

7601 Quail Woods Rd.
Wilmington, NC 28411
May 30, 2024

North Carolina Utilities Commission
4325 Mail Service Center
Raleigh, NC 27699-4300
Chief Clerk's Office

Commissioners:

Please accept the written version of my oral testimony and my written testimony in the attached.

Thank you.

Sincerely,

A handwritten signature in blue ink, appearing to read "TH", is written over the word "Sincerely,".

Tim Holder

**Regarding Duke Energy's Carbon Plan—Integrated Resource Plan (CPIRP),
Docket No. E 100, Sub 190.**

**Written version of oral Testimony for the North Carolina Utility Commission in
Wilmington, NC**

Given at the New Hanover County Court House on April 29, 2024

My name is Tim Holder and I live at 7601 Quail Woods Rd, Wilmington, NC 28411 and
I am a Duke Energy ratepayer.

[The oral testimony below is repeated in my written testimony.]

This Carbon Plan relies on the construction of 4 new methane-gas power plants that will generate large amounts of carbon dioxide which will exacerbate climate change. Solar and wind are downplayed and delayed in the Plan even though they are less expensive than gas and emit no carbon dioxide. The CO2 emissions will exacerbate the effects of climate change on my family as well as eight billion other people.



My family includes my wife, our son and his family, including two grandsons, ages 20 and 16, and our daughter, age 26



And it will affect 30 members of my extended family, with 10 members under the age of 25. It is the younger ones of my family who will suffer the worst and longest from the disastrous effects of climate change.



My wife has asthma and needs to use this inhaler. Climate change will make her condition worse.

My brother Ben in San Francisco experienced the smoke from a large forest fires over a 100 miles away. Ben told me the smoke was so dense that people could hardly see across the street. Just breathing was so horrible they stayed inside for several days.

Here in Wilmington Hurricane Florence dropped 36 inches of rain in 72 hours as it devastated houses by blowing roofs off and flooding them. It spun up a tornado which sounded like a train as it passed with 50 feet of our house.

Because of these effects I urge Duke Energy to change the Carbon Plan to:

- Achieve the state-mandated goals established in HB 951 by dropping the 4 methane-gas plants from the Plan.
- Replace those gas plants with wind, solar and battery storage.

My family and I plead that you hear this message and change the Carbon Plan.

##End of oral testimony.##

Written Testimony for the North Carolina Utility Commission in Wilmington, NC
Submitted May 2, 2024

**Regarding Duke Energy's Carbon Plan—Integrated Resource Plan (CPIRP),
Docket No. E 100, Sub 190.**

[In a separate document, I have submitted a written version of my oral testimony at the April 29 NC Utility Commission hearing in Wilmington I have also integrated the two pages of my oral testimony into this document.]

My name is Tim Holder, I live at 7601 Quail Woods Rd, Wilmington, NC 28411, and I am a Duke Energy ratepayer.

1. The Carbon Plan now being considered by the NCUC will exacerbate climate change rather than minimizing it.

To help resolve the effects of the Carbon Plan on climate change I urge Duke Energy to change it to:

- Completely retire coal earlier than its target date of 2035.
- Drop the four methane-gas plants from the Plan which otherwise would lock in decades of continued reliance on dirty fossil fuels and would almost triple the amount of new gas build-out.
- Consider the environmental effects of fracking in West Virginia which are not accounted for in the Plan.
- Replace those gas plants with wind, solar and battery storage for a more resilient future with a lower cost than fossil fuels.
- Stop making solar more expensive and more difficult for residential, commercial, school, and church buildings to use.
- For backup to wind and solar, rely on battery storage and *only existing* fossil fuel plants.
- Instead of delaying the process *to consider* offshore wind until the 2040s, start it in 2025.
- Start more onshore wind development soon.
- Balance the financial interests of shareholders with public interest of affordability and reliability for rate payers.
- Take concrete steps for offshore wind in 2025 vs. simply considering it in the 2033 or later as is in the Plan.
- Increase investments in battery storage to improve solar and wind utilization and provide greater grid reliability.
- Responsibly transition to a more diverse, resilient electrical grid that protects ratepayers and communities.
- Drop small modular nuclear reactors (SMR's) and hydrogen and let national research programs do the research because it will take decades to make them cost effective at best.

- Ramp up energy efficiency measures so it can achieve goals of 2% for 2025 and 5% for 2050 which the North Carolina Sustainable Energy Association proposed in 2022, compared to Duke's 1.5% for both milestone years.

