Attention: NCUC Docket E-100, Sub 179

Dear Members of the North Carolina Utilities Commission,

Thank you for the opportunity to provide input to the process of developing a carbon plan for North Carolina's large electric utilities under your auspices. We appreciate your efforts to provide multiple venues and formats for commenting.

We are a group of retired and former staff and managers from the US Environmental Protection Agency offices in Research Triangle Park and Chapel Hill, NC. We represent decades of scientific, engineering, economic, analytical, policy and regulatory experience, including with the energy sector. All of us are long-time residents of North Carolina. Most of us have raised our families here. We have a stake in North Carolina's future and we are concerned about the harmful effects of climate change now and into the future.

Summary of Our Recommendations

We urge the Commission to order significant revisions to the Duke Energy Carbon Plan for the following reasons, discussed in greater detail below in this submission:

- Consider updated modeling that has been submitted, which reveals that greater carbon reductions, energy savings, and ratepayer cost savings are readily achievable
- Do not permit construction of new gas-fired power plants
- Incorporate more cost-effective resources and strategies:
    - Offshore wind energy,
    - Solar energy,
    - Renewables coupled with storage, and
    - Energy efficiency measures such as demand-side energy management
- Incorporate consideration of the disproportionate effects of methane gas emissions on low-income and communities of color, and indigenous communities.

Introduction

The world's scientists, in the form of the Intergovernmental Panel on Climate Change (IPCC), tell us that we need to achieve net zero carbon dioxide emissions by 2050 in order to have a substantial chance of keeping warming to a relatively safe level.[i,ii] North Carolinians are being harmed now by continued warming, which is already happening and shows signs of accelerating.

As summarized by an NC State researcher, "Over the past two decades, climate change has increased the frequency and severity of flooding beyond anything we've seen in history,"[iii] The flooding we experienced from Hurricanes Matthew and Floyd, as well as from the increased rainfall contained in more frequent storms, are likely to be more frequent occurrences in the future, as is the damage from more occurrences of extreme heat in our state. We must do all we can to stop contributing to the increasing damage.

Consider these numbers:[iv,v]

2.7 degrees F. — Increase in average daily temperature in Raleigh and Durham, 1970 to 2021
13 — Number of days in 2022, just through July, that had a high temperature of more than 95 degrees, Raleigh-Durham International Airport
40 — Estimated number of days per year in 2042 that will have a high temperature of at least 95 degrees, under a higher carbon emissions scenario
100 — Estimated number of days per year in 2099 that have a high temperature of at least 95 degrees, under a higher carbon emissions scenario[vi]

As you are aware, HB 951 lays the ultimate responsibility on the North Carolina Utilities Commission (NCUC) to develop a carbon plan that will achieve the goal of net-zero carbon dioxide emissions from electricity by 2050. It is clear that the draft plan developed by Duke Energy is inadequate to this task. Under all four scenarios laid out by Duke Energy in its draft carbon plan, North Carolina will unnecessarily fall far short in addressing the impacts of climate change on our state at the level needed.

First, all four scenarios in Duke's draft plan continue our state's reliance on methane natural gas. All actually ADD a significant amount of natural gas to Duke's fleet, even though natural gas-fired plants have a typical lifespan of 40-60 years.

Second, the plan does not go nearly far enough to incorporate already more cost-effective resources and strategies such as offshore wind energy, solar energy, renewables coupled with storage, and energy efficiency measures such as demand-side energy management. And bolstered by the energy and climate provisions in the Inflation Reduction Act recently passed by Congress, these strategies will become even more cost-effective for utilities, communities, and individual consumers.

Duke Energy's carbon plan falls far short of the carbon reduction that is possible, and it also falls short of the charge in the NCUC's charter to provide power that is currently "least cost" for NC ratepayers. In addition, it is worth pointing out that clean energy solutions currently employ over 90,000 people in North Carolina; greatly reducing emissions from our electricity system is a demonstrated win-win for North Carolina's people and economy.[vii]

Stakeholder Recommendations

Stakeholders who took part in discussions with Duke Energy this year made important points that Duke Energy did not fully take into account. A summary provided by Duke Energy after the January 25, 2022 stakeholder meeting contains a list of critical points made by many stakeholders, including, among other points, the following:

- Consider a "no new gas" scenario.
- Consider the offshore wind development goals in NC Executive Order 218 (2,800 MW by 2030 and 8,000 MW by 2040).
- Consider an option including a very high level of distributed resources, and all currently available mechanisms for those resources to shift load out of peak periods.
- Consider centering efficiency and demand-side management as first choice resources.
- Consider solar and storage together as a resource.

