

LIGHTING THE WAY

*Electricity,
the Future,
and Freedom of
Energy for
North Carolina*



Carolina
FORWARD

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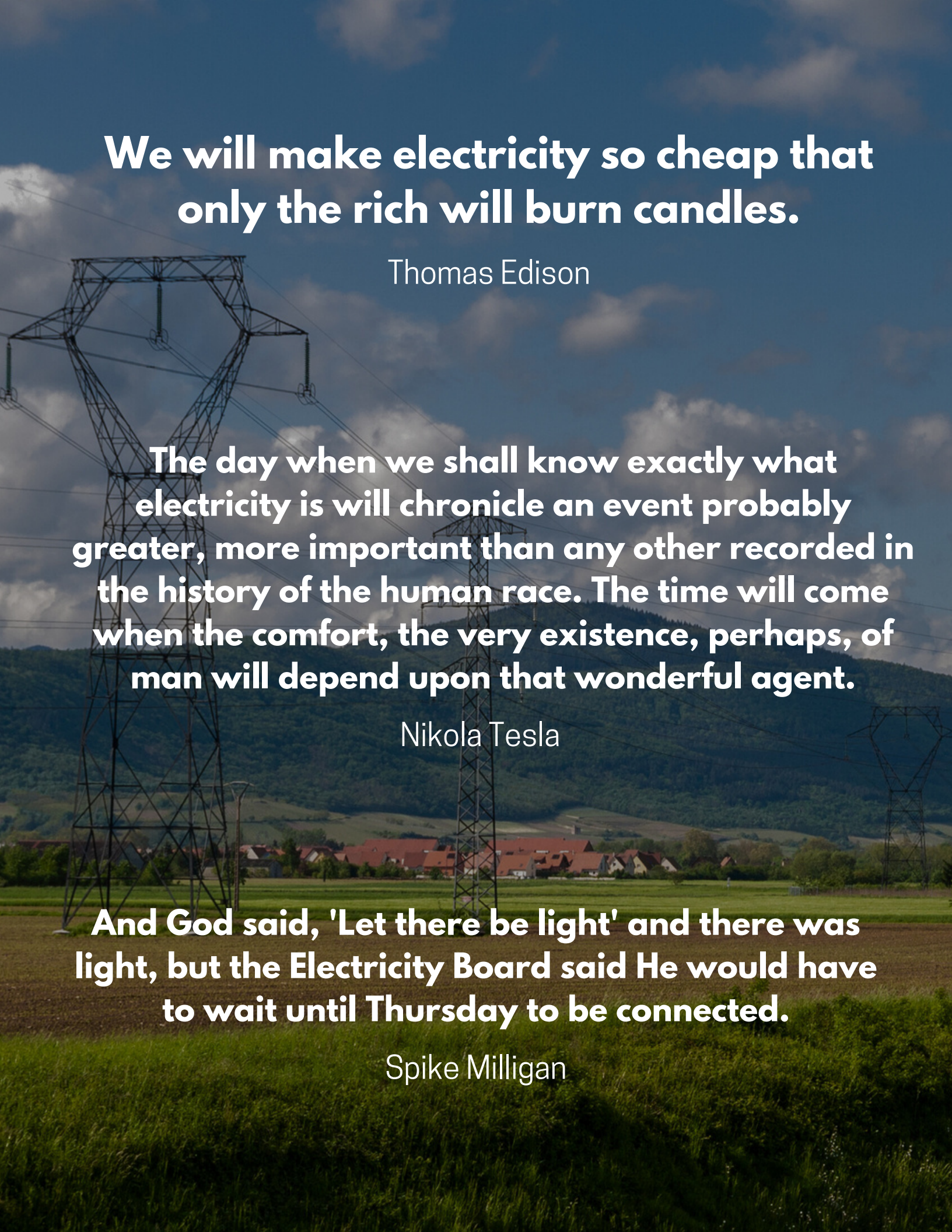
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**We will make electricity so cheap that
only the rich will burn candles.**