2. Effects of climate change on my family and friends

This Carbon Plan relies on the construction of four new methane-gas power plants that will generate large amounts of carbon dioxide which will exacerbate climate change. Solar and wind are downplayed and delayed in the Plan even though they are less expensive than gas and emit no carbon dioxide. The CO₂ and methane emissions will impact nearly every aspect of the environment. But it is the effects on humans that I am most concerned about, particularly my family and friends.

2.1 My close family



My son, wife, grandsons, daughter
and daughter-in-law

It will affect my wife Sue, age 66, my son Ted and his wife Rebecca, both age 51, their two sons Eli and Owen, now ages 16 and 20. Also my wife and I adopted Khalida Yaar, then a teenage Afghan girl, 10 years ago. She is now 26 and lives here in Wilmington with her boyfriend Jared who is 30.

2.2 My extended family

The pictures below show my extended family for a total of thirty.



My extended family

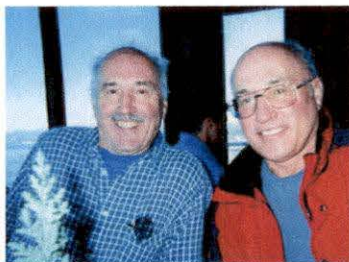
I worry the most about the youngest ones, Jared, Khalida, Owen, Eli and ten grand nieces and nephews who will suffer the worst and longest from the disastrous effects of climate change—*unless* the Carbon Plan takes out the planned fossil fuel and replaces with renewable energy. Of course, other polluters will have follow suit. However, one should note that amongst providers of electricity in the U.S. Duke is one of the top polluters. Duke should do its part to solve the problem instead making it worse.

2.3 My wife

She says she can't imagine using it more now than she already does. And going to the doctor to treat her asthma will cost money. The Duke Plan as it stands now will accelerate the harmful effects climate, thereby aggravating my wife's asthma. *It will take money out of my pocket for the doctor's bills and treatments.* There are hundreds of thousand other people who suffer health effects caused by climate change and the Carbon Plan does not take account of those much larger health and medical costs.



Inhaler



My brother Ben on left and me

2.4 My brother Ben

My brother Ben and his family in San Francisco experienced the smoke from a large forest fires over a 100 miles away a couple of years ago. Ben told me the smoke was so dense that people could hardly see across the street.

Just breathing was so horrible they stayed inside for several days. The five million plus people of the San Francisco Bay area had so much trouble breathing outside because of the smoke, they stayed inside until the air cleared. Now that's an effect climate change you really don't want to live through. It had never happened in the sixty plus years my brother has lived there with his two boys and two grandchildren.

Ben also has a friend who lived in Paradise, California until the huge forest fire nearly wiped it all off the map six years ago. In 2010 the U.S. Census reported a population of 26,800. After the Camp Fire, the population declined by more than 90%. ("Paradise, California, Has Lost More Than 90 Percent of Its Residents Since Last Year's Deadly Fire". *Earther*. Accessed May 28, 2024.) That's two degrees of separation to my brother's friend. What a stunning shock that had to be to see not only your house but your whole town gone in an instant. We all know what a ferocious thing a ragging forest fire looks like from TV news.

2.5 My nephew Benny

My brother also has a son, Benny, who has been living in Lake Tahoe California. This winter there was so much snow it was over the roof of their two-story house. The picture below is near where he lives. Climate change is causing weather extremes—very dry, very wet, and very snowy.



Snow at Lake Tahoe, California, 2023

2.6 My sister-in-law Cathie and her family



My sister-in-law Cathie and her family

My wife's sister Cathie and all of their children and grandchildren live to the east of San Diego. A couple of years ago they could see the very large fires and smoke which were within 30 miles of their houses. They told us about their extreme anxiety—a strong wind in their direction could blow the their community to ashes, just like in Paradise.

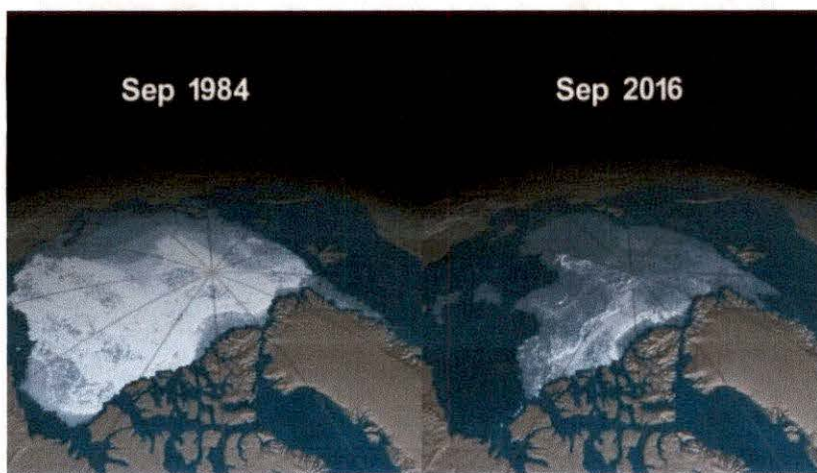
2.7 My friends in Oregon, Siberia, Alaskan Arctic, and New Orleans

