

**STATE OF NORTH CAROLINA  
UTILITIES COMMISSION  
RALEIGH**

DOCKET NO. E-100, SUB 179

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of:		
Duke Energy Progress, LLC, and Duke	)	POST-HEARING BRIEF
Energy Carolinas, LLC, 2022 Biennial	)	OF NC WARN AND THE
Integrated Resource Plans and Carbon Plan	)	CHARLOTTE
	)	MECKLENBURG NAACP

Pursuant to the North Carolina Utilities Commission's ("NCUC" or "Commission") *Notice of Due Date for Proposed Orders and/or Briefs* entered on October 4, 2022 in the above-referenced docket, Intervenor NC WARN and the NAACP Charlotte-Mecklenburg County Branch #5376-B (collectively, "NC WARN *et al.*"), through undersigned counsel, hereby submit the following Post-Hearing Brief concerning the proposed Carbon Plan filed on May 16, 2022 (the "Carbon Plan") by Duke Energy Carolinas, LLC ("DEC") and Duke Energy Progress, LLC ("DEP") (collectively, the "Companies").

**SUMMARY**

In their Joint Comments filed on July 15, 2022, NC WARN *et al.* identified several errors with the Companies' proposed Carbon Plan and made concrete recommendations to correct these errors.<sup>1</sup> NC WARN *et al.* reiterates those recommendations now. For purposes of the present Post-Hearing Brief, NC WARN *et al.* urges the Commission to correct the following errors with the Companies'

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<sup>1</sup> NC WARN *et al.*'s Joint Comments, pp. 47-50.

proposed Carbon Plan as elicited during the course of the evidentiary hearing convened on September 13, 2022 in the above-captioned matter (the “evidentiary hearing” or “hearing”):

(a) The Companies proposed a natural gas buildout of 800 MW to 2,400 MW of Combined Cycle (“CC”) and 6,800 MW to 10,900 MW of Combustion Turbine (“CT”) through 2050. This buildout is impossible to square with House Bill 951’s mandate that the Commission approve a Carbon Plan which achieves a seventy percent (70%) reduction in emissions of carbon dioxide by 2030 and carbon neutrality by 2050. Accordingly, at the outset, the Commission should be deeply skeptical about the Companies’ proposed Carbon Plan.

(b) The Companies’ natural gas buildout is largely driven by several modeling flaws, which had the effect of increasing the purported need for new generation assets. For instance, DEC’s retail sales growth from 2016 through 2021, the most recent five-year period, averaged 0.0 percent, and DEP’s declined at a rate of -0.7 percent during the same period. Despite these trends, the Companies project demand growth of 0.8 percent for DEC and 0.4 percent for DEP. This overly optimistic projected growth is not supported by the current evidentiary record and should therefore be rejected.

(c) The Companies proposed a planning reserve margin (“PRM”) of seventeen percent (17%). However, the evidence elicited during the evidentiary hearing in this matter revealed that the Companies have numerous coal and natural gas units which were completely idle during recent winter peaks. Moreover, at the most recent extreme winter peak during recent memory, namely the polar

vortex of February 20, 2015, the Companies easily imported electricity from neighbor balancing authorities, and the Companies eventually testified during a Staff Conference that they were not close to shedding load. The PRM is too conservative and should be reduced.

(d) The Companies also made critical errors in their modeling of solar plus storage (“SPS”) which had the effect of erroneously increasing the Companies’ proposed reliance upon natural gas. For instance, the Companies’ modeling artificially capped the battery storage component of a SPS system and, furthermore, failed to consider that the storage component of a SPS system can be charged from the grid. These errors are particularly egregious when the Companies’ current paucity of battery storage is compared to the present burgeoning energy storage deployments in the United States. In other words, the Companies already fall far behind their peers in SPS, and the Companies’ proposed Carbon Plan will further exacerbate the problem.

(e) The Companies’ natural gas buildout was further supported by an erroneous projection of natural gas prices. In fact, the Companies’ projection of natural gas prices *never* anticipates that natural gas prices will get as high as the price exists *today*. The Companies’ natural gas projection is unrealistic and should be rejected.

(f) The concept of natural gas-fired generation is completely inconsistent with carbon neutrality. To overcome this contradiction, the Companies propose to transition one hundred percent (100%) of their natural gas fleet to

“green hydrogen” by 2050. This proposal is completely speculative, unsupported by the evidence, and should be rejected.

(g) The Companies proposed 570 MW of Small Modular Reactors (“SMR”) by 2034. This proposal should be rejected as completely unrealistic. Among other problems, there are currently no operational SMRs providing commercial power anywhere in the world, the Companies have not even selected an SMR technology, and the Companies have not selected a site for the technology. The Companies’ speculative plan to develop 570 MW of SMR harkens back to the Lee Nuclear Station debacle, in which DEC cancelled the nuclear project and asked the Commission to pass on about \$368 million in planning and pre-construction costs to ratepayers. The Companies’ attempt to ignore the lessons of Lee Nuclear Station should be denied.

(h) The Companies’ Grid Edge program should be bolstered. The Companies’ testimony and proposed Carbon Plan consistently gave first priority to “shrinking the challenge” through the Grid Edge project, yet the Companies consistently propose actions which would have the opposite effect. For instance, the Companies’ growth projection for Net Energy Metering (“NEM”) has substantially declined between the 2020 Integrated Resource Plan proceeding and the present proceeding, and the Companies, in a separate docket, have proposed NEM tariffs which would reduce customer savings from rooftop NEM solar, thus disincentivizing customer-owned solar. The Companies should be ordered to place greater priority on EE/DSM and the Grid Edge program.

(i) When the above errors are corrected, it becomes unnecessary to engage in the Companies' natural gas buildout. Instead, the Commission should issue a Carbon Plan along the lines of that proposed by NC WARN *et al.* or, alternatively, Synapse Energy Economics ("Synapse"). Either approach would avoid the need to construct carbon-emitting and climate-wrecking natural gas units.

### **ARGUMENT**

#### **I. Errors with the Companies' Carbon Plan Modeling**

##### **A. Demand Growth Forecast**

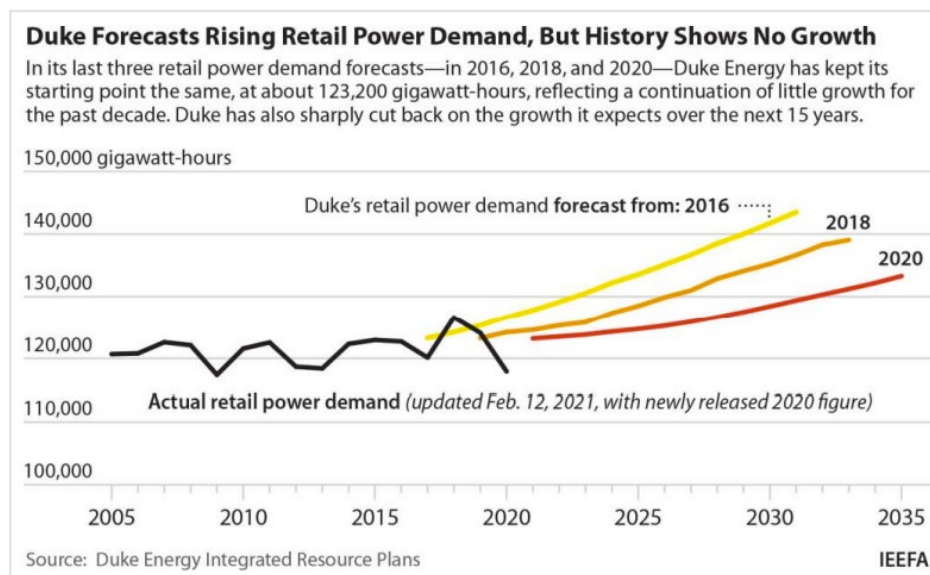
In the proposed Carbon Plan, the Companies project demand growth of 0.8 percent for DEC and 0.4 percent for DEP.<sup>2</sup> Under the current evidentiary record, these projections are unrealistic.

