objectively- and holistically-developed resource plans adequately address such risks.[10]

Q8. WHAT IS YOUR RESPONSE TO THIS POSITION?

A8. While I agree with the focus on protecting system reliability and customer affordability, I disagree that the best approach in a time of significant energy technology and policy flux is slow-motion decision-making that looks into the rearview mirror rather than proactively adapting to what plainly lies ahead. At a corporate level, Duke Energy acknowledges an imperative to decarbonize the electricity sector and the entire economy, and the pace needed to stay competitive and compliant in the foreseeable future requires decisive, forward-looking plans. The solution set for the electricity sector – including increasing levels of renewables and energy storage – is at this point well-established, and Duke should be making every effort to rapidly integrate more of these resources into its grid in the most cost effective and reliable manner possible.[11] Building large amounts of costly new natural gas infrastructure is not only unnecessary but also exposes Duke's customers to future regulatory risk, including stranded assets and fuel price volatility that renewables deployment can minimize and avoid.

Whether one personally agrees with the pressing need to rapidly decarbonize the economy is beside the point: the marketplace is increasingly aligning with this position, and the implications for South Carolina's economic competitiveness are material. South

[10] Snider Rebuttal at 7.
[11] See e.g. https://newscenter.lbl.gov/2021/01/27/getting-to-net-zero-and-even-net-negative-is-surprisingly-feasible-and-affordable/

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Carolina job-producing companies in Duke's territory have adopted carbon reduction goals, with Michelin targeting zero carbon emissions from its plants by 2050,[12] General Electric targeting carbon neutrality by 2030,[13] and the BMW Group aiming to reduce its emissions 80 percent from 2019 levels by 2030.[14] Other leading companies such as Google, Apple, Amazon, Walmart, GM, Johnson & Johnson, and nearly 300 others have committed to 100% renewable energy.[15] Some of these companies are making access to 100% renewable energy a prerequisite to expanding into new markets. Public opinion is also aligning, with voters across the political spectrum expressing support for clean energy development.[16]

Fortunately, as I will discuss below, "more renewables and storage" and "system reliability and customer affordability" are not mutually exclusive goals. Duke can and should be accelerating towards a known solution set of low-cost new renewables and storage while avoiding the risk to its customers of its proposed natural gas buildout.

Q9. PLEASE REVIEW THE PRIMARY REASONS THAT DUKE'S IRP MUST BE REJECTED.

A9. As I discussed in my direct testimony, Duke has failed to identify a single plan as its candidate for the "**most** reasonable and prudent means of meeting the electrical utility's energy and capacity needs as of the time the plan is reviewed."[17] Duke claims that its "pathways" approach meets the Act 62 test "as a total plan that can adapt to changing standards, technology and policy decisions in the future."[18] However, the most

[12] https://www.michelin.com/en/news/michelin-takingaction-for-the-planet/
[13] https://www.ge.com/renewableenergy/about-us/carbon-neutral
[14] https://www.bmwgroup.com/en/responsibility/group-wide-environmental-protection.html
[15] https://www.there100.org/re100-members
[16] https://www.conservativeenergynetwork.org/wp-content/uploads/2021/01/201002-Clean-Energy-National-Online-Survey-Interview-Schedule.pdf
[17] S.C. Code Ann. § 58-37-40(C)(2) (emphasis added).
[18] Snider Rebuttal at 37.

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1 straightforward reading of the Act 62 language implies a single, "most" reasonable and
2 prudent plan, not a portfolio of plans with disparate resource mixes, asset retirement, and
3 transmission buildout.

4 The preferred plan that the Commission ultimately approves will serve as the input
5 into other proceedings including avoided costs, competitive procurement of solar and
6 energy storage resources, new unit certification, and demand-side management ("DSM")
7 program planning. These proceedings require a specific set of resources to be assumed and
8 input values to be used, not a portfolio of potential resource mixes that would produce
9 different results in production cost modeling.

10 Nor is Duke's claim that its "total plan" can "adapt to changing standards"
11 meaningful. While *any* plan, whether identified individually or as part of a multi-resource
12 plan package, can be amended to attempt to comply with changing standards, technology,
13 and policy decisions in the future , retaining flexibility while also reducing risk and
14 maintaining reliability and cost-effectiveness can be better accomplished through
15 recommendations included in my testimony.