Updated Modeling Using the Same Model as Duke Energy Reveals Greater Carbon Reductions, Energy Savings, and Ratepayer Cost Savings

Recently four NC public groups commissioned a report (referred to as the "Synapse report") that attempted to replicate the results of Duke Energy's modeling.[viii] The report was unable to replicate Duke Energy's results without forcing the model to select for additional fossil fuel generation. The Synapse report generated new scenarios without forcing specific generation and found that the scenarios chosen by the model differed significantly from Duke Energy's scenarios. The new scenarios generated by the model contain significantly more renewable resources and no new fossil fuel resources[ix]; would not compromise reliability; and would cost less for NC ratepayers. Below we will note a few of the specific differences.

Duke Energy's Proposed Continued Reliance on Gas-Fired Power Plants is Ill-Considered

NC's carbon plan is directed to have a goal of 70% carbon dioxide reduction from electricity generation by 2030 and to achieve net-zero CO2 emissions by 2050. Only one of Duke's four scenarios meets this goal. The 2050 goal, in particular, is utterly incompatible with buildout of any new gas-fired generation, unless that generation is retired before the end of its useful life. There are two ways that this could play out between now and 2050:

1. If the gas-fired generation is not retired, then NC will not meet the goal of net-zero electricity generation; or

2. If the gas-fired generation is retired, likely because it is finally recognized as being uneconomic, the cost will be borne by NC ratepayers in exactly the way that Duke Energy currently plans to charge ratepayers for the cost of retiring uneconomic coal-fired generation.

Moreover, Duke's scenarios call not just for a buildout of gas-fired generation, but also for a concomitant buildout of expensive gas pipeline infrastructure. This brings with it the likelihood that pipelines will be sited next to low-income communities and communities of color. Those siting battles are likely to continue to be contentious, expensive, environmentally unjust, and ultimately unnecessary.

Duke Energy clearly anticipates this problem, as the draft carbon plan scenarios contain the assumption that all gas-fired plants will be converted to hydrogen-burning plants by 2050, even though Duke is clearly aware that the cost of hydrogen has never been shown to be competitive. Indeed, in October 2021 New York State rejected a utility bid to build two new gas-fired power plants, arguing that the plants would impede the state's ability to meet its carbon reduction goals, and that a transition to burning hydrogen had not been demonstrated as feasible.[x]

This contrasts with the clear and consistently demonstrated viability and cost-effectiveness of renewable energy, as we discuss below.

In addition, while Duke Energy's charge is simply for its emissions to be net-zero with respect to carbon dioxide, it is well known that the greatest greenhouse gas contribution to global climate change from gas-fired generation comes from the significant emissions of methane leaked and vented during natural gas operations (drilling/fracking, storage, transport and distribution). A

recent Stanford University study, using innovative airborne sensors, showed methane leak rates from oil and gas operations to be far higher than previously estimated.[xi]

This is cause for great concern because, as Dr. Drew Shindell, IPCC report chapter lead and Nicholas Professor of Earth Sciences at Duke University, stated in a 2019 letter to Governor Roy Cooper, "Methane has been the largest contributor to the worldwide failure to keep on an emissions trajectory consistent with a 2°C global warming target, causing 90% of the departure from such a trajectory that we have seen since 2000.[xii][xiii] [xiv]

In the same letter, Dr. Shindell goes on to say that "Recent analysis indicates that, due to a rapid decline in the cost of renewables, the cost of clean energy generation is likely to be lower than the cost of new gas plants for 90% of the proposed construction in the U.S. by the date those plants are expected to be placed into service.[xv] The same analysis shows that more than 90% of proposed new gas-fired power plants are likely to be uncompetitive by 2035. This implies that, if Duke Energy does succeed in building new gas plants, these plants are very likely to end up as stranded assets, exacerbating the already thorny problem of unrecovered debt that is preventing the utility from closing coal plants. Many other recent publications have illustrated the extreme financial and climate risks associated with new natural gas.[xvi]"