At the outset, it should be noted that the Companies have a long history of overstated demand growth projections. NC WARN *et al.*'s expert witness, William E. Powers ("Mr. Powers"), sponsored the following figure which illustrates the Companies' tendency to overstate demand growth:<sup>3</sup>

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<sup>2</sup> The Companies' Carbon Plan, App. F, p. 19.

<sup>3</sup> Transcript, Vol. 22, p.159.



The above figure establishes that the Companies, dating at least as far back as the 2016 Integrated Resource Planning proceeding, have exclusively overstated demand growth. Given this historical trend, the Commission should view the Companies' present demand growth projection with extreme skepticism.

Indeed, the present evidentiary record does not support the Companies' current demand growth projections. Consider, for example, the Companies' response to NC WARN's Data Request No. 4-4 in the present proceeding.<sup>4</sup> In subsection (b), NC WARN *et al.* propounded the following question:

State any and all disagreements with the following statement on page 35 of the Powers Report: "Actual DEC retail sales growth from 2016 through 2021, the most recent five-year period shown in the Carbon Plan, averaged 0.0 percent."<sup>5</sup>

<sup>4</sup> NC WARN *et al.* Modeling Panel Direct Cross-Examination Ex. 1.

<sup>5</sup> *Id.* at 1.

In response, the Companies flatly admitted that “The quoted statement is factually correct.”<sup>6</sup> Even more significant, the Companies made a similar admission regarding NC WARN *et al.*’s allegation that “retail sales data shows that actual DEP retail sales declined from 2016 through 2021, the most recent five-year period, at a rate of -0.7 percent.”<sup>7</sup> The Companies acknowledged that “this statement has fidelity to the data that are displayed.”<sup>8</sup>

The Companies’ proposed Carbon Plan described “Total Electricity Sales” for DEC and DEP for the period of 2012 to 2021.<sup>9</sup> In response to cross-examination, the Companies admitted that the data reveal numerous years during the period from 2012 to 2020 in which the Companies’ total electricity sales were comparable to or exceeded the most recent year reported, namely 2021.<sup>10</sup> Indeed, the evidence reveals that DEC’s total electricity sales in 2021 were less than or nearly the same as 2015, 2016, 2018 and 2019, and similarly, that DEP’s total electricity sales in 2021 were less than or nearly the same as 2015, 2016, 2017, 2018, and 2019.<sup>11</sup>

Consistent with the Companies’ history of overstating demand growth, the present evidentiary record does not support the Companies’ demand growth projections. For these reasons and others, NC WARN *et al.* recommends, as stated in Mr. Powers’ direct testimony, that “[t]he Companies should assume

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<sup>6</sup> *Id.* at 2.

<sup>7</sup> *Id.* at 1.

<sup>8</sup> *Id.* at 2.

<sup>9</sup> The Companies’ Carbon Plan, App. F, pp 16-17.

<sup>10</sup> Transcript, Vol. 8, pp. 160-63.

<sup>11</sup> The Companies’ Carbon Plan, App. F, pp. 16-17.

recent actual annual energy and peak demand rates are the best indicator of future trends.”<sup>12, 13</sup>

B. Planning Reserve Margin

Consistent with their last several Integrated Resource Planning proceedings, the Companies have again recommended a winter planning reserve margin of seventeen percent (17%) for both DEP and DEC. However, the evidence elicited during the evidentiary hearing revealed that this proposed PRM is unnecessarily conservative and should be reduced.

First, it is important to provide context to the Companies’ proposed PRM. Specifically, the importance of the PRM issue cannot be overstated. The Companies’ Modeling Panel testified that the PRM is an “important component” to the Carbon Plan, and that “it is important to get that right.”<sup>14</sup> In fact, Mr. Powers testified that “the Companies’ modeling errors related to the reliability issue directly led the Companies to propose an unnecessary and prolonged reliance upon coal-fired generation”<sup>15</sup> and natural gas.<sup>16</sup>

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<sup>12</sup> Transcript, Vol. 22, p. 163.

<sup>13</sup> NC WARN *et al.* recognizes the Companies’ argument that increased electric vehicle (“EV”) adoption may increase demand growth. However, as described in Mr. Powers’ direct testimony, this argument is “speculative” on the current evidentiary record. See Transcript, Vol. 22, p. 163. There are several reasons, described by Mr. Powers, for why EV adoption may not materially increase demand growth. *Id.* at 162-63. That said, NC WARN *et al.* appreciates the potential significance of increased EV adoption, and NC WARN *et al.* recommends that this topic be studied in future carbon plan dockets, and the results of such studies should be used to make necessary corrections to the Companies’ demand growth projections.

<sup>14</sup> Transcript, Vol. 8, pp. 163-64.

<sup>15</sup> Transcript, Vol. 22, p. 164.

<sup>16</sup> *Id.* at 217.

Mr. Powers identified several flaws in the Companies' analysis with respect to the PRM. For example, Mr. Powers identified substantial "CT, coal and DSM capacity that went unused by the Companies at the 2021 and 2022 winter peaks."<sup>17</sup> In fact, Mr. Powers testified that more than 7,000 MW of CT, coal and DSM capacity went unused by the Companies at the 2021 and 2022 winter peaks.<sup>18</sup>

In response to cross-examination, the Companies were forced to acknowledge that substantial coal and natural gas assets were idle during 2021 and 2022 winter peaks.<sup>19</sup> By way of example but not limitation, the following coal units were not running on the winter peak date January 29, 2021:<sup>20</sup>

- Allen # 1,
- Allen # 5,
- Cliffside # 5,
- Marshall # 1,
- Marshall # 2,
- Roxboro # 3, and
- Roxboro # 4.

A full list of the coal units not running during winter peak events during 2021 and 2022 is contained within NC WARN *et al.* Modeling Panel Direct Cross-Examination Exhibit No. 2. A review of the said Exhibit No. 2 proves that it is

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<sup>17</sup> *Id.*

<sup>18</sup> *Id.* at 166.

<sup>19</sup> *E.g.*, Transcript, Vol. 8, pp. 171-72, 178.