16 **Q10. EVEN IF ACT 62 DID NOT REQUIRE THE COMPANY TO PRESENT A SINGLE RESOURCE PLAN**
17 **TO THE COMMISSION FOR EVALUATION, HAS DUKE PROVIDED SUFFICIENT INFORMATION**
18 **TO ALLOW THE COMMISSION TO WEIGH THE MERITS OF ITS SIX PORTFOLIOS?**

19 A10. No. Duke has failed to provide the Commission with sufficient information to make this
20 determination among the six portfolios. Duke's analysis on the operational, policy, and
21 technology advancements required to implement each portfolio's resource mix is lacking.
22 It appears from Duke's own timelines that small modular reactors and pumped hydro
23 facilities – key pillars of several of Duke's plans – will not be online in sufficient time to

meet several of its portfolios.[19] Duke's narrow focus on comparing the Present Value Revenue Requirement ("PVRR") between its various portfolios fails to consider risk factors related to natural gas delivery and cost. Absent more robust information that Duke has not provided, the Commission will be unable to make a determination of the most reasonable and prudent plan based on the record in this docket.

Q11. DESPITE THIS, WHY DOES DUKE PROPOSE THAT THE COMMISSION APPROVE ITS IRP IN THIS CASE?

A11. Duke's primary argument that the Commission should not reject or modify its proposed IRP to address its acknowledged deficiencies is that Duke will fix these problems later. Duke promises to resolve several problems in the IRP Update it will file in the fall, and claims that it would be procedurally inconvenient to extend the current docket while also filling the IRP Update. This argument fails for two reasons.

First, it is inconsistent with Act 62. Act 62 provides that the purpose of annual IRP Updates is to provide "an update to the electric utility's base planning assumptions relative to its most recently accepted integrated resource plan," such as forecasted load, changes in retirement dates of assets, and renewable energy forecasts.[20] These updates are reviewed only by the Office of Regulatory Staff ("ORS"), which in turn submits a report to the Commission "providing a recommendation concerning the reasonableness of the annual update."[21] The Commission may then "accept the annual update or direct the electrical utility to make changes to the annual update that the commission determines to be in the public interest."[22] Act 62 does not explicitly provide intervenors (other than ORS) an

[19] Lucas Direct at 14.
[20] S.C. Code Ann. § 58-37-40(D)(1).
[21] S.C. Code Ann. § 58-37-40(D)(2).
[22] S.C. Code Ann. § 58-37-40(D)(2).

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1 opportunity to fully review and comment on annual Updates. Act 62 *does* give the
2 Commission the right to approve, modify, or deny a utility's proposed IRP during a "full"
3 IRP proceeding such as this one, and gives intervenors the right to comment on any
4 modified IRP. It would be inappropriate and inconsistent with this statutory scheme to
5 allow the utility to defer significant corrections to its IRP to annual updates, which are
6 subjected to limited scrutiny. Duke should not be exempted from this statutory scheme
7 simply because revising its IRP would be burdensome or inconvenient for the Company.

8 Although the Commission doubtless has the discretion to allow greater
9 participation by other stakeholders in annual IRP updates (such as the right to intervene,
10 take discovery, and present testimony), it has not yet indicated that it will do so with respect
11 to Duke's next update. But to the extent that the Commission were to permit Duke to defer
12 any changes to its IRP Update – which again, I believe is not appropriate – it should at a
13 minimum clarify that intervenors in this proceeding would have the right to fully review
14 and comment on those changes.

15 Second, approving Duke's deficient IRP based on the promise of future corrections
16 is inconsistent with the standard of review under Act 62. Under the statute, the
17 Commission must decide whether Duke's IRP "represents the most reasonable and prudent
18 means of meeting the electrical utility's energy and capacity needs **as of the time the plan**
19 **is reviewed.**"[23] The plan is currently being reviewed in this docket; what Duke may or
20 may not do in the future is immaterial. For example, Duke claims that it is sufficient to
21 delay incorporating the new federal investment tax credit ("ITC") extension until its 2021
22 IRP Update,[24] despite the fact that this change will have a material impact on the cost, and

[23] S.C. Code Ann. § 58-37-40(C)(2) (emphasis added).
[24] Snider Rebuttal at 44.