As noted in this analysis (and quoted in Forbes[xvii]), "These changes are already contributing to cancellations of planned natural-gas power generation…The need for these new methane natural-gas plants can be offset through clean-energy portfolios (CEPs) of energy storage, efficiency, renewable energy, and demand response." Finally we refer to the Synapse report modeling analysis submitted recently to the NCUC docket, which uses the same model as Duke Energy but does not force the model to choose any particular resources upfront. The Synapse analysis does not result in ANY new gas-fired generation.

The Relative Low Cost of Renewables and Storage

A recent report from Lazard financial analysts also suggests that renewable costs are, under many circumstances, lower than the costs of fossil fuel generation.[xviii] The Lazard analysis reports ranges of levelized costs for a variety of types of both renewable energy and fossil fuel energy, clearly showing lower costs for renewables in many cases.

The plans of NextEra Energy[xix] illustrate this point. In a recent presentation to investors, NextEra said it can reach the goal of company-wide net-zero emissions in 2045 (with interim goals more stringent than Duke's) partly by increasing its Florida Power & Light (FP&L) subsidiary's solar generation to 90,000 MW and energy storage to 50,000 MW. It can do this without increasing FP&L bills "because renewable energy is often less expensive than existing and new fossil-fueled generation."

NextEra expects "that wind coupled with storage will cost $25/MWh to $32/MWh later this decade while solar with storage will cost $30/MWh to $37/MWh…In comparison, NextEra expects electricity from existing natural gas-fired power plants will cost $35/MWh to $47/MWh and power from new combined cycle gas-fired plants will cost $56/MWh to $69/MWh."[xx] These assumptions are consistent with the Lazard analysis.

Recent utility capacity additions across the US bear this out. According to 2021 analyses of recent trends[xxi], renewable capacity additions exceeded gas-fired generation significantly. More wind alone than gas was installed for the previous three years. More solar alone than gas was installed for the

previous two years, and made up "58% of all new U.S. generation capacity over the past six years" according to Lawrence Berkeley National Lab.

Given these facts, Duke Energy's draft carbon plan scenarios do not appear to be "least cost" for ratepayers, as is required under NC law. It should be noted that the Synapse report selects far more cost-effective solar, storage, and wind resources, as discussed more below.

The Viability and Huge Potential of Offshore Wind

In June 2021, Governor Cooper issued Executive Order 218, entitled "Advancing North Carolina's Economic and Clean Energy Future With Offshore Wind."[xxii] The Executive Order calls for 2.8 gigawatts (i.e. 2800 megawatts) of wind energy to be built off the NC coast by 2030, and 8 gigawatts (8,000 megawatts) by 2040.

Even though Duke's filing acknowledges offshore wind as "mature, scalable, and increasingly cost-effective" (as echoed in the Lazard analysis), the draft carbon plan scenarios incorporate significantly less offshore wind than the Executive Order calls for – a mere 1,800 megawatts.

This is despite the fact that, according to the US Department of Energy's National Renewable Energy Lab, North Carolina has the third highest offshore wind potential on the entire East Coast (and fifth highest in the US).[xxiii] In fact, North Carolina already has 4,000 megawatts of capacity under lease.[xxiv] According to a recent study by the Raleigh-based Southeastern Wind Coalition and Environmental Entrepreneurs, an offshore wind farm built off the coast near Wilmington could bring in $4.6 billion in net economic benefits for the state.[xxv]

We believe that the carbon plan should at the very least incorporate the Governor's June 2021 Executive Order goals of 2,800 MW off the NC coast by 2030, and 8,000 MW by 2040. This is also consistent with the amount of offshore wind development the Synapse model analysis recommends should be underway by 2030.

Duke Energy's scenarios should have included this goal; it is unclear why they do not. Also, the NCUC should require Duke Energy to compare the costs of building offshore wind itself against the cost of procuring the wind energy from third parties, in order to ensure, per the NCUC charter, that Duke Energy will be providing power that is "least cost" for NC ratepayers.

