



**BUILDING PEOPLE POWER
FOR ENERGY & CLIMATE JUSTICE**

November 9, 2023

Honorable Roy A. Cooper
Governor of North Carolina

Subject: Appreciation and Duke Energy gambling North Carolina's future on "Hydrogen-Capable" natural gas

Dear Governor Cooper,

We appreciate both of your recent public statements criticizing Duke Energy's purported approach to carbon reduction, particularly the focus on high-risk false solutions. As you pointed out to *The News & Observer*, North Carolina should be expanding renewables; polls show a large majority of bipartisan voters strongly support that view and favor energy competition.

Realizing that Duke Energy is making the climate crisis worse is a first step toward a major course correction for North Carolina. With the climate crisis increasingly causing havoc worldwide and with affordable solutions available, NC WARN urges you to build upon your [October 18](#) and [November 2](#) statements with timely actions to move Duke Energy off its climate- and community-wrecking path.

Without your direct intervention, the NC Utilities Commission (NCUC) will continue its decades-long pattern of siding with Duke Energy while violating fair process and damaging public wellbeing.

Each of the three main prongs of Duke Energy's pro-carbon plan – *under the best conditions and under Duke's own timeframe* – fails to achieve the major carbon reductions that global climate scientists insist must happen by 2030. Each would cause power bills and monopoly profits to rise year after year while Duke executives game state regulators and the public over its false solutions.

The primary focus of this letter is hydrogen. The other certain climate failures presented by Duke Energy include investing billions on experimental nuclear reactors and billions on overpriced and unneeded high voltage transmission corridors, all while Duke stifles the clean energy competition favored heavily in public polls by both [Conservatives for Clean Energy](#) and [NC League for Conservation Voters Foundation](#).

As we have told you many times over the years, NC WARN is eager to convert our criticism to praise for you. We and innumerable allies would like very much to help you stand out from other US governors by taking extraordinary but doable actions in the public interest. Your open criticisms of Duke Energy fittingly point to the heart of North Carolina's challenge: *Duke Energy leaders are willing to gamble North Carolina's wellbeing on development of highly speculative and even failed technologies while stifling cheaper, faster, proven solutions.*

HYDROGEN: A HIGH-RISK PRETEXT TO EXPAND FOSSIL FUELS

We commend you for explaining that continued construction of gas-fired power plants could strand billions of dollars if those plants are forced to close long before they are paid for. You are right on target.

On October 18, you emphasized concern about Duke's proposal to rely heavily on attempting (again) to build experimental nuclear reactors. Its plan to build scores of "hydrogen-capable" fracked gas-burning turbines throughout the 2030s is an equally high-risk, false solution. Duke claims that it *might* be able to start blending hydrogen into natural gas infrastructure – 3% by 2041 – then magically convert all gas fuel to 100% hydrogen by 2050 based on the creation of some new technology.

This is part of a national utility campaign to justify the expansion of gas infrastructure by manipulating the decades-long but unfulfilled promise of "green hydrogen" as a clean source of power generation. Of course, CEO Lynn Good and her leadership team will be retired long before such "someday" utility planning would ever bear fruit or, more likely, fail altogether. And it would be far too late to help avert global climate and social chaos. Their goal is to pour billions of ratepayer dollars into gas turbines, pipelines and electrolyzers, thus keeping investors hooked to the cash cow monopoly until they can retire.

Because of the very high costs and extremely low efficiencies, today the U.S. produces nearly no green hydrogen, which would use renewable power to create hydrogen through the electrolysis of water. Numerous energy experts contend that green hydrogen is unlikely to ever become a carbon-reducing or cost-effective answer to emissions by utilities. Among them is Bill Powers, P.E., of San Diego, a consulting engineer for NC WARN who provided technical support for this letter.

Among the leading problems with green hydrogen:

- **INCREASED AIR POLLUTION.** If Duke Energy ever succeeded in replacing fracked gas-fired generation with hydrogen, it would actually greatly *increase* emissions of smog-forming nitrogen oxides compared to burning gas, thus harming communities located near power plants and other infrastructure.¹ This would violate your recent Environmental Justice order.
- **UP TO 80% WASTE OF CLEAN POWER.** Converting solar or wind power to green hydrogen, then back to electricity in a gas turbine power plant would waste up to 80 percent of the clean energy. Even the highest efficiency system would waste half or more of the solar or wind

¹ Energy Innovation Policy & Technology LLC, *Assessing The Viability Of Hydrogen Proposals: Considerations For State Utility Regulators And Policymakers*, March 2022: <https://energyinnovation.org/publication/assessing-the-viability-of-hydrogen-proposals-considerations-for-state-utility-regulators-and-policymakers/>.

power used to produce the green hydrogen due to process inefficiencies.² Duke Energy stockholders would be the only beneficiaries of such a power-to-hydrogen-to-power maneuver.