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thus modeled optimization results, associated with new solar and solar plus storage facilities.[25]

Duke's approach requires this Commission to ignore data that is today known now to be correct or reasonable. The ITC extension is current and binding law: failing to incorporate its impact in a full IRP proceeding is *per se* arbitrary and unreasonable. Duke also proposes several other future modeling assumption updates, including shifting to a 100% single-axis tracking ("SAT") assumption for future Tranche 2 CPRE and a consideration of shifting all future solar plus storage projects to 100% SAT.[26] Switching to 100% SAT was recommended in my testimony and thoroughly supported with market data as of the end of 2019, before Duke began its modeling in this case.[27] These changes could and should have been incorporated into the original IRP filing and the resource adequacy results in this proceeding, would likely have produced higher summer and winter capacity credits for solar and storage. The availability of less-expensive solar and storage that can contribute more to capacity needs and produce more energy is a material change and should be considered and evaluated in determining the most reasonable and prudent plan in *this* IRP.

Q12. IS DUKE'S CLAIM CORRECT THAT REVISING THE CURRENT IRP IS UNREASONABLE GIVEN THE TIMING OF THE IRP UPDATE?

A12. No. For example, Duke witness Matthew Kalemba states:

> If the Companies were to incorporate this change in policy into a modified IRP, a Commission order on a modified IRP in these dockets would not be expected until December 2021/January 2022. This timing makes a modified IRP incorporating these changes obsolete in light of the September 2021

[25] Under IRS guidelines, storage equipment paired with solar also qualifies for the federal ITC.
[26] Kalemba Rebuttal at 33.
[27] Lucas Direct at 49.

> IRP Update, which will be available before the 2020 IRPs are ever approved.[28]

The Company's argument on this point is not valid. The Commission must carry out its statutory obligation to approve the most reasonable and prudent plan in a fully-litigated IRP proceeding (which the IRP Update is not) under Act 62. If it rejects or requires modification to an IRP plan as the result of this evaluation, that is an appropriate outcome that is specifically contemplated by Act 62. Whether or not this causes the annual IRP update to become outdated does not alter the Commission's duty in this docket. Under Duke's position, the Commission would not be able to take an action other than approving an IRP as other authorized actions available to it (*i.e.*, rejecting or requiring modifications) would necessarily conflict with annual IRP updates. This is clearly not what Act 62 envisioned.

Q13. WHAT IS YOUR RECOMMENDATION WITH RESPECT TO THIS ISSUE?

A13. This is the first Duke IRP to be decided under Act 62 and, as such, it has substantial precedential importance. Delaying the correction of key inputs until the IRP Update or even until the projected Fall 2023 IRP cannot render the current IRP Act 62-compliant. The Commission should carefully weigh the evidence that was presented here and base its decision on those facts. While I appreciate the fact that Duke agreed to correct certain modeling assumptions such as the mix of SAT in the future, these updates are reasonable – or already law – today and should be incorporated into modeling in this case.

I continue to recommend that the Commission reject the Company's IRP and require material modifications in this proceeding. This should include a requirement to select a single resource plan and incorporating material updates to modeling assumptions

[28] Kalemba Rebuttal at 8.

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I recommended in my direct testimony such as the extension of the ITC and changes in the SAT mix for future projects, among others. I also recommend a more accelerated renewable and storage buildout supported by the Synapse modeling. Shifting up the deployment of these resources will save Duke's customers money while substantially reducing CO_2 emissions. I discuss the specific buildout recommendations in the next section.

III. ADDITIONAL MODELING SHOWS RELIABILITY AND CUSTOMER AFFORDABILITY ARE ATTAINABLE WITH NO NEW NATURAL GAS ASSETS.

Q14. WHAT DID YOU PREDICT IN YOUR DIRECT TESTIMONY WOULD BE THE MODELING RESULT OF MAKING THE ADJUSTMENTS TO DUKE'S INPUT VARIABLES?