Solar Energy, Including Solar Combined with Energy Storage, is a Demonstrated Resource Insufficiently Deployed by Duke Energy

Solar energy is already an economic engine in NC, employing over 8,000 people across the state.[xxvi] Inexplicably, all four of Duke's scenarios artificially cap the amount of new solar energy that can be deployed across North Carolina's grid. The scenarios cap solar deployment at 5,400 to 6,800 MW of development, despite the fact that solar is more cost-effective for ratepayers than the additional gas and nuclear in the plans, and is not subject to the volatility of future gas prices or the technological and economic uncertainties associated with hydrogen or small modular nuclear reactors.

The model scenarios in the Synapse report, by contrast, contain significantly more solar and storage resources than are contained in Duke Energy's analysis, at less cost to ratepayers. Specifically, its "Optimized Scenario" selects 7,200 MW of additional solar energy and 5,600 MW of storage.

Pairing solar with storage, with the cost of batteries dropping significantly, has two additional advantages: 1) batteries obviate the need for new gas-fired peaker plants, and 2) battery storage can help make communities more resilient in the face of storms by providing local backup power.

According to a recent US Energy Information Administration report, utility-scale battery storage costs dropped 72% between 2015 and 2019, an average of 27% per year. The result, according to the report, is that the combined capacity of U.S. battery storage projects grew by 28% in 2019, continued on a greater pace in 2020, and is poised to grow by 10 more times by 2023, to result in addition of 10,000 MW to the grid.[xxvii]

The carbon plan should detail plans to rapidly expand solar and batteries (both utility-scale and community-scale), especially in underserved rural areas.

Duke's Draft Plan Insufficiently Accounts for the Considerable Benefits of Demand-side Energy Management, Including Energy Efficiency Programs

As you know, demand-side energy programs can help utilities lower energy use at peak demand times, helping to obviate use of more costly and higher-emitting peaker plants. The Energy Information Administration tracks the incremental annual electricity savings and costs from energy savings attributable to demand-side programs run by utilities. Most of these programs are focused on residential and commercial customers, and save between 1% and 4% per year in energy use. Most of the cost is for initial startup, but the savings can run for years.[xxviii]

It has often been noted that the cheapest energy is energy not used. Reducing demand on our current resources will speed the transition from fossil fuel to cleaner resources, reducing the existential damage from climate change that much faster.

Notably, a 2017 study from the US Department of Energy's National Renewable Energy Lab (NREL) indicates that the energy efficiency savings potential from NC single family homes is over 40%.[xxix] With proper policy, much more of this energy savings from ratepayers could be realized, which translates directly not just to lower carbon emissions, but also to lower electricity bills.

In addition, a 2016 study from the Regulatory Assistance Project addressing overall energy consumption indicated that "it should be possible to cost-effectively meet 30 percent of forecast electricity needs with new efficiency investments over the next 10 years."[xxx]

Nevertheless, Duke Energy's draft plan caps the carbon emissions savings that can be counted from demand-side energy programs at 1% per year. Stakeholders in Duke Energy's process were clear in their comments that this is far lower than the potential of such programs. Moreover Duke's draft plan includes an "opt-out" for large commercial and industrial customers, where the savings potential is arguably the greatest, and would benefit customers as well as obviating the need for high-polluting, more costly gas or coal-fired peaker plants.

The NC carbon plan should put more effort into demand-side energy programs and should not cap the countable carbon savings from such programs.

Duke's draft plan worsens inequities and environmental justice

Expanding the use of methane gas under the scenarios proposed by Duke disproportionately impacts low-income and communities of color, and indigenous communities in the following ways:

- Continued increases in temperature from emitting methane impacts those who must work outdoors (e.g., construction and agricultural workers), and people who lack air conditioning or other resources to mitigate the impacts of increased heat.
- Methane contributes to ozone air pollution, a potent air pollutant that affects lung development in children as well as people with asthma, lung and heart disease. EPA has found that health impacts frequently fall heaviest on these communities.[xxxi]
- The infrastructure for methane gas (pipelines, storage facilities, pump stations, and power plants) are more often sited in or near these communities, creating risks for leaks, explosions, and structural failures, as well as the negative impacts from construction.[xxxii]
- As explained above, the higher cost of building and operating gas-fired power plants versus less expensive solar, wind and storage options raises costs for these already energy burdened communities.