In the 1970's I lived in Portland, Oregon for 7 years and it never hit more than 100 degrees in those years. I have a close friend who is still living there. We talk on the phone from time to time and eventually we get to the weather. Usually she says, "Well, it's more rain and grey." In the summer she would remark if it was hot that it was in the 90's. Then it was inching above 100—about ten degrees warmer than forty years before. Then one day it hit 117 in the springtime (not even in summer yet) which is completely unheard of. Above 100 would be something. We were both aghast.

I have lived in many places around the U.S. and Russia, experienced climate change and gained an understanding of it through the lens of those living there.

I worked in Siberia one year and in the winter, where 40 to 60 below is normal. These cold temperatures are what keeps permafrost from melting. Parts of Siberia have hit over 100 degrees consistently in recent years, breaking many records—simply unbelievable. These high temperatures have been melting the permafrost which causes an array of expensive problems with infrastructure and fires on the tundra. My friends there are having to contend with that. It's a similar story with the Arctic part of Alaska where I lived for six years. My friends there are suffering through those same problems with melting permafrost.

In the circumpolar region of the earth the rising temperatures have enabled flora and fauna from southern areas to move northward, upsetting ecosystems and indigenous cultures which center on hunting and gathering to sustain themselves for millennia. My Alaska Native friends (Eskimos or as they call themselves, the Inupiat) have told me that on the west coast of Alaska the view across the Chukchi Sea to the ice always extended over the horizon in June. Gradually the ice has melted earlier and earlier and now it is gone by April. They hunt for marine mammals and this change in ice conditions has negatively affected their hunting and gathering which provides their food. Climate change causes the polar ice cap to recede which further drives more climate change.



NASA satellite photos contrasting September 1984 ice cover of the north polar region with 2016 region illustrating that ice cover has been receding at an alarming rate.

My wife and I moved to New Orleans a year after Katrina which wreaked enormous physical destruction. We expected that since we had watched it unravel on TV. What we didn't expect was the collective post traumatic shock syndrome which was palpable for over one million people. In our three years there we evacuated twice driving north just one day ahead of them. Climate change is generating more hurricanes and typhons with greater intensity. This includes North Carolina.

3. Hurricane Florence

Hurricane Florence was the most destructive hurricane with significant effects in recent years in North Carolina. My wife Sue, our daughter Khalida, and I had moved to Wilmington in April 2018 and Florence happened in September just five months later. First there is the anxiety of watching it track across the Atlantic for seven days with heat generated by heat from the Sahara desert, with winds of over 170 mph, taking a direct aim for us. As it neared landfall the wind speed dropped to about 70 mph and then just after landfall the wind speed dropped to under 70 mph. When it hit it dropped as much as 36 inches of rain in 72 two hours in some areas. It was Biblical, a once in a 1,000-year storm in some areas.

For my wife, daughter and me, a tornado touched down and passed within 50 feet of our house. *It sounded like a freight train running through, it was just terrifying.* We woke up the next morning to find that the tornado decimated tall trees in a small forest we view from back porch, wrecking the view of the beautiful green trees. It wrenched our guts when we saw what the tornado had done. (Invariably when TV reporters interview people who have endured tornados they quiver and say, “That tornado was just sounded and felt like a train came through.”)

Fortunately we had no wind or flooding to our house—just a miracle. But near us in Ogden, less than a half a mile away, down Torchwood Boulevard and in many other parts of the Wilmington region, Florence ripped roofs off causing people to put up tarps covering them to protect from further rain damage well over a year later, till they could find a repair crew. Despite these efforts there was lots of flood damage to houses and businesses. Even Best Buy on College Road was closed for several months to repair their flood damage. I had to go to the Best Buy in Jacksonville, an hour north, to get a computer repaired two months after Florence.

My wife and I volunteered for Samaritan’s Purse to help people who had flood and wind damage. We joined teams of fifteen or so people to help repair their houses. When we walked in their house we just gasped and held back our tears. It was simply horrible. They had to throw away furniture and other belongings. We tore off water-logged sheet rock from walls and ceilings and tore out water-soaked fiberglass insulation. Our teams worked for a day, putting in 200 hours or so and walked away feeling like we had done something to help them out. At the end of the workday we formed a circle, said a prayer, and the homeowners gave us deep heartfelt thanks. But most had much more expensive repairs to be done. They were lucky if they had insurance to pay for it.