<sup>20</sup> NC WARN *et al.* Modeling Panel Direct Cross-Examination Exhibit No.

exceedingly common for the Companies to keep substantial coal units idle during winter peak events.

Similarly, the following natural gas units were completely idle during the same winter peak date (January 29, 2021):<sup>21</sup>

- Lee 7C,
- Lee 8C,
- Lincoln 1-8, and
- Lincoln 9-16.

Even worse, the following seven (7) natural gas units were completely idle during the winter peak event of January 12, 2022:<sup>22</sup>

- Lee 7C,
- Lee 8C,
- Lincoln 1-8,
- Lincoln 9-16,
- Mill Creek 1-4,
- Mill Creek 5-8, and
- Rockingham 2.

A full list of the natural gas assets not running during winter peak events during 2021 and 2022 is contained within NC WARN *et al.* Modeling Panel Direct Cross-Examination Exhibit No. 4. As with the Companies' coal units, a review of the said

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4. <sup>21</sup> NC WARN *et al.* Modeling Panel Direct Cross-Examination Exhibit No.

<sup>22</sup> *Id.*

Exhibit No. 4 proves that it is exceedingly common for the Companies to keep substantial natural gas units idle during winter peak events.

Even more surprising, many of these generation assets were in *planned* outage during peak events. For instance, the following coal units were in planned outage during winter peak events in 2021 and 2022:<sup>23</sup>

- Marshall # 2,
- Cliffside # 5, and
- Roxboro # 4.

Relatedly, the following natural gas units were in planned outage during winter peak events in 2021 and 2022:

- Rockingham CT 4,
- Rockingham CT 5,
- Lee CT 8C,
- Asheville CT #3,
- Smith CT #1,
- Smith CT #2,
- Smith CT #3,
- Smith CT # 6, and
- Wayne County CT #14.

The existence of substantial planned outages during winter peak is highly significant because, during cross-examination, the Companies' Modeling Panel

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3. <sup>23</sup> NC WARN *et al.* Modeling Panel Direct Cross-Examination Exhibit No.

admitted that peak events are relatively predictable.<sup>24</sup> Therefore, the Companies made a *conscious decision* to place coal and natural gas units in planned outage during winter peak events. Hence, the Companies were confident that they had ample reserves notwithstanding the planned outage of generation assets.

These substantial idle assets—including assets in planned outage—during winter peak is sufficient, without more, to justify a rejection of the Companies’ proposed PRM. During the evidentiary hearing, undersigned counsel asked the Modeling Panel, “Mr. Snider, if Duke consistently has substantial idle assets during winter peak events, does that not suggest, or could it not suggest, that Duke’s planning reserve margin is too conservative?” In response, Mr. Snider hedged about the number of years which would represent a trend, but ultimately admitted that if the Companies “had excess over a long enough period, then that might call into question do you have excess generation relative to your needs.”<sup>25</sup>

In response to cross-examination about idle assets, the Companies’ witnesses argued that the winters of 2021 and 2022 involved atypically low demand due to weather conditions, Coronavirus and other factors.<sup>26</sup> The Companies’ argument is incorrect. Indeed, the winter peak in 2022 was extremely typical. During cross-examination, the Companies’ Reliability Panel admitted that the winter peaks during 2012, 2013, 2016 (DEP only), 2017 (DEC only), 2019, 2020, and 2021 were less than or comparable to 2022.<sup>27</sup>

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<sup>24</sup> Transcript, Vol. 8, pp. 174-75.

<sup>25</sup> Transcript, Vol. 8, p. 166.

<sup>26</sup> *E.g., id.* at 162.

<sup>27</sup> Transcript, Vol. 20, pp. 48-50.

Mr. Powers also testified that the ample availability of imports renders the Companies' seventeen percent (17%) PRM unnecessarily conservative. For instance, the Companies' Transmission Panel admitted that "the Companies' Resource Adequacy study accounts for nearly 2,000 MW of non-firm assistance from neighboring systems during peak demand periods."<sup>28</sup> However, Mr. Powers testified that the Companies "were short, relative to their non-firm imports target, by about 1,000 MW at the 2020/2021 and 2021/2022 winter peaks."<sup>29</sup> Therefore, according to Mr. Powers, the Companies "underutilized non-firm imports" in 2020/2021 and 2021/2022.<sup>30</sup> Nonetheless, this failure to achieve the Companies' non-firm imports target (2,000 MW) did not compromise the Companies' operating reserve margin during these winters.<sup>31</sup>

The ample availability of imports is illustrated by examining the Companies' performance during the polar vortex of February 20, 2015. The following exchange during the evidentiary hearing captures the extreme nature of this weather event:<sup>32</sup>

Q Mr. Snider, do you recall the Polar Vortex event from February 20<sup>th</sup> of 2015?

A I do.

Q Would you characterize that as a pretty extreme weather event?

A Oh, I absolutely would; yes.

Q And that's something that taxed Duke's system in a very significant manner.

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<sup>28</sup> Transcript, Vol. 16, p. 106.

<sup>29</sup> Transcript, Vol. 22, p. 168.

<sup>30</sup> *Id.*

<sup>31</sup> *Id.* at 169-70.

<sup>32</sup> Transcript, Vol. 9, pp. 21-22.

A Taxed not just Duke's system, the entire southeast was taxed during that 2015 Polar Vortex.

Despite the extreme nature of this polar vortex weather event, the Companies were in no danger of shedding load, and the Companies had ample available amounts of non-firm imports to meet even more load. During a Staff Conference on March 2, 2015 regarding the polar vortex, the Companies' witness testified as follows:<sup>33</sup>

Chairman Finley: So how far were you away from having to shed load?

Mr. Peeler: Well, so certainly there were several other options still available. We had not called on VACAR reserves, so we still had firm transmission availability to bring in. There were still energy options. We still could have pushed more non-firm energy . . . . it [i.e., shedding load] wasn't imminent by any means.

. . . .

Chairman Finley: . . . . Did this event, these events, these cold weather events point out to you whether or not your regional and inter-regional planning is deficient or needs to be improved in some fashion?

Mr. Peeler: There were no deficiencies that I could identify. . . . We were able to bring in – you know, I think we were importing about 1,200 MW of energy at one time into our BAA. That's a sizable energy move in a very stressful time. So we were able to move energy in from PJM. We moved energy in from Southern Company. We had our reserve sharing capabilities on our firm transmission. So I didn't see any deficiencies. As a matter of fact, I was pleasantly surprised at the performance of not just the Duke Energy transmission system, but our neighboring systems as well.

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<sup>33</sup> NC WARN *et al.* Modeling Panel Direct Cross-Examination Exhibit No. 7, pp. 11-12 & 18-19 (emphasis added).

The polar vortex event illustrates several points. For example, during the most extreme weather event in recent memory, the Companies were not remotely close to shedding load, and in fact had substantial untapped import sources available. Furthermore, even during this uniquely challenging peak event, the Company imported only 1,200 MW of non-firm energy, which is far less than the 2,000 MW of non-firm assistance assumed in the Companies' Resource Adequacy study.