Finally, the artificial limits that Duke places on energy efficiency and solar detailed above means that some of the cheapest pathways to saving and generating energy are limited in the scenarios, and therefore these savings cannot be passed on to low-income and other energy-burdened customers.

These shortcomings of Duke's carbon plan contradict Executive Order 246, "North Carolina's Transformation to a Clean Equitable Economy" issued earlier this year. The EO details what "responsible solutions to climate change" must address, including equity in greenhouse gas emission reductions, promoting equity in health, and increasing resilience in impacted communities. If Duke's plans are adopted as proposed, the NCUC would not be in compliance with the order.

Conclusion

We believe that Duke Energy's draft Carbon Plan is short-sighted, inadequate to the task of addressing the harmful effects of climate change on our state, and unnecessarily polluting and costly to NC citizens, particularly those who continue to bear the greatest burdens. In contrast, it has been shown, by robust results from Duke Energy's own model (and by the actions of other US utilities), that greater reliance on renewable resources and greater effort on energy efficiency will yield far more benefit for NC citizens.

Thank you again for the considerable time and effort you put into this work, and for the opportunity to comment during this process. We look forward to a carbon plan that will provide a clean, safe, equitable, and prosperous future for all North Carolinians.

Sincerely,

Kathy Kaufman, former Regulatory Analyst, Air Economics Group, US EPA Office of Air Quality Planning and Standards
Dale Evarts, former Director, Climate, International and Multimedia Group, US EPA Office of Air Quality Planning and Standards

…with the support of the following North Carolina alumni of the US Environmental Protection Agency (EPA):

Gerry Akland, Former Director, Human Exposure Research Division, US EPA Office of Research and Development

John Bachmann, Former Associate Director for Science/Policy and New Programs, US EPA Office of Air/Office of Air Quality Planning and Standards

William F. Barnard, Former Atmospheric Physicist, National Environmental Research Laboratory, US EPA Office of Research and Development

Dianne Byrne, Former Section Chief, Pollutant Assessment Branch, US EPA Office of Air Quality Planning and Standards

Jane C. Caldwell, Ph.D., Former Environmental Health Scientist, US EPA Office of Research and Development

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James Southerland, Former Chief, Source Assessment Section, US EPA Office of Air Quality Planning and Standards

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Teresa Wall, Former Program Analyst, Toxicity Assessment Division, National Health and Environmental Effects Research Laboratory, US EPA Office of Research and Development

William O. Ward, PhD, Former Data Scientist, National Health and Environmental Effects Research Laboratory, US EPA Office of Research and Development

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[xxi] https://www.energy.gov/eere/wind/articles/land-based-wind-market-report-2021-edition-released and http://utilityscalesolar.lbl.gov/

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[xxiii] http://web.archive.org/web/20210110172118/https://www.nrel.gov/docs/fy21osti/77411.pdf, figure ES-4.

[xxiv] https://energync.org/duke-energys-proposed-carbon-plan/

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From:	Ackerman, Le Anne
To:	Snyder, Joann
Subject:	FW: Submission for Docket E-100 Sub 179 Carbon Plan
Date:	Wednesday, August 17, 2022 11:33:43 AM
Attachments:	Letter to NCUC on Draft Carbon Plan from 33 EPA-RTP alumni 8-17-22 submitted.pdf

From: kathy kaufman <kknarotsky@yahoo.com>
Sent: Wednesday, August 17, 2022 11:30 AM
To: Ackerman, Le Anne <lackerman@ncuc.net>
Subject: Submission for Docket E-100 Sub 179 Carbon Plan

Ms. Ackerman,

It was lovely to speak with you just now. Attached is the submission I had trouble getting the Carbon Plan website to take this morning.

If you could submit it to the docket E-100 Sub 179 I would be very grateful. (If there is a subsequent link to the submission that you can share with me, I would be grateful for that as well).

Thank you so much in advance.

-Kathy Kaufman