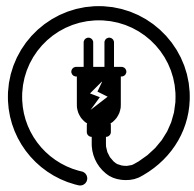
Thomas Edison

**The day when we shall know exactly what
electricity is will chronicle an event probably
greater, more important than any other recorded in
the history of the human race. The time will come
when the comfort, the very existence, perhaps, of
man will depend upon that wonderful agent.**

Nikola Tesla

**And God said, 'Let there be light' and there was
light, but the Electricity Board said He would have
to wait until Thursday to be connected.**

Spike Milligan



Executive Summary

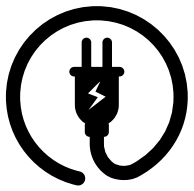
In the last century, electricity has gone from a novelty enjoyed only by the unimaginably rich to a necessity of civilization as we know it. As our relationship with electricity has changed, so it has with how we generate and distribute it. Generating electrical power alone is a material and technological matter; distributing it affordably, fairly and sustainably is the realm of energy policy. In a state of more than 10 million people, where electricity touches every single person's life, and especially their livelihoods, energy policy must put the long-term needs of the people before those of insider special interests.

This paper introduces the concept of **"energy freedom."** This represents both a policy alternative as well as a conceptual leap. North Carolina's legacy monopoly utility model, which we share with much of the southeast, was a product of its time. But times have changed, and so have the needs of the state that model serves. Better technology now offers us better choices not only for generating electricity, but for how to make it more reliable, affordable and sustainable.

None of this is without precedent. Drawing on real-world case studies from across the country, **Energy Freedom for North Carolina** points the way for an energy policy that expands choice for consumers and curbs the role of special interests while also modernizing the grid itself.



Reforming North Carolina's energy posture will require not only bipartisan political courage, technical rigor and a readiness for change. Ultimately, it will depend on leadership for a better and stronger state that works for all its people, not entrenched special interests. That, indeed, is the hardest challenge of any public policy reform. Yet a better way exists. Let us envision what it would look like.



Introduction

Energy freedom is the inherent right of individuals and businesses to exercise autonomy in selecting their energy sources and providers. This fundamental right not only fuels economic growth and safeguards national security, but also upholds environmental preservation. With rich examples of energy freedom emerging nationwide, North Carolina can be a pioneer in the Southeast by deregulating its electricity market and fostering a flourishing renewable energy sector. Moreover, the state hosts a myriad of forward-thinking new energy stakeholders dedicated to developing groundbreaking technologies that enhance energy affordability and accessibility.

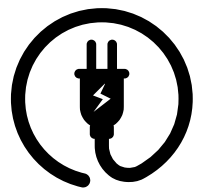
The main obstacle to achieving comprehensive and efficient energy policies, as well as sustainable outcomes, is the problematic association between North Carolina and a "regulated monopoly," specifically Duke Energy and its shareholders. Vertically integrated energy companies in the American South, including Duke Energy, have exhibited monopolistic tendencies that have hindered energy freedom.¹ In contrast, other regions in the United States have promptly taken steps toward establishing a more open and competitive market.



The good news is that the tide is turning in North Carolina. Led by the federal government, lawmakers are actively debating how to regulate and structure an electricity market that puts consumers first and prizes innovation. This includes introducing solar-friendly policies, incentivizing clean energy businesses to locate in the state, and expanding net metering. Additionally, advanced energy technologies are gaining traction as a viable option for delivering reliable power with much lower emissions than fossil fuels.²

This document presents a comprehensive vision for advancing energy freedom in North Carolina. It advocates for policies that foster competition, fuel innovation, and empower consumers in the energy market. Furthermore, it underscores the importance of deregulation and endeavors to ensure affordable and reliable energy access for all residents of North Carolina.





A Brief History of the Grid

The energy grid of the United States is a highly intricate and indispensable system comprising a network of power plants, transmission lines, and distribution networks. Serving as the backbone of our modern society, it plays a crucial role in delivering reliable electricity to homes, businesses, and industries across the nation.