During his direct testimony, Mr. Powers corrected the Companies' multiple errors and determined that their actual reserve margin at peak was as follows:<sup>34</sup>

**Table 5. Calculated Actual Winter Peak Equivalent Planning Reserve Margins ("PRMs") for DEC and DEP in the Winters of 2020/2021 and 2021/2022**

Winter peak year	Coincident winter peak, MW	Unused coal, CT, and DSM, MW	Reserve margin at actual peak, %
2020/2021	27,398	7,657	27.9
2021/2022	29,028	7,255	25.0

The evidence therefore establishes that the Companies' operating reserves are not nearly as narrow as represented.

For all of these reasons, among others, the evidence elicited during the evidentiary hearing established that the Companies' proposed PRM of seventeen percent (17%) is far too conservative and should therefore be reduced.

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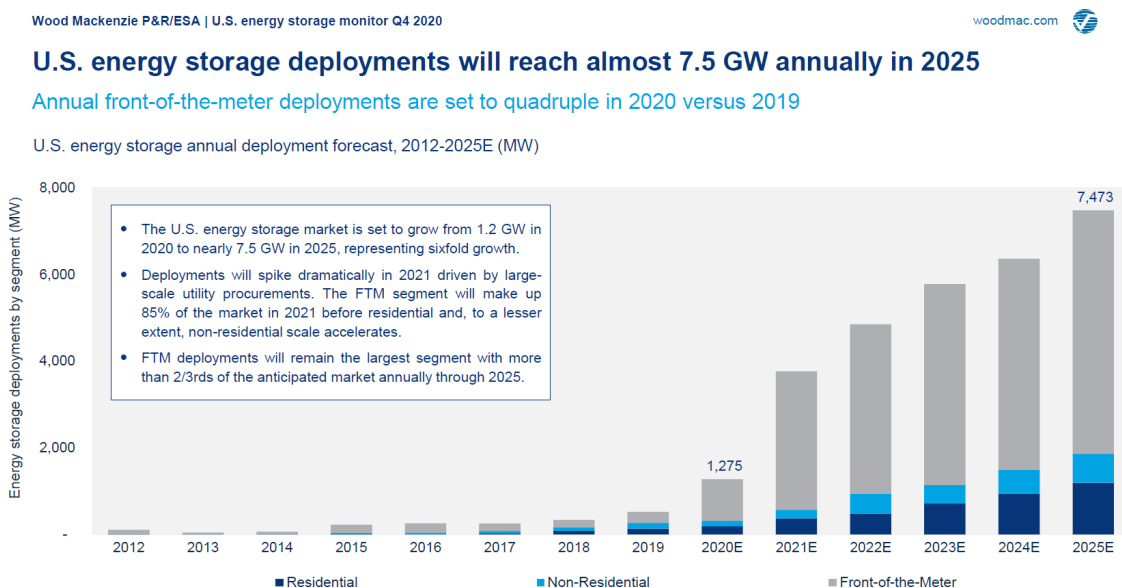
<sup>34</sup> Transcript, Vol. 22, p. 17.

## II. Errors with the Companies' Proposed Near-Term Procurement Activities

### A. Solar Plus Storage

The Companies committed several grievous errors in their analysis of the likely performance of SPS. These errors are especially unfortunate given that the Companies already lag behind their peers in the implementation of battery storage.

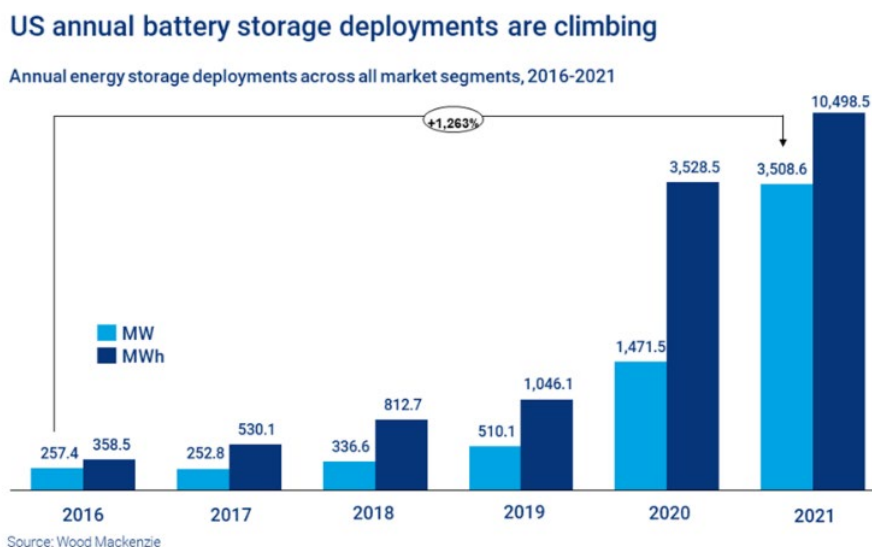
Battery storage is a burgeoning technology. Indeed, evidence elicited during the hearing establishes that United States battery storage deployments are estimated to reach almost 7.5 GW annually by 2025. This statement is supported by the following figure which was entered into evidence during the hearing:<sup>35</sup>



Relatedly, annual battery storage deployments across all market segments have increased by about 1,263% for the period of 2016 to 2021. This statistic is

<sup>35</sup> NC WARN *et al.* Modeling Panel Direct Cross-Examination Exhibit No. 9, p. 2.

corroborated by the following figure which was also admitted into evidence during the hearing:<sup>36</sup>



Despite these trends, the Companies currently own very little energy storage in the Carolinas. As of May 2022, the Companies possess only about 14 MW of battery storage in the Carolinas, namely the Mt. Sterling Microgrid, AVL Rock Hill and the Hot Springs Microgrid.<sup>37</sup> Equally lamentable is that the Companies' proposed Carbon Plan would do very little to bridge the gap between the Companies and their peers: the Companies propose to add only 350 MW of new battery storage by 2027.<sup>38</sup> In light of the rapid nationwide proliferation of battery storage, Mr. Powers testified that "the lack of sufficient battery storage in the [Companies'] portfolios is a primary reason that the Companies fill the gap with new CC and CT capacity."<sup>39</sup>

<sup>36</sup> NC WARN *et al.* Modeling Panel Direct Cross-Examination Exhibit No. 9, p. 1.

<sup>37</sup> The Companies' Carbon Plan, App. K, p. 2, Table K-1.

<sup>38</sup> The Companies' Carbon Plan, App. E, p. 2.

<sup>39</sup> Transcript, Vol. 22, p. 185.

The Companies' modeling errors with respect to SPS will cause them to fall yet further behind their peers. For example, the Companies' model placed an unnecessary, artificial cap on the storage component of a SPS system. Mr. Powers testified that "the base case SPS system modeled by the Companies is a 75 MW solar array coupled to 20 MW of battery storage with four hours of storage at 20 MW. This results in the equivalent of about one hour of storage at 75 MW."<sup>40</sup>

Conversely, Mr. Powers testified that the applicable standard of care for "the number of hours of battery storage relative to the nameplate capacity of the solar array is the number of hours of storage at the capacity rating of that solar array."<sup>41</sup> By way of example, "if the solar array is rated at 75 MW, then four hours of battery storage is  $75 \text{ MW} \times 4 \text{ hours} = 300 \text{ megawatt-hours (MWh)}$ ."<sup>42</sup> In short, the Companies' model imposed a cap on storage which departs from typical practice and fails to track with reality. In so doing, the Companies erroneously—and artificially—undervalued the likely performance of SPS systems.