To give context in the larger picture for hurricane Florence, here in North Carolina, forty hurricanes and significant storms have hit the state since 2008.
([https://en.wikipedia.org/wiki/List_of_North_Carolina_hurricanes_\(2000%E2%80%93present\)](https://en.wikipedia.org/wiki/List_of_North_Carolina_hurricanes_(2000%E2%80%93present)))

4. Climate change is global, it affects *the entire world*

The Carbon Plan doesn’t solve the problem of climate change, it makes climate change worse. The Carbon Plan will accelerate climate change not just in North Carolina but also will contribute to climate change for the entire world. Accelerating climate change will cause:

- Steadily rising higher temperatures of the air, land and oceans
- More record-breaking forest fires
- An increasing number and intensity of storms and hurricanes
- An increasing number of and intensity of flood events
- An increasing damage to important natural ecosystems and damage to sociocultural systems

One need only look at the reports by the United Nations International Panel on Climate Change over the last thirty years to find elaboration of facts about climate change. (<https://www.ipcc.ch/report/ar6/wg2/>)

These will all have negative impacts on the environment including humans. This is just wrong that any decision-making body would ignore such effects their decisions would have. Climate change will affect the eight billion people on this earth to one degree or another. Climate change does not discriminate on any aspect of diversity—race, ethnicity, gender etc. except for income.

Climate change will worsen health effects, including respiratory and cardiovascular conditions, heat-related conditions, and many more. A common example of health effect is in the summertime and one area has heat wave, often there are fatalities, especially the elderly who are less mobile and perhaps can't afford air conditioning, and are less socially connected that they die from heat prostration.

To ameliorate the effects of rising heat right now, humans with sufficient income can buy air conditioning; but poorer people cannot. But even if you can afford air conditioning, it is only a partial fix—you have to go outside of your house at least some of the time for bear necessities. Also we all experienced what happened during the COVID epidemic, namely deterioration of social and mental health. And air conditioning is run on electricity which, with Duke's Plan emitting methane and CO₂, would simply become a vicious cycle. The heat will be intolerable for all 8 billion people on the planet *unless* Duke, and other polluters, do their part to stop the emissions of methane and CO₂.

I turn now to parts of the world where more and more people have been suffering terrible tolls from climate change.

In Libya in 2023 more than 11,000 people died and at least another 10,000 went missing from torrential rain and flooding. <https://www.cnn.com/2023/09/16/world/global-rain-flooding-climate-crisis-intl-hnk/index.html>

In Pakistan in 2022 unprecedented floods:

- Killed over 1,400
- Directly affected more than thirty three million people
- Destroyed nearly 900,00 houses
- Damaged or destroyed over 22,000 schools
- Destroyed over 8,000 miles of roads and nearly 440 bridges
- Killed over 1.1 million livestock

The reason for this is that climate change melted glaciers and contributed to the torrential rain gushing down river valleys and flood plains doing the damage enumerated above. https://en.wikipedia.org/wiki/2022_Pakistan_floods#:~:text=2022%20Pakistan%20floods.&text

=On%2025%20August%202022%2C%20Pakistan,natural%20disasters%20in%20world%20history, Accessed May 16, 2024.

Climate change will be costly. Globally, damage to farming, infrastructure, productivity and human health will cost an estimated thirty eight trillion dollars per year by 2050 or 17% of GDP, according to a German government-backed research by the Potsdam Institute for Climate Impact Research.

National Geographic has two articles which give a clear description of the effects of climate change which amplify what I have written above. I incorporate them by reference. <https://www.nationalgeographic.com/environment/article/global-warming-effects>
<https://education.nationalgeographic.org/resource/earths-changing-climate/> Accessed May 16, 2024

5. Ranking of Duke in carbon dioxide emissions and leaking sulfur hexafluoride

One may argue that the methane and CO2 that Duke will emit by this Plan is a small fraction of the total emissions worldwide. However, scoping down geographically, Duke was the number one utility nationwide in emissions of CO2 in 2013. <https://grist.org/climate-energy/these-are-the-10-dirtiest-power-companies-in-the-u-s/>. Those emissions and their effect on climate change are the reason for HB 951.