“... going from power to green hydrogen, storing it, moving it around and then using it to generate electricity — [the losses] are simply too big,”

— Michael Liebreich³, BloombergNEF

- ENORMOUS LAND USE. If Duke Energy did ever succeed in converting its gas-fired generation to green hydrogen generation, it would require the equivalent of about 270 square miles of solar panels.⁴ By comparison, 15 counties in North Carolina each have less land area.
- VAST USE OF FRESH WATER to produce green hydrogen through electrolysis. General Electric calculated in 2021 that a large electrolyzer plant would consume as much water as a city of 70,000 people.⁵ The 1-gigawatt (GW) electrolyzer plant GE modeled would produce enough hydrogen to support the baseload operation of a relatively small 360 MW combined cycle gas-burning plant.^{6,7} That’s 0.36 GW. In comparison, Duke Energy currently has roughly 12 GW of gas-fired generation capacity and proposes to add over 7 GW more.⁸

² The electrolysis of water, where water is split into H₂ and oxygen, is an energy intensive process. As a result, a large amount of input electric power is needed for each unit of H₂ produced. The efficiency of the electrolysis process, 60 to 80 percent, combined with the efficiency of converting the H₂ fuel to electric power in a gas turbine, 30 to 60 percent (depending on the configuration), leads to a low roundtrip efficiency for use of green H₂ for power generation. What this means in practical terms for a typical combustion turbine (CT) with a thermal efficiency of 30 percent is that, for every five kilowatt-hours (kWh) of production at a wind or solar power plant dedicated to green H₂ production, only about 1 kWh is delivered to the grid by the CT. This is a roundtrip efficiency of about 20 percent. A more efficient combined cycle (CC) unit, with a thermal efficiency of 50 to 60 percent, would produce 1 kWh of electricity for every 2 to 2.5 kWh of wind or solar power dedicated to green H₂ production. This equates to a roundtrip efficiency of 40 to 50 percent. Even in a high efficiency CC application, half or more of the solar or wind electric power that was used to produce the green H₂ is lost to process inefficiencies [reference: Bill Powers, P.E.]

³ Canary Media, *The problem with making green hydrogen to fuel power plants*, October 2023:

<https://www.canarymedia.com/articles/hydrogen/the-problem-with-making-green-hydrogen-to-fuel-power-plants>.

⁴ Duke Energy, August 2023 Carbon Plan (<https://www.duke-energy.com/our-company/about-us/irp-carolinas>) projects a DEC/DEP 2038 grid power demand of ~200,000,000 megawatt-hour (MWh) per year (Chapter 2, Table 2-4), and that 5 percent of this demand, ~10,000,000 MWh, will be met in 2050 by CTs and CCs burning green H₂ (Chapter 3, Table 3-2). Assuming a mean power-H₂-power efficiency of 25 percent, 40,000,000 MWh of solar power would need to be generated to enable 10,000,000 MWh of green H₂ CT and CC output. Assuming solar energy production of 1,500 MWh per MW, and 100 MW of solar production capacity per square mile, approximately 270 square miles of solar production would be needed to produce meet the 2050 green H₂ target.

⁵ GE, Response to the DOE Hydrogen Program RFI DE-FOA-0002529, 2021, p. 3.

⁶ H₂ production rate for 1 GW electrolyzer in GE RFI example = 165,000 tons/yr (150,000 tonnes/yr). Higher Heating Value (HHV) of H₂ = 61,013 Btu/lb. MMBtu per year (HHV) of H₂ production = ~20 million MMBtu/yr. Fuel heat input necessary to operate 360 MW combined cycle plant with HHV heat rate of 7,000 MMBtu/MWh for 8,000 hr/yr = 360 MW x 7,000 MMBtu/MWh x 8,000 hr/yr = ~20 million MMBtu/yr.

⁷ The 1 GW electrolyzer plant would also have a cost of ~\$1 billion in current dollars, at an assumed capital cost of \$1,000/kW (See following Subsection E).

⁸ Duke Energy, August 2023 Carbon Plan, Chapter 3, Figure 3-3.

- **BETTER TECHNOLOGIES ALREADY ON HAND.** Even gas turbine manufacturers such as Siemens envision that if gas units were ever able to burn 100 percent hydrogen, they would be used infrequently, thus very inefficiently.⁹ At present, Duke Energy uses combined-cycle plants for “round the clock” generation. Those manufacturers also recognize that burning hydrogen tomorrow, or natural gas today,¹⁰ to supply peaking power is already being undercut economically by battery storage technology.

Even Duke Energy projects that converting gas-fired power units to hydrogen would take decades to achieve, if ever. This is a total failure in the face of what climate scientists demand. Duke would build gas through the 2030s, and by 2050 hydrogen would be only 5% of its system-wide generation. In the meantime, Duke would keep burning more and more fossil fuels, raising rates and squandering our state’s chances to ever help avert runaway climate and social chaos.

RIGGED PROCESS REQUIRES YOUR INVOLVEMENT

The importance of your personal involvement cannot be overstated. We urge you to demand and ensure a new type of decision-making that’s not dominated by corporate deception and control over state regulators. Your role as Governor is to help the people of the state understand the enormity of this challenge and the importance of making the best decisions at this crucial juncture.

Nationally, a cabal of monopoly power providers continues to aggressively mislead elected officials, regulators and the public through campaigns promoting false solutions and blocking the true transition off fossil fuels. They do this in lieu of honest efforts to decarbonize. Central to their dirty work is the persistent use of anti-democratic influence to distort and thwart fair, well-informed decision-making.