The Commission will be aware that, in response to the Public Staff's criticisms, the Companies added an additional SPS configuration intended to address the above-described issue. However, Mr. Powers testified that "this additional configuration, while an improvement on the two SPS configurations in the Carbon Plan, is one-half the storage necessary for the SPS to achieve equivalency to a CT."<sup>43</sup>

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<sup>40</sup> Transcript, Vol. 22, p. 186.

<sup>41</sup> *Id.*

<sup>42</sup> *Id.*

<sup>43</sup> *Id.*

The Companies made further mistakes in their evaluation of SPS. For example, the Companies' model failed to consider that SPS batteries are capable of being recharged with grid power to maximize reliability to meet winter peak.<sup>44</sup> In the Modeling Panel's direct testimony, the Companies made admissions which were tantamount to acknowledging that this oversight constitutes a modeling error: "The Companies acknowledge that hybrid SPS assets are being designed with bidirectional inverters to enable charging the storage asset with both DC solar energy and grid energy."<sup>45</sup> In other words, the Companies acknowledge that their model fails to reflect reality, and thereby, the Companies admit that, yet again, their model undervalues the likely performance of SPS.

In defense of their model, the Companies claim that "the EnCompass model is not equipped with this capability" to model a SPS with bidirectional charging.<sup>46</sup> This defense may explain *why* the Companies failed to properly model SPS, but this defense does not *correct* what constitutes an obviously, and seemingly admitted, modeling error. In his direct testimony, Mr. Powers explained that the Companies' excuse does not constitute a correction of an obvious modeling error: "The portfolio modeling performed by the Companies must reflect that the SPS batteries can be charged with grid power to assure battery reliability."<sup>47</sup>

In summary, Mr. Powers testified that "these errors constitute serious flaws which resulted in a minimal amount of battery storage in the Carbon Plan in the

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<sup>44</sup> *Id.* at 187.

<sup>45</sup> Transcript, Vol. 7, p. 346.

<sup>46</sup> *Id.*

<sup>47</sup> Transcript, Vol. 22, p. 187.

near term.”<sup>48</sup> The Commission should therefore reject the Companies’ proposal to tepidly implement battery storage. As recognized in Mr. Powers’ testimony, properly modeling SPS would significantly reduce the need for further natural gas assets.<sup>49</sup>

B. Conversion from Natural Gas to “Green Hydrogen”

The Companies propose a massive buildout of natural gas capacity: specifically, 800 MW to 2,400 MW of CCs and 6,400 MW to 10,900 MW of CTs.<sup>50</sup> It would be impossible to achieve carbon neutrality by 2050 with this substantial reliance upon natural gas. To overcome this problem, the Companies propose to convert one hundred percent (100%) of their natural gas fleet to “green hydrogen” by 2050.<sup>51</sup>

This drastic conversion is completely unrealistic. Indeed, the Companies’ proposed Carbon Plan acknowledges that there are “significant uncertainties” with the concept that these natural gas plants can be converted to one hundred percent (100%) hydrogen.<sup>52</sup>

Mr. Powers described in detail the uncertain and speculative nature of the Companies’ proposal during his direct testimony. For example, in generating their proposal for a wholesale conversion to green hydrogen, Mr. Powers described how the Companies extensively “relied on a 19-page green hydrogen (H<sub>2</sub>) promotional

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<sup>48</sup> *Id.* at 218.

<sup>49</sup> *Id.* at 185.

<sup>50</sup> Transcript, Vol. 22, p. 218; see also the Companies’ Carbon Plan, App. E, pp. 77 & 86.

<sup>51</sup> *E.g.*, the Companies’ Carbon Plan, App. E, pp. 31-32.

<sup>52</sup> The Companies’ Carbon Plan, App. E, p. 43.

brochure prepared by the” Office of Energy Efficiency and Renewable Energy.<sup>53</sup> That “promotional brochure contained exceptionally low aspirational cost projections for green H<sub>2</sub> production.”<sup>54</sup> According to Mr. Powers, “the Companies’ extensive reliance upon this short promotional brochure for such a significant planning issue is unrealistic.”<sup>55</sup>

There are many other reasons why the Companies’ proposal to transfer their natural gas fleet to green hydrogen is underdeveloped and speculative. For instance, Mr. Powers testified that “[t]here is no accounting in the Carbon Plan for the potentially high capital cost of converting a CC or CT power plant designed to burn natural gas to burn 100 percent H<sub>2</sub>.”<sup>56</sup> According to Mr. Powers’ direct testimony, “[a]ll elements of the Companies’ existing CC and CT power plants that will operate beyond 2050 will likely require major modification to enable use of 100 percent H<sub>2</sub> fuel.”<sup>57</sup> For instance, the following elements would probably require modification: (a) fuel piping component materials, (b) pipe sizes, (c) sensors and safety systems, and (d) gas turbine components exposed to H<sub>2</sub> combustion exhaust gases.<sup>58</sup>

Further adding to the speculative nature of the Companies’ request are statements made by gas turbine manufacturers which cast significant doubt upon the role in which the Companies seek to cast their natural gas fleet after 2050.

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<sup>53</sup> Transcript, Vol. 22, p. 192.

<sup>54</sup> *Id.*

<sup>55</sup> *Id.*

<sup>56</sup> *Id.* at 193-94.

<sup>57</sup> *Id.* at 194.

<sup>58</sup> *Id.*

According to Mr. Powers, “Gas turbine manufacturers envision gas turbines firing 100 percent H<sub>2</sub> as operating infrequently, and then only in regions with high power costs.”<sup>59</sup> For instance, Siemens, a major gas turbine manufacturer and the provider of the Companies’ 402 MW Lincoln 17 CT, states as follows:<sup>60</sup>

As significantly, today, running electrolysis to produce 50 MW for one hour at a CCGT running at 50% efficiency could require 175 MW of renewable power and 3,400 kilograms (more than 14,000 gallons) of hydrogen, he said. “So, the affordability part of the equation could be an issue,” which is why hydrogen power could provide more economical as short-term (three or four hours a day) renewable support in places such as Europe,” he added.

Therefore, even gas turbine manufacturers consider turbines operated by green hydrogen as a niche generation source only. The Companies have seemingly failed to analyze this issue with their proposal to convert all natural gas resources to green hydrogen.

The Companies have failed to meaningfully analyze how mandatory carbon-reduction goals can be met if their speculative proposal to transition to one hundred percent (100%) green hydrogen does not come to fruition. According to Mr. Powers’ testimony, “There is no assessment of what happens with the CTs and CCs if those uncertainties are not resolved by 2050.”<sup>61</sup> Therefore, the Companies’ green hydrogen proposal should be rejected.