EPA records show that in 2020 Duke Energy is one of the top leakers of a gas that is 25,000 times more polluting than carbon dioxide. The gas, sulfur hexafluoride, is one of the most potent and longest-lasting climate pollutants. A representative of Duke surmised that this may be a reflection of how often Duke Energy inspects equipment and refills leaked gas relative to other companies. The emissions were equal to the annual greenhouse gas emissions of more than 59,000 automobiles. <https://www.nbcnews.com/news/us-news/duke-energy-one-top-leakers-gas-25000-polluting-carbon-dioxide-epa-rec-rcna45742> Accessed May 16, 2024.

I do not find these facts in the Carbon Plan but they are critical in considering the Plan. Are we to expect more of this as Duke proposes four new gas-methane plants? If so, it would give all the more reason to take these gas-methane plants out of the Plan and put more solar and wind into the plan.

6. North Carolina House Bill 951

In 2021, state lawmakers passed HB 951 which ordered the North Carolina Utilities Commission to adopt a Carbon Plan that would reduce carbon dioxide emissions from electricity generation to 70% below 2005 levels by 2030 and achieve “net zero” emissions, or carbon neutrality, by 2050.

HB 951 was approved by overwhelming bi-partisan legislative majorities and Duke Energy, the largest utility in North Carolina, obviously plays a major role in achieving those

goals. Duke's Carbon Plan does not meet the legal requirements in HB 951 to reduce carbon dioxide emissions and therefore is wrong and runs against the *public* interest.

The Plan will cost ratepayers more than a Plan which calls for 4 new methane-gas plants than a Plan with more wind and solar coupled with batteries. The rise in rates will burden low-income households with higher monthly energy bills — as much as 73% by some estimates. <https://ncnewsline.com/2024/04/23/duke-energy-feeling-the-heat-as-public-hearings-continue-this-week-on-carbon-plan/> Accessed May 16, 2024. This adds more of a burden on low income householders which are often people of color causing environmental injustice.

7. Six kinds of energy production in the Carbon Plan

7.1 Coal and methane-gas

The Carbon Plan relies on coal-fired power plants, resulting in stranded assets that later are forced into early retirement, which would mean putting unnecessary costs on customers. Duke has committed to retire just 30% of its coal generation by 2030 and proposes to replace all coal with gas by 2035. I urge Duke to completely retire coal earlier than its target date of 2035 so that it can achieve the goals of HB 951 sooner.

Contrary to Duke's public assertions that it's taking bold action to address the climate crisis, it proposes four new methane-gas plants, making it the second largest of any utility in the nation. The Plan will accelerate the dangerous effects of climate change. *And it does so not just in the vague future but right now.*

This undermines its promise of a transition to clean energy. Methane is more than twenty eight times as potent as carbon dioxide at trapping heat in the atmosphere. Worse yet, the source of the gas is from West Virginia and is produced by fracking. Fracking increases the amount of carbon dioxide released into the atmosphere, escalating climate change. It also contaminates drinking water, disrupts ecosystems, and has adverse effects on human and animal health. The effects of fracking in West Virginia are not accounted for in HB 951 or the Carbon Plan simply because we are in North Carolina. But I urge the Plan to consider it.

The Plan does propose more solar and offshore wind, but the electricity generated by them are vastly outweighed by the increase in proposed new methane-gas plants. This is a huge, missed opportunity because the clean technologies we need are available now and cheaper than ever before, and most especially cheaper than gas. The Plan proposes three times as much new gas as that proposed in the previous plan. This would commit North Carolina to one of the largest gas build-outs contemplated by any utility in the nation. It proposes shifting from coal to gas instead of shifting from coal directly to clean energy.

The Commission should push Duke to prioritize renewables, not gas. Duke Energy says it's Plan maintains an all of the above strategy. This is simply a wrong thing to do because it runs against the goals of HB 951. The Plan is for four new fossil fuel plants pushing renewable energy sources further into the future, thus worsening the effects of climate change instead of reducing

its effects in the milestone years of 2030 and 2050. The four planned polluting fossil fueled power plants are the same kinds of plants that led to rolling black outs at the end of 2022. Taking full advantage of renewable energy would minimize the risk of black outs.

The cost of wind and solar coupled with battery storage has declined steadily for decades and become lower than the cost of coal and gas in recent years. The Plan for methane-gas is expensive and creates an artificial barrier to clean, affordable energy.

I urge the Commission to balance the financial interests of *shareholders* with public interest of affordability and reliability for *rate payers*. HB 951 mandates carbon emission reduction to minimize effect on climate change, which benefits *everyone*—ratepayers and shareholders alike.

7.2 Solar

Solar is the most cost-effective and readily scalable energy resource. Solar is now more economic than centralized gas-powered electric plants. Therefore, I support sufficient investments in solar and solar plus storage in the near term to meet the 2030 goal. Duke's much-touted solar expansion won't even begin until at least 2028 and the expansion doesn't last long.