The origins of the U.S. energy grid can be traced back to the late 1800s when commercial electric power plants began to emerge. Initially, these power plants were relatively small and inefficient, catering to a limited number of clients. However, as technological advancements accelerated and the demand for electricity surged, the grid underwent significant expansion.



During the early 1900s, multiple corporations operated their own independent grids, which often led to frequent outages and an inefficient system. Recognizing the need for a more coordinated and reliable approach, the federal government intervened and regulated the grid in the 1930s, streamlining its operations and ensuring a more unified and robust system.

The post-war era witnessed a remarkable transformation of the grid, propelling it into a vast and interconnected network capable of supplying electricity nationwide by the 1970s. However, as the grid expanded, so did the challenges. The notable 1977 blackout in New York City, which left millions without power for hours, served as a wake-up call, leading to significant advancements in technology to enhance grid reliability.

In the face of evolving energy needs, including the rise of renewable energy sources and the growing demand for electric vehicles, the energy grid faces new and complex challenges. These challenges have spurred a renewed focus on grid modernization efforts nationwide. Through the implementation of innovative technologies, the grid is gradually becoming more efficient, reliable, and secure, ensuring a sustainable energy infrastructure for the future.

Duke Energy: North Carolina's energy monopoly

Duke Energy established a monopoly in North Carolina through a series of mergers and acquisitions. In 1900, Durham Light, Heat, and Power came into existence, followed by the formation of Duke Energy Company in 1924 through a merger with Charlotte Power Company. Then, in 1997, Duke Energy Company and PanEnergy Corporation joined forces to create Duke Energy Corporation. In 2012, Duke Energy acquired Progress Energy, further expanding its control over the state's electric transmission and distribution infrastructure.

Currently, Duke Energy is a vertically integrated utility company responsible for all aspects of the electricity supply chain in North Carolina, from generation to transmission to distribution. This means that Duke Energy is the sole provider of electricity to over 7 million customers in the state.

The vertically integrated utility model offers several advantages. Firstly, it ensures reliability and security of supply by enabling better coordination and management of electricity flow. This minimizes outages and guarantees access to power when needed. Secondly, this model can lower costs as Duke Energy achieves economies of scale.



However, there are also drawbacks to the vertically integrated utility model. It grants excessive power to the utility company, as Duke Energy holds a monopoly on the market. This lack of competition diminishes incentives for innovation and price reduction, resulting in higher costs for consumers and limited market choices.³

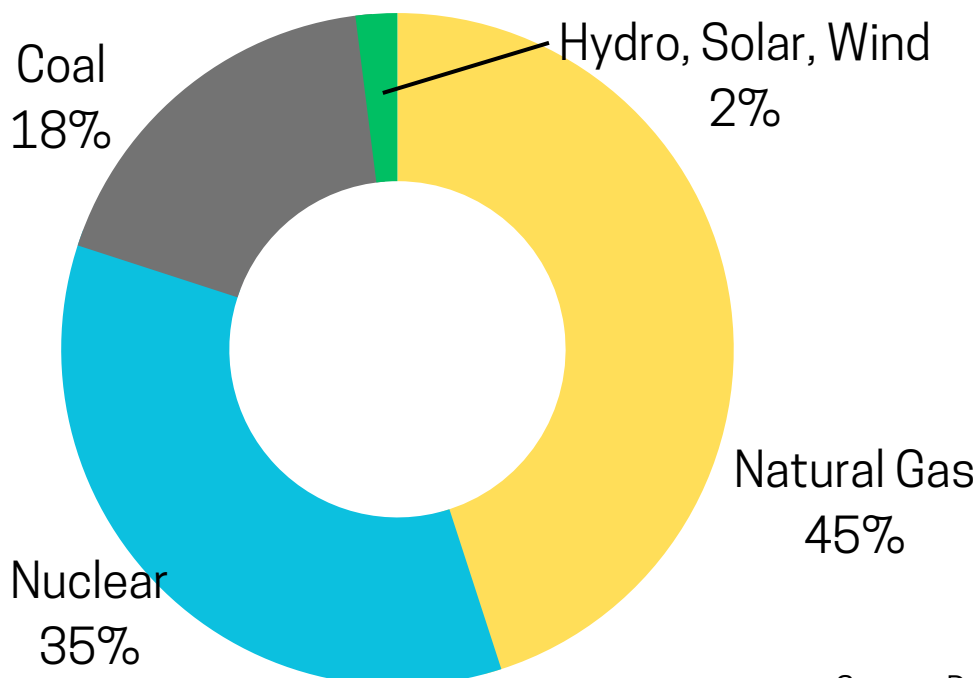
Additionally, the vertically integrated utility model can - and has - significantly influenced the company's investment choices. Duke Energy's significant investment in coal-fired power plants has been a major and obvious disincentive to retire those plants in favor of cleaner sources. Currently, Duke Energy does not plan to retire its coal plants until 2035. This delay is an anchor slowing down North Carolina's progress towards a clean energy economy.