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<sup>59</sup> *Id.*

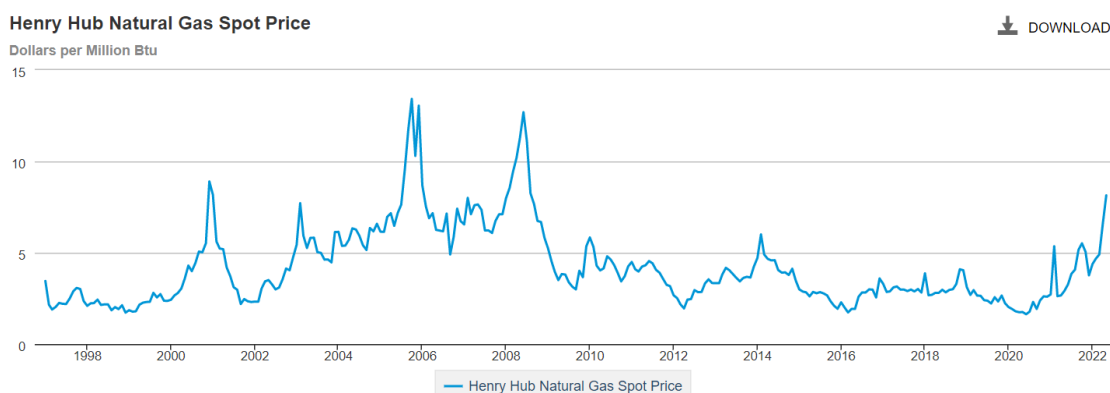
<sup>60</sup> *Id.* at 195.

<sup>61</sup> *Id.* at 193.

### C. Natural Gas Price Projections

The Companies' proposed natural gas buildout was further supported by an erroneous projection of natural gas prices. In fact, as discussed below, the Companies' projection of natural gas prices *never* anticipated that natural gas prices would get as high as those prices already exist *today*. The Companies' natural gas projection is unrealistic and should therefore be rejected.

According to Mr. Powers' direct testimony, "[n]atural gas price volatility has been an inherent feature of the natural gas market."<sup>62</sup> To illustrate this point, Mr. Powers sponsored the following figure generated by the US. Energy Information Administration ("EIA"):<sup>63</sup>



According to Mr. Powers, "the Companies' natural gas projections fail to adequately recognize this volatility in the natural gas market."<sup>64</sup>

In fact, the Companies' projection never anticipates natural gas prices getting as high as they are presently. The Companies' proposed Carbon Plan projects natural gas prices remaining under \$4/MMBtu through 2032, rising to

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<sup>62</sup> Transcript, Vol. 22, p. 197

<sup>63</sup> *Id.* (as of July 3, 2022).

<sup>64</sup> *Id.* at 196.

\$5/MMBtu in 2040 and about \$7/MMBtu by 2050.<sup>65</sup> However, in response to cross-examination, the Companies' Modeling Panel admitted that, as of August 2022, natural gas prices are as high as \$8.81/MMBtu.<sup>66</sup>

In fact, an exhibit admitted into evidence during the hearing established that natural gas prices have remained over \$7/MMBtu since May 2022,<sup>67</sup> which is higher than the Companies project natural gas prices until 2050. Based on this recent volatility, in response to cross-examination, the Companies admitted that, "if Duke ran its natural gas projection today the resulting projection or forecast would be higher than what is reflected in the Carbon Plan."<sup>68</sup>

As described by Mr. Powers, "the Companies' natural gas price projections fail to adequately recognize the volatility in the natural gas market and are unrealistically optimistic."<sup>69</sup> Therefore, the Companies' projection should be rejected.

#### D. Impact of the Inflation Reduction Act

The Inflation Reduction Act ("IRA"), signed into law on August 16, 2022, offers \$391 billion in clean energy grants, rebates and tax credits over the next 10 years and will significantly impact the Companies' modeling and result near-term procurement activities.

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<sup>65</sup> The Companies' Carbon Plan, App. E, p. 40.

<sup>66</sup> Transcript, Vol. 9, p. 56.

<sup>67</sup> NC WARN *et al.* Modeling Panel Direct Cross-Examination Exhibit No. 10.

<sup>68</sup> Transcript, Vol. 9, pp. 53-54.

<sup>69</sup> Transcript, Vol. 22, p. 196.

In his direct testimony, Mr. Powers testified regarding the White House's projection that the IRA will result in 170,000 new residential solar systems in North Carolina over the next 10 years.<sup>70</sup> At an average 5-kilowatt system size, that projection would lead to 850 MW of solar added to the state's grid. Given the rapid proliferation of battery storage,<sup>71</sup> it is reasonable to assume that many of those systems will also include battery storage. The IRA also provides \$8.8 billion in rebates for home energy efficiency upgrades, some of which will cover up to 100% of the cost for low-income participants, plus \$27 billion in loans and grants for greenhouse gas reduction projects that will flow through state, local and Tribal governments and green banks.<sup>72</sup> Clearly, the impact will be significant.

The Companies' Modeling Panel stated in its rebuttal testimony that the Companies had "performed preliminary modeling sensitivity analysis based on an initial review of the IRA to test the robustness of the Companies' proposed near-term actions" and reported that this modeling "continues to validate the near-term actions and supports inclusion of limited new hydrogen-capable gas resources in the near-term action plan."<sup>73</sup> Commissioner Clodfelter requested details of the IRA modeling, which were filed on September 22, 2022 as Modeling and Near-Term Actions Panel Late-Filed Exhibit No. 1, which states that: "this analysis . . . provides

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<sup>70</sup> Transcript, Vol. 22, p. 210.

<sup>71</sup> *Supra*, Section II.A.

<sup>72</sup> Urban Sustainability Directors Network, *Inflation Reduction Act Miniguide*, accessed October 21, 2022: [https://www.usdn.org/uploads/cms/documents/ira\\_for\\_members.pdf](https://www.usdn.org/uploads/cms/documents/ira_for_members.pdf).

<sup>73</sup> Transcript, Vol. 27, p. 38.

additional support for the Companies' near-term action plan with respect to the amounts of solar, battery, onshore wind, CC, and CT resources included."<sup>74</sup>

However, the Companies' analysis addresses only supply-side resources. It also ignores the significant customer investments in solar, storage and energy efficiency that will result from the IRA. Even in its analysis of IRA impacts on utility-owned assets, the Company considers only the base tax credit of 30% and does not incorporate the new, stackable tax credits (additional 10-20% credit for projects in low-income communities; additional 10% credit for projects on brownfields or in "energy communities" with high levels of coal, oil or gas employment).

The Companies admit this in the aforementioned late-filed exhibit:<sup>75</sup>

The energy community eligibility in the IRA is very site-specific and therefore also was not applied to any resource technology at this time.

and

The IRA also provides for incentives that could increase or accelerate the adoption of energy efficiency ("EE"), electric vehicles ("EV"), and net energy metering of rooftop solar ("NEM"). Because incentives for these load modifiers will require more analysis to determine near- and longterm impacts to the load forecast, the IRA Analysis did not include any adjustments to the Carbon Plan load forecast for IRA Analysis.