Duke will keep strangling large-scale solar companies, much like it's done to rooftop solar companies through its regulator-sanctioned change to net metering rules. The Plan then relies on tactics of unfair competition. This is a case of a monopoly squeezing out the little guy. Duke is motivated to block homeowners and owners of commercial and industrial buildings from putting solar panels on their roofs because it reduces the power needed from Duke and its use of overbuilt transmission lines. I urge Duke stop making solar more expensive and more difficult for residential, commercial, school, and church buildings to use. A Plan which gives a disadvantage of one source of power over another is constructed on a weak and erroneous argument.

If all of these users put solar at their point of use, the demand for electricity from Duke would be correspondingly lower in part because fewer transmission lines and power stations would be needed. Prioritizing investments sooner in solar would avoid delays in implementation and higher costs due to inflation.

7.3 Wind

Offshore wind has proven itself as a dependable technology with forty two megawatts of turbines deployed off the coast in U.S. federal waters. Wind energy pairs well with solar due to maximum resource outputs at different times of the day. North Carolina has the second-highest offshore wind net technical energy potential in the U.S. according to the National Renewable Energy Laboratory. Duke itself secured an offshore wind lease in 2022, south of Brunswick County, which has an estimated four GW of capacity, according to Duke's proposed

CPIRP. It is called Wilmington East Wind Energy Area. There are two other projects in planning and development off the North Carolina coast in the federal waters, namely the Kitty Hawk and Wilmington East Wind Energy Areas. Duke offshore holding complements those two and will enable interties.

The company says it would like to “preserve the option of *only 1,600 megawatts* offshore for 2033 or later.” (emphasis added). In other words this is not a plan to do something concrete, just a plan to *consider* doing something in the vague and conceptual in 2033, and even pushes it off until nine years in the future. I urge Duke to start concrete steps for offshore wind in 2025—next year. Every year wind and solar are deferred, electricity produced will cost ratepayers more because wind and solar cost less than gas.

The Carbon Plan does not mention *onshore wind* and I urge that the Plan do so in substantial amounts and soon.

7.4 Battery storage

Duke proposes 650 MW of standalone battery storage to be procured in 2025 and 2026 for operation by 2031. I urge that the Carbon Plan increase investments in battery storage to improve solar and wind utilization and provide greater grid reliability. Batteries charged with solar and wind can provide electricity when one of them is not providing electricity. The cost curves for wind, solar, and battery storage are downward compared to the cost curve for gas-powered electricity which is relatively flat.

Coupling wind and solar with battery storage has become cost effective in recent years. This also would provide more firm, dispatchable resources during times of extreme weather events, such as 2023's Winter Storm Elliott.

The Plan does not do enough to take full advantage of the new incentives for renewable energy under the landmark Inflation Reduction Act. Doing so would reduce the overall cost of solar, wind and battery storage making them even more economic than gas.

7.5 Small modular nuclear reactors and hydrogen

Duke proposes a new small modular nuclear, or SMR, by 2035 and hydrogen in order to provide low carbon generation. However, the commercial viability of SMRs and hydrogen are still unproven and some experts anticipate it will take decades to achieve cost-effectiveness compared to wind, solar and battery storage because they are still theoretical.

By proposing to build an SMR, the utility locks in as much delay as possible in achieving its essential emission reduction requirements in HB 951. Currently, there are no SMRs commercially operating anywhere in United States. Bill Gates, for instance, has been working for several years on one in Wyoming which is commendable but it is not yet operational. There are

enormous unknowns regarding the production and transportation of clean hydrogen, as the utility itself acknowledges.

I urge dropping SMRs and hydrogen from the Plan and letting the federal programs research those two, which would have the effect of making the Carbon Plan as a whole more cost effective. Relying on proven sources of energy would enable renewables to start earlier.

7.6 Energy efficiency

I urge that the Plan reexamine energy efficiency and demand-side management. The initial Carbon Plan assumed that it can achieve a 1% reduction in eligible retail load through energy efficiency and demand-side management measures and that Duke has a goal of 1.5%. The North Carolina Sustainable Energy Association's modeling showed that energy efficiency savings could lead to 2% less energy by 2035 and 5% less by 2050 compared to Duke's 1.5%. Duke should adopt the 2% and 5% goals of the SEA.

Energy efficiency can help reduce costs and thereby improve the level of less expensive energy production. I urge the Carbon Plan ramp up energy efficiency measures. Duke proposes more solar for post-2027 than the initial Carbon Plan but still not as much as SEA proposed in 2022.