In recent years, there have been bipartisan calls for reforming Duke Energy's monopoly in North Carolina. Some advocates propose opening up the market to competition, which would enhance consumer choice and lower prices. Others argue that Duke Energy is a reliable and efficient utility company, advocating for the current system to remain unchanged.

The debate over Duke Energy's monopoly in North Carolina is likely to persist, as it is a multifaceted issue with no simple solutions. Critics attribute the company's high costs and poor service to its lack of competition, while proponents contend that the monopoly ensures grid stability and efficiency.

Duke Energy facts:

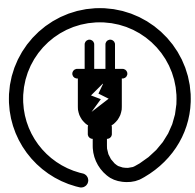
Total Energy Generated (2022):



Net Income
(2022)
\$2.4 billion

Shareholder
Dividends
(2022)
\$3.1 billion

Source: Duke Energy 2022 Annual Report



Our Energy Future

A prisoner of ideology, not opportunity

Energy production is primarily a technological challenge, rather than an ideological pursuit. While technology has advanced significantly since the establishment of North Carolina's energy system, for reasons previously mentioned, the system itself has remained largely stagnant.

Ideology and politics have significantly hindered the progress of energy generation. State policies, often influenced, and even written, by industry lobbyists, tend to favor certain energy sources while neglecting renewable alternatives.⁴ This unfair treatment creates an imbalanced playing field, making it incredibly challenging for renewable energy sources to compete. The powerful influence of political campaign contributions, including "dark money" political spending, further exacerbates the issue. The fossil fuel industry, infamous for its partisan political engagement, actively opposes government policies that promote the adoption of renewable energy, which could jeopardize their financial interests. Consequently, legislation supporting the advancement of renewable energy struggles to gain momentum.



Duke Energy's Roxboro coal power plant

As a result of these challenges, energy generation has failed to fully capitalize on technological advancements. Solar and wind power, for example, have become more cost-effective and efficient in recent years. However, due to the aforementioned factors, these technologies have encountered significant hurdles in establishing a strong footing in the global energy market.

By addressing these challenges and embracing technology, we can unlock the full potential of energy generation and pave the way towards a more sustainable future.

How North Carolina achieves energy freedom

There are three components of energy policy that North Carolina elected and appointed officials and community leaders should champion: **1 reliability, 2 affordability, and 3 sustainability.**

1. **Reliability** is the ability of the energy system to meet demand without interruption. A reliable energy system is essential for economic growth and quality of life.
2. **Affordability** is the cost of energy to consumers. Energy costs have a significant impact on household budgets and businesses.
3. **Sustainability** is the ability of the energy system to meet current needs without compromising the ability of future generations to meet their own needs. A sustainable energy system is essential for protecting the environment and ensuring long-term economic prosperity.

By embracing these three components, North Carolina can move towards a smarter energy system that is reliable, affordable, and sustainable. This means leveraging cutting-edge technology to maximize energy efficiency, reduce emissions, and create jobs in the clean energy sector. It also means investing in renewable resources such as solar and wind power to diversify the state's energy supply and increase its energy independence.