A14. In my Direct Testimony, I predicted that:

> If Duke were to make these updates to its modeling, it is likely that cost-optimal portfolios will feature earlier coal retirements, lower natural gas builds, and higher and earlier solar, solar plus storage, and standalone storage deployment. These updated portfolios will enable Duke's customer to reap the benefit of the federal ITC extension while jumpstarting Duke's progress towards its own 2050 net zero goals.[29]

Q15. HAS ANY MODELING BEEN PERFORMED TO SUPPORT THIS PREDICTION?

A15. Yes. Synapse performed and submitted modeling in the Duke's North Carolina IRP proceeding.[30] As discussed more fully in the surrebuttal testimony of Rachel Wilson of Synapse, submitted today on behalf of CCEBA and other intervenors, two portfolios were modeled using EnCompass software.[31] The first portfolio, "Mimic Duke," used most of Duke's

[29] Lucas Direct at 111.
[30] *See* Initial Comments of the North Carolina Sustainable Energy Association and the Carolinas Clean Energy Business Association on Duke Energy Carolinas, LLC and Duke Energy Progress, LLC's Integrated Resource Plans, NCUC Docket No. E-100, Sub 165 (Mar. 1, 2021).
[31] Surrebuttal Testimony of Rachel Wilson (Apr. 15, 2021), Exhibit RW-2 "*Synapse Report: Clean, Affordable, Reliable: A Plan for Duke Energy's Future in the Carolinas*" ("Synapse Report").

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inputs and assumptions from its Base Case with Carbon Policy to establish a base case and calibrate the EnCompass model. The second, "Reasonable Assumptions," reflected several changes in key input assumptions such as renewable and battery costs and DSM.[32]

Q16. HOW WERE NATURAL GAS PRICES FORECASTED IN THIS MODEL?

A16. Both scenarios above used EnCompass's natural gas forecast with adjustments. This differed from Duke's assumption in two ways. First, the EnCompass model did not assume lower costs associated with Marcellus shale gas were available (*i.e.*, there was no basis differential applied to some of Duke's new or future natural gas plants), which is consistent with the lack of transportation options from that area to Duke's territory. Second, Synapse included a $1.50/MMBTU cost adder to secure firm supply to any new natural gas combined cycle ("NGCC") units.[33] These two changes resulted in a natural gas price forecast that was of a similar shape to Duke's, but shifted upwards in cost.

Q17. WAS THE NATURAL GAS FORECAST USED IN THE SYNAPSE MODELING IDENTICAL TO THE FORECAST YOU RECOMMENDED?

A17. No, it was not. The purpose of the Synapse modeling was to show that utilizing a limited number of more reasonable assumptions than Duke's would yield an alternative portfolio that was cheaper and cleaner than the base case while retaining the same reserve margins and avoiding any loss of load hours. Further, by not including a basis differential and including a reasonable firm fuel transport adder, the natural gas figures that Synapse used were higher than those used by Duke, offsetting some of the impact of too-low natural gas prices that ORS witnesses identified.[34]

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[32] Synapse Report at 11.
[33] Synapse Report at 12.
[34] See Section IV, *infra*.

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Q18. WHAT ARE THE HIGH-LEVEL RESULTS OF THE SYNAPSE MODELING?

A18. First, Synapse's modeling demonstrated that the Reasonable Assumptions portfolio with more renewable energy and battery storage and no new natural gas was able to meet Duke's "priorities of operational reliability and customer affordability." Second, this Reasonable Assumptions portfolio was $7.2 billion or 9.5% less costly than the Mimic Duke case over the planning period. Third, the Reasonable Assumptions portfolio would produce half of the CO_2 emissions between 2021 and 2035 as the Mimic Duke scenario, hitting the 70% reduction goal by 2027, and positioning the Company much closer to its long-term 2050 goal of net-zero emissions. Finally, the Reasonable Assumptions portfolio meets 100% of customer load, including on difficult-to-manage winter mornings.[35] Ms. Wilson discusses these results in more detail in her testimony.