It is entirely understandable that the Companies could not have performed a more thorough analysis at this time, and the Companies do report that they will do further IRA analysis in the context of future CPCN and IRP proceedings.<sup>76</sup>

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<sup>74</sup> Modeling and Near-Term Actions Panel Late-Filed Exhibit 1, p. 10.

<sup>75</sup> *Id.* at 3.

<sup>76</sup> Modeling Panel Rebuttal Testimony, pp. 17, 46.

However, since the IRA, in all likelihood, will consistently and significantly favor renewables, storage, and energy efficiency over new gas, we will have ignored a significant opportunity to more efficiently reach the targets of House Bill 951 if a full analysis is not done before advancing plans for new gas capacity. The Commission should therefore reject the Companies' request to have new gas approved for planning purposes in its near-term action plan. Instead, the Commission should wait until the full impact of the IRA is analyzed before approving more climate-wrecking natural gas.

### **III. Errors with the Companies' Proposed Near-Term Development Activity—Small Modular Reactors**

In their proposed Carbon Plan, the Companies proposed 570 MW of Small Modular Reactors ("SMR") by 2034.<sup>77</sup> This proposal should be rejected as completely unrealistic.

According to Mr. Powers, SMRs "are an unproven option without any history of success in the power industry."<sup>78</sup> Indeed, in response to cross-examination, the Companies admitted that "[t]here is no current SMR anywhere in the world that is generating power and providing it for commercial operation."<sup>79</sup> Despite this complete absence of operational pedigree, numerous companies have dedicated many years and substantial money in a failed attempt to bring SMRs to the market.<sup>80</sup>

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<sup>77</sup> The Companies' Carbon Plan, Executive Summary, p. 23.

<sup>78</sup> Transcript, Vol. 22, p. 198.

<sup>79</sup> Transcript, Vol. 17, p. 183.

<sup>80</sup> *E.g.*, Transcript, Vol. 22, pp. 198-201.

To illustrate the referenced struggles experienced by SMR developers, Mr. Powers testified concerning the problems of NuScale, which is considered a leading developer of SMR technology. NuScale reached an agreement with Utah Associated Municipal Power Systems in 2017 to build twelve 50 MW modules that would come online in 2024. Since that time, the scale of the project has been consistently reduced, while the cost has risen, and the completion deadlines have been pushed back. According to Mr. Powers,<sup>81</sup>

Later, the [NuScale] plan changed to six 77 MW modules projected to come online in 2029. The currently projected NuScale production cost could be more than twice the cost of utility-scale solar and wind power generation. . . . NuScale's problematic financial state would indicate a 2029 operational date for its SMR is highly problematic.

The example of NuScale illustrates that SMR technology is at best unproven and potentially non-viable.

Moreover, it is possible that the purported benefits of SMRs may not come to fruition. During cross-examination, the Companies testified that a principal benefit of SMRs is that “they are standardized design; modular, which means there’s more offsite construction.” However, when asked whether there is a “supply chain” to facilitate this standardization, the Companies admitted that “[o]ne has not been built.”<sup>82</sup> In other words, at present, the means to accomplish the principal purported benefit of SMRs does not even exist.

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<sup>81</sup> *Id.* at 201-02.

<sup>82</sup> Transcript, Vol. 17, p. 183.

In addition to SMRs being a speculative and unproven technology, the Companies' own proposal is underdeveloped and uncertain. For example, the Companies testified that they have not yet selected a technology or design manufacturer for SMRs.<sup>83</sup> And furthermore, the Companies have not even selected a site for locating an SMR.<sup>84</sup> Despite all these uncertainties, the Companies propose to bring online 570 MW of SMR by 2034.<sup>85</sup> This deadline is unrealistic.

The Companies will surely downplay their SMR proposal by noting that permission is sought only to pursue initial development activities for SMRs. However, the Companies' request ignores the lessons learned during the Lee Nuclear Station debacle. The Commission will recall that DEC's proposed Lee Nuclear Station was cancelled in 2017 following years of pre-construction planning and development.<sup>86</sup> Indeed, DEC *never* entered the construction phase of development for Lee Nuclear Station.<sup>87</sup> Nonetheless, DEC requested a rate recovery of \$368 million in development expenses associated with the cancelled project.<sup>88</sup> The example of Lee Nuclear Station illustrates the extreme nature of the Companies' "initial development" request for SMRs, and furthermore illustrates the unacceptable risks incumbent with any nuclear proposal.

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<sup>83</sup> *Id.* at 179 & 181.

<sup>84</sup> *Id.* at 184.

<sup>85</sup> The Companies' Carbon Plan, Executive Summary, p. 23.

<sup>86</sup> Transcript, Vol. 18, p. 26.

<sup>87</sup> *Id.* at 27.

<sup>88</sup> *Id.*; *see also* CPSA's Long-Term Resources Panel Direct Cross-Examination Exhibit No. 1.

Based on all of these uncertainties, Mr. Powers testified that “[i]t would be imprudent for the Commission to authorize” the Companies to pursue development activities for SMRs.<sup>89</sup> Indeed, it is far from certain that SMRs will ever be a viable technology.

In addition to the above, counsel for NC WARN *et al.* has reviewed the Joint Post-Hearing Brief of 350 Triangle, The Environmental Working Group, and NC-APPPL (collectively, “Joint Intervenors”) which will be filed in this docket. In their Post-Hearing Brief, Joint Intervenors set forth compelling arguments based upon the evidentiary record for why the Companies’ request concerning approval of plans to pursue near-term development activities related to new nuclear technology and their request for additional determinations related to this technology should be rejected. NC WARN *et al.* agrees that the Companies’ said requests concerning new nuclear technology should be rejected.

#### **IV. Errors with the Companies’ EE/DSM / Grid Edge Proposal**

Throughout the Companies’ proposed Carbon Plan, the Grid Edge program was given “first priority.”<sup>90</sup> During cross-examination, the Companies’ EE/DSM / Grid Edge Panel described the need to “shrink the challenge as being a first pillar of energy transition.”<sup>91</sup> However, the evidence elicited during the hearing established that the Companies’ proposed Carbon Plan fails to live up to these promises.

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<sup>89</sup> Transcript, Vol. 22, p. 202.

<sup>90</sup> Transcript, Vol. 22, p. 220.

<sup>91</sup> Transcript, Vol. 13, p. 133.

For instance, the Companies' growth projection for NEM has significantly declined between the 2020 Integrated Resource Planning docket and the above-captioned docket. In his direct testimony, Mr. Powers stated the following:<sup>92</sup>

There were 169 MW of NEM solar online in the Companies' territories in North Carolina at the end of 2021. The Companies projected in the 2020 IRPs that 745 MW would be online in North Carolina by 2035. This is a NEM solar increase in North Carolina of 576 MW between the end of 2021 and 2035.