Among the top corporate culprits are the senior leaders of Duke Energy, who seem stuck on short-term profits instead of acting in the public interest as required by Duke’s corporate charter. That charter is the actual permission to operate in this state, and is granted by the people of North Carolina requiring that Duke Energy act in our best interest.

Without the direct involvement of your office and that of the Attorney General – through formal intervention in the Carbon Plan docket – the NCUC will continue its years-long pattern of siding with everything Duke Energy seeks. This includes secretive processes and the blatant disregard of evidence presented by technical experts working for the Attorney General and numerous qualified

⁹ Power Magazine, *High-Volume Hydrogen Gas Turbines Take Shape*, September 2019: <https://www.powermag.com/high-volume-hydrogen-gas-turbines-take-shape/>.

¹⁰ NextEra Energy, Investor Conference 2022, PowerPoint, June 14, 2022, p. 26: https://www.investor.nexteraenergy.com/~/_media/Files/N/NEE-IR/news-and-events/events-and-presentations/2022/06-14-2022/June%202022%20Investor%20Presentation_Website_vF.pdf.

interveners. Over many years, Duke has repeatedly shown that it simply *must* rig the process because rarely can it win an honest debate.

Left unchecked, the NCUC will allow Duke Energy to bleed ratepayers year after year by pouring public money – through rate hikes and billions in federal taxpayer subsidies already well underway – into technologies that have, for decades, remained “just over the horizon” from becoming commercially viable. For years to come, Duke will keep greenwashing us all with crafty terms like “hydrogen-capable gas” and “small modular reactors”, promising that successful development of each is just around the corner; corporate leaders will keep blocking competition posed by genuine climate solutions such as local solar-plus-storage, which is the fastest, cheapest way to decarbonize.¹¹

This is exactly what Duke Energy and compliant utilities commissions did in both Carolinas and Florida with the incredibly hyped but miserably failed Westinghouse “Advanced Passive 1000” nuclear reactor. Duke’s role in that ruse continued for 13 years until it was forced to finally pull the plug in 2017 – after wasting over \$2 billion in ratepayer dollars. Regulators kept going along with the “rope-a-dope” promise that design problems would be resolved – despite mountains of evidence presented by NC WARN and allied opponents of the AP1000 reactor that the entire effort was predicated on cutting corners.

Just yesterday, the lead developer of the “small modular reactor” saw its first project and its corporate future [collapse](#), dealing a blow to ambitions for a wave of new reactors.

“Hoping” the NCUC will “force” Duke Energy to change – as the N&O quoted you as saying – is like hoping a toddler will stop feeding a dog treats. Your NCUC has repeatedly shown its inability to be independent arbiters of the powerful Duke Energy monopoly. We need you to lead a new type of debate.

MOVING FORWARD

Governor Cooper, even Duke Energy leaders acknowledge the numerous uncertainties surrounding the hydrogen gamble. Both editions of their Carbon Plans reflect layers of doubt about making green hydrogen *a viable option to support the clean energy transition; the need for significant R&D; cost of production, cost of storage, production reliability ... generation asset technology limits, limited operational experience ... transportation limitations as a result of pipeline material and volume limits.*

¹¹ NCWARN, DOCKET NO. E-100, SUB 179, DEC/DEP 2022 Biennial Integrated Resource Plan and Carbon Plan, Direct Testimony of William E. Powers for NC WARN and Charlotte Mecklenburg NAACP, September 2, 2022.

Clearly, Duke's green hydrogen pipe dream is not worth gambling North Carolina's future on. The hydrogen failure would mean continued suppression of available, cheaper solutions and would leave Duke burning a large amount of fossil fuels for decades.

As demonstrated clearly for many years, the NCUC has fully proven its inability to work in the public interest. Now, *you* must take charge, and help the public understand the importance of us all pressing Duke Energy to dramatically change course.

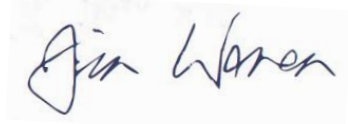
Giant corporations make giant mistakes, as Duke Energy has shown with multiple costly blunders. Since 2010, those include the giant coal ash debacle and the failed construction of: six nuclear reactors noted above; the Atlantic Coast gas Pipeline; a gas-fired power plant at Duke University; and large coal units at Cliffside NC (Unit 7) and at Edwardsport, Indiana.

Yet Duke's leaders still have the gall to gamble North Carolina's future on very high-risk approaches. I hope you will agree that we simply cannot allow Duke Energy leaders to drag this state through another corporate failure at this critical time.

NC WARN urges you to do all possible to become the climate leader the people of North Carolina and the world so badly need. We have previously laid out a number of [specific steps](#) you can take, along with this letter's request that you intervene with the NCUC. These are extraordinary but doable actions to address the unprecedented challenges we all face.

We appreciate your consideration.

Sincerely,

A handwritten signature in blue ink that reads "Jim Warren". The signature is written in a cursive, flowing style.

Jim Warren
Executive Director

cc. Attorney General Josh Stein