8. NCUC Public Hearing April 29, 2024 in Wilmington, North Carolina

At the April 29 public hearing, I urged the Commission to really listen to and carefully consider my comments as an individual and the comments of other individuals at the hearing. The Commission is a public body in America which has the obligation to listen and in this context, listening is a hallmark of democracy.

I worked for over forty years for local and federal government agencies on environmental issues. It was my job to listen to testimony at many scores of public hearings and I read voluminous transcripts of those hearings. Further, it was my job to analyze testimony and to draft policy alternatives. I know from this experience that it's not easy to sustain the power of concentration. However, it was my duty then and now it is yours to do so.

General sources: Sierra Club, North Carolina Sustainable Energy Association, NCWarn, Environmental Defense Fund and Duke Energy

Appendix 1

Energy production and climate change in the news

Electrical energy production and climate change are constantly in the news nowadays as opposed to twenty some years ago. This reflects the fact that the effects of climate change are being felt *now, not some vague date in the future* and the fact that that there is clear and indisputable evidence that burning of fossil fuels is the cause of climate change. It is therefore incumbent on

policy-making bodies, such as NCUC, to maximize the use of renewable energy and stop using fossil fuels. Most of what I read and hear validates the points I make in this testimony. I provide a sampling of such news I have come across just in recent weeks in Appendix 1.

1. UN climate chief: We have 2 years to save the planet

Governments, business leaders and development banks have two years to take action to avert far worse climate change, the U.N.'s climate chief said on Wednesday... Scientists say halving climate-damaging greenhouse gas emissions by 2030 is crucial to stop a rise in temperatures of more than 1.5 Celsius that would unleash more extreme weather and heat. Yet last year, the world's energy-related CO2 emissions increased to a record high. Current commitments to fight climate change would barely cut global emissions at all by 2030. Simon Stiell, executive secretary of the United Nations Framework Convention on Climate Change said the next two years are "essential in saving our planet."

Kate Abnett and Simon Jessop, Reuters, *Wilmington StarNews*, April 12, 2024, page 10A.

2. Climate change: World's oceans suffer from record-breaking year of heat

Fuelled by climate change, the world's oceans have broken temperature records every single day over the past year, a BBC analysis finds. Nearly 50 days have smashed existing highs for this time of year by the largest margin in the satellite era. Planet-warming gases are mostly to blame, but the natural weather event El Niño has also helped warm the seas. The super-heated oceans have hit marine life hard and driven a new wave of coral bleaching.

The analysis is based on data from the EU's Copernicus Climate Service. Copernicus also confirmed that last month was the warmest April on record in terms of global air temperatures, extending that sequence of month-specific records to 11 in a row. For many decades, the world's oceans have been the Earth's 'get-out-of-jail card' when it comes to climate change. Not only do they absorb around a quarter of the carbon dioxide that humans produce, they also soak up around 90% of the excess heat.

This human-driven ocean warming is having considerable impacts on global sea life and may even be shifting the seasonal cycle of sea temperatures, according to a recent study. Perhaps the most significant consequence of the recent warmth has been the mass bleaching of coral globally. These key ocean nurseries turn white and die because the waters they live in grow too hot. They are a critical element in the ocean ecosystem, home to around a quarter of all marine species.

Unusually warm seas may also have taken a direct toll on one of the most beloved ocean-going creatures in the coldest continent, the emperor penguin. "There have been examples of the sea-ice collapsing before emperor chicks have properly fledged, and there have been mass

drowning events," says Prof Meredith. "The emperor penguin is a threatened species because of climate change, and the sea-ice and the ocean temperatures are strongly implicated in that."

"The problem of climate change is that it's happening too quickly for evolution to catch up with it," says marine biologist Dr Nova Mieszkowska from the University of Liverpool. "When we talk about climate change, we tend to reduce that to changes on the surface because we live there," said Angélique Melet, a researcher with Mercator Ocean International. "However, the deep ocean is one of the aspects [of global warming] that is committing us to centuries and millennia of [climate] change." But Dr Melet stresses that is not a reason to give up on cutting emissions. Depending on our actions, we can reduce the speed of that warming, and we can decrease the overall amplitude of that warming and sea-level rise."

Matt McGrath, Mark Poynting and Justin Rowlatt, BBC News Climate & Science. *Climate change: World's oceans suffer from record-breaking year of heat.*

<https://www.bbc.com/news/science-environment-68921215> Accessed May 14, 2024

3. Record breaking heat affects human health

Last summer, Phoenix experience 31 days of 110-degree-plus day time temperatures and 19 nights when it never went below 90. And Phoenix wasn't the only area that got hit. The Centers for Disease Control and Prevention reports that, across the country, there was an alarming increase in folks going to the emergency room for heat-related illnesses.