Q19. What interconnection limits did Synapse include in its modeling?

A19. The model was limited to 1,500 MW of PV between 2021 and 2029 and 1,800 MW of PV in 2030 and beyond, and to 100 MW, 200 MW, and 300 MW at various years for onshore wind. Battery storage was limited to 1,660 in 2021, increased to 1,900 MW in 2027, and to 1,960 MW in 2030 and beyond.

These figures are higher than the current interconnection limits of 500 MW and 900 MW between DEC and DEP in the base and high renewables cases, respectively. Duke has not provided any basis on which to predict what its ability to interconnect new generation will be over the planning period. But the arbitrarily low limits Duke sets in its model (which are lower than Duke's actual past performance) are unreasonable and not reflective of improvements that are being made to the interconnection process.

[35] Synapse Report at 18-21.

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Incorporating the higher but still reasonable limits used in the Synapse model will allow the model to consider higher levels of annual renewables deployment, while preventing it from selecting portfolios that are simply impracticable.

Q20. WHEN DOES THE SYNAPSE MODEL BEGIN TO ADD NEW RENEWABLE GENERATION?

A20. The model begins building solar and onshore wind in 2023 and battery storage in 2026. Annual additions, show in Figure 1 below, are relatively modest in the early years before ramping up in earnest in 2026 and beyond. Notably, unlike Duke, the Synapse modeling did not "force in" any renewables. It began with 3,925 MW of existing PV generation on the DEC and DEP systems as of 2021 and added all additional resources as a result of the modeling optimization.

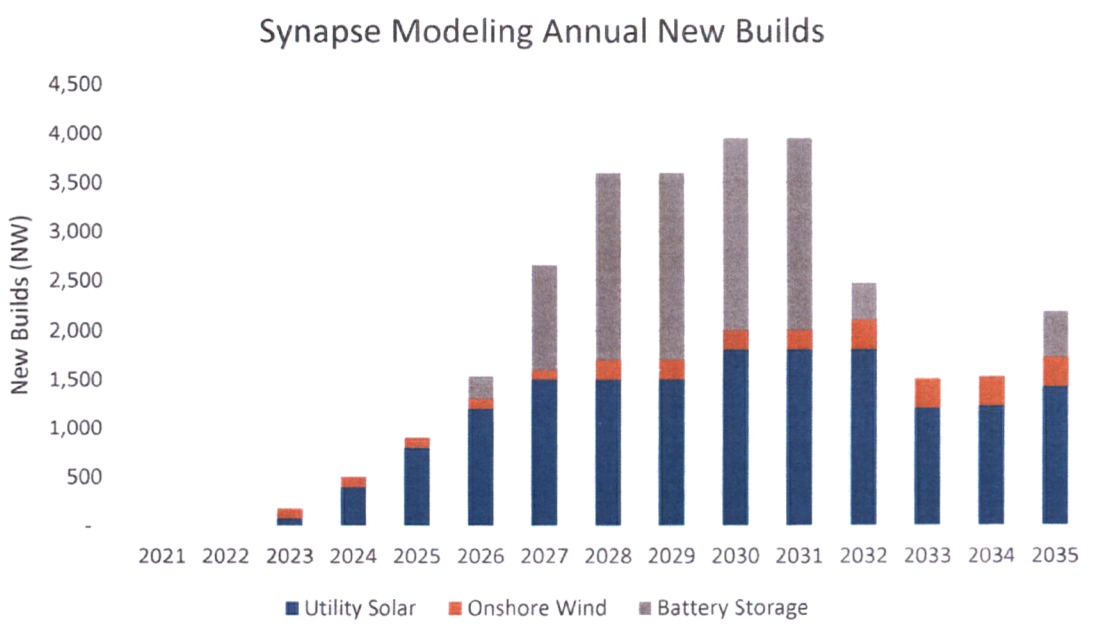

Figure 1 - Synapse Modeling Annual Builds

Q21. IF THE COMMISSION WERE TO ADOPT AN IRP BASED ON A SIMILAR RESOURCE MIX, WOULD YOU ADVOCATE FOR THIS EXACT BUILD OUT SCHEDULE?