Conversely, "[t]he Companies' proposed Carbon Plan projects a NEM addition rate of 26.5 MW per year in North Carolina, the equivalent of an additional 371 MW by 2035."<sup>93</sup> Therefore, the Companies' proposed Carbon Plan would dramatically reduce the role of NEM solar, relative to the Companies' 2020 forecasts. This reduction is completely inconsistent with the "first priority" promised by the Companies' proposed Carbon Plan.

The Companies' NEM program is an important component of the Companies' effort to "shrink the challenge." In a separate docket,<sup>94</sup> the Companies have proposed a number of changes to their current NEM tariff. During cross-examination, the EE/DSM / Grid Edge Panel testified that the Companies' proposed changes to the NEM tariff would impose a new minimum monthly bill charge upon net energy metering customers.<sup>95</sup>

These proposed changes to the Companies' NEM tariff would reduce the savings of NEM customers by a significant amount. According to NC WARN *et al.*

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<sup>92</sup> Transcript, Vol. 22, p. 209.

<sup>93</sup> *Id.* at 209-10.

<sup>94</sup> NCUC Docket No. E-100, Sub 180.

<sup>95</sup> Transcript, Vol. 13, pp. 138-39.

Grid Edge Panel Direct Cross-Examination Exhibit No.1, the current annual savings under DEC's RS tariff are \$909.17, which would be reduced by about 29.3% to \$643.11.<sup>96</sup> Similarly, the annual savings under DEC's RE tariff would be reduced by about 31% from \$1,025.06 to \$708.32.<sup>97</sup> Furthermore, the annual savings under DEP's tariff would be reduced from \$1,171.31 to \$821.23—*i.e.*, a reduction in savings of about 29.89%.<sup>98</sup> In summary, the Companies' proposed NEM tariff would reduce the annual savings of NEM customers by the following percentages:

- Reduced Annual Savings under DEC's RS Tariff: 29.3%;
- Reduced Annual Savings under DEC's RE Tariff: 31%; and
- Reduced Annual Savings under DEP's NEM Tariff: 29.89%.

Therefore, the Companies have proposed changes to NEM solar which would reduce the value of rooftop solar systems and therefore slow the proliferation of solar. This change further undermines the Companies' promise to "shrink the challenge."

Despite the Companies' admissions about the importance of "shrinking the challenge," the Companies' EE/DSM / Grid Edge proposals fall far short. The Commission should order the Companies to bolster these programs.

In addition to the above, counsel for NC WARN *et al.* has reviewed the Post-Hearing Brief of Appalachian Voices Regarding Energy Affordability which will be

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<sup>96</sup> NC WARN *et al.* Grid Edge Panel Direct Cross-Examination Exhibit No. 1, p. 2.

<sup>97</sup> *Id.*

<sup>98</sup> *Id.* at 3.

filed in this docket. In its said Post-Hearing Brief, Appalachian Voices set forth compelling arguments based upon the evidentiary record for why the Commission should direct the Companies to expand EE/DSM programs and increase engagement in current EE programs for income-qualified, high energy use customers and, furthermore, reject the Companies' proposed expansion of low-income eligibility to include customers with income between 200% and 300% of the Federal Poverty Level. NC WARN *et al.* support these requests of Appalachian Voices.

**V. No New Natural Gas**

As the Commission is well aware, House Bill 951 requires (with limited exceptions) a seventy percent (70%) reduction in emissions of carbon dioxide by 2030 and carbon neutrality by 2050. During cross-examination, the Companies' Modeling Panel acknowledged that, as a result of these carbon emissions reduction goals, "natural gas is going to have to play a much-reduced role in Duke's energy fleet as we move toward this 2050 date."<sup>99</sup> This is because, as the Commission is also aware, natural gas-fired generation involves the emission of carbon dioxide.<sup>100</sup>

Despite the fact that natural gas-fired generation emits carbon dioxide, and as a result, natural gas units must be phased out in order to satisfy House Bill 951, the Companies have—remarkably—proposed a massive buildout of natural gas capacity: specifically, 800 MW to 2,400 MW of CCs and 6,400 MW to 10,900 MW

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<sup>99</sup> Transcript, Vol. 9, p. 40.

<sup>100</sup> Transcript, Vol. 7, p. 111.

of CTs.<sup>101</sup> These various concepts are completely irreconcilable. It is unrealistic for the Companies to propose an expensive carbon-emitting natural gas buildout while simultaneously reducing carbon emissions. Put differently, the best way to stop emitting carbon is to *stop emitting carbon*.

It is completely practical to stop the natural gas buildout and thereby stop the emission of carbon. For example, when the errors described in the present Post-Hearing Brief are corrected—*i.e.*, corrections for overstated demand growth projections, inflated reserve margins, erroneous modeling of SPS, etc.—the need for further natural gas units disappears. Moreover, several alternative models, such as that proposed by Synapse, involve no further natural gas units.

The risk to the environment caused by natural gas-fired generation is well known, and was previously the subject of comments in this proceeding, but there is a risk to ratepayers' wallets and pocketbooks, too. For example, in response to cross-examination, the Companies' witness, Kendal Bowman, testified concerning how the construction of natural gas units, if ultimately deemed incompatible with House Bill 951's carbon reduction goals, will result in stranded assets which burden ratepayers:<sup>102</sup>

Q . . . . What my question was, is -- again, in the hypothetical, if a Carbon Plan is approved which fails to meet these carbon emissions goals, isn't it possible that the construction of these assets could result -- the construction of these generation assets could result in these assets not being able to be put to use for the entirety of their serviceable life?

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<sup>101</sup> Transcript, Vol. 22, p. 218; see *also* the Companies' Carbon Plan, App. E, pp. 77 & 86.

<sup>102</sup> Transcript, Vol. 7, pp. 111-12 (emphasis added).

A. I mean, that is always a possibility with any asset that gets constructed. I would say it's not contingent just upon a Carbon Plan.

Q. But if the -- well, strike that. Now, if the -- again, hypothetically. I know we're not gonna agree on this eventuality, but hypothetically if -- if Duke ended up constructing generation assets which could not be put to use throughout their serviceable life because of these carbon emission goals, that is, of course, an expense that would have to be borne by either ratepayers or Duke investors; is that fair to say?

A. That's fair to say. . . .

The risk of utilizing additional natural gas capacity is too high. These risks impact both the environment and ratepayers' financial well-being. Given these risks, the Commission should issue a Carbon Plan which involves no new natural gas.

### CONCLUSION

The evidence elicited during the evidentiary hearing revealed numerous material flaws with the Companies' proposed Carbon Plan. For the reasons described herein, among others, NC WARN *et al.* respectfully requests that the Commission reject the Companies' proposed Carbon Plan and adopt the recommendations set forth in more detail on pages 47-50 of NC WARN *et al.*'s Joint Comments filed in the present docket.

*[Signature Follows on Next Page]*

This the 24th day of October, 2022.

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CERTIFICATE OF SERVICE

I hereby certify that I have this day served a copy of the foregoing document upon all counsel of record by email transmission.

This the 24th day of October, 2022.

/s/ Matthew D. Quinn

Matthew D. Quinn