The three main categories of heat-related distress are heat cramps, heat exhaustion and heat stroke. Heat cramps happen when muscles become dehydrated....Heat exhaustion is signaled by heavy sweating, a rapid heart-beat and dizziness....Heat stroke requires immediate medical attention. It can cause confusion, dry skin, balance problems and even loss of consciousness. If there is no relief from extreme heat, it can lead to brain injury, cardiovascular and breathing problems, *and death*. [emphasis added]

Dr. Mehmet Oz and Dr. Michael Roizen, "Avoid heat-related dangers", *Wilmington Star News*, May 23, 2024, page 11A

4. Extreme heat shuts schools for millions

May 1 (Reuters) - Hena Khan, a grade nine student in Dhaka, has struggled to focus on her studies this week as temperatures surpassed 43 degrees Celsius (109 degrees Fahrenheit) in the Bangladesh capital. "There is no real education in schools in this punishing heat," she said. "Teachers can't teach, students can't concentrate. Rather, our lives are at risk." Khan is one of more than 40 million students who have been shut out of classrooms in recent weeks as heatwaves have forced school closures in parts of Asia and North Africa.

As the climate warms due to the burning of fossil fuels, heatwaves are lasting longer and reaching greater peaks. In turn, government authorities and public health experts across the

world are increasingly grappling with whether to keep students learning in hot classrooms, or encourage them to stay home and keep cool.

U.S. schools are now cancelling class for an average of six to seven school days each year for heat, compared with about three to four days a decade ago, said Paul Chinowsky, a civil engineer who led a 2021 study on schools and rising temperatures for the firm Resilient Analytics. In Bangladesh last year, schools were closed for 6-7 days, said Save the Children's Sengupta. "But this year, they are saying it might be closed for 3 to 4 weeks," he said, as May is often the hottest month in South Asia.

<https://www.reuters.com/business/environment/extreme-heat-is-closing-schools-widening-learning-gaps-worldwide-2024-04-30/> Accessed May 14, 2024

5. Natural gas is not a clean “bridge” fuel

Fossil fuel companies have known natural gas isn't a clean “bridge” fuel for years. They have pushed the idea of natural gas as a “bridge” fuel that can ease the transition from coal to clean energy. But a comment on a draft for a 2017 speech by a BP executive shows the company knew gas wasn't a clean choice. “Once built, gas locks in future emissions above a level consistent with 2 degrees,” the comment read, according to the congressional investigation.

https://oversightdemocrats.house.gov/sites/evo-subsites/democrats-oversight.house.gov/files/evo-media-document/2024-04-30.COA%20Democrats%20-%20Fossil%20Fuel%20Report.pdf?utm_medium=email Accessed May 16, 2024.

6. Methane by the numbers

The cost of wasted gas emitted by the U.S. oil and gas companies per year is \$2 billion, enough to fuel 10 million homes in the U.S. Methane is 84 times more potent than carbon dioxide in the near term. The oil and gas industry can achieve 75 percent reductions globally using technologies available today, two-thirds of it at no net cost. Environmental Defense Fund, *New Hope in the Race to Slow Warming*, 2024.

7. Solar and wind outperform nuclear energy costs

Ursula von der Leyen, the president of the European Commission, stated at a “nuclear summit” in Brussels that “the reality today, in most markets, [is that nuclear power is in] a slow but steady decline in market share”. The numbers underscore that downturn. Solar and wind power together began outperforming nuclear power globally in 2021, and that trend continues as nuclear staggers along.

Solar alone added more than 400 gigawatts of capacity worldwide last year, two-thirds more than the previous year. That's more than the roughly 375 gigawatts of combined capacity of the world's 415 nuclear reactors, which remained relatively unchanged last year. At the same

time, investment in energy storage technology is rapidly accelerating. In 2023, BloombergNEF reported that investors for the first time put more money into stationary energy storage than they did into nuclear.

In “Postcards From a World on Fire,” 193 stories from individual countries show how climate change is reshaping reality everywhere, from dying coral reefs in Fiji to disappearing oases in Morocco and far, far beyond.

Stephanie Cooke, *The Fantasy of Reviving Nuclear Energy*, Opinion, Guest Essay, New York Times, April 18, 2024, <https://www.nytimes.com/2024/04/18/opinion/nuclear-power-fantasy-climate.html?eType=EmailBlastContent&eid=061bd7e4-a090-48b2-b0cb-eeb7277e338c>
Accessed May 13, 2024.