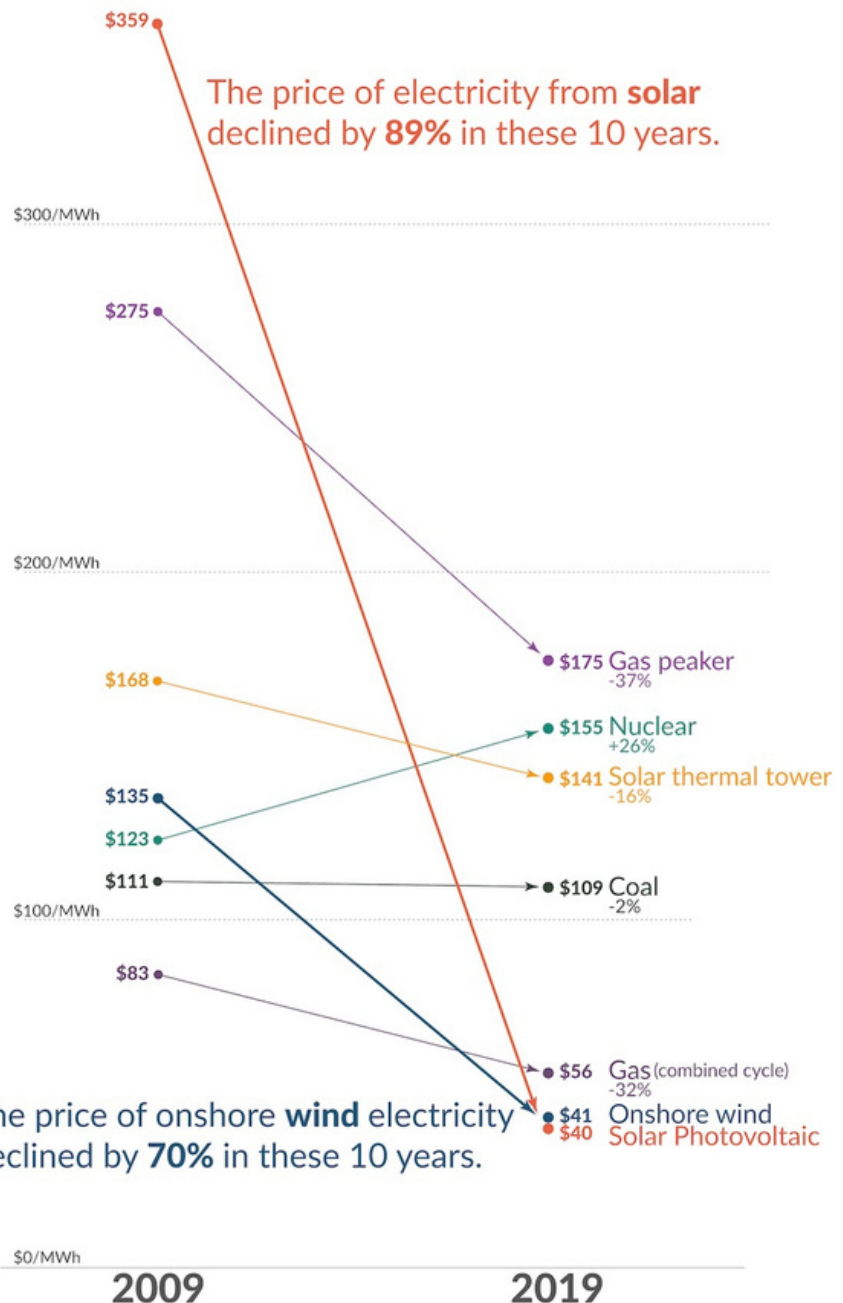
Fossil fuels, including coal, oil, and natural gas, compare unfavorably to renewable energy sources when considering factors such as reliability, affordability, and sustainability. Fossil fuels are finite resources, vulnerable to price volatility and geopolitical tensions, which in turn lead to unpredictable energy costs. Moreover, their extraction, transportation, and combustion contribute to air pollution and greenhouse gas emissions, exacerbating climate change and posing health risks.⁵

By contrast, renewable sources like solar, wind, and hydropower offer a consistent and abundant energy supply, with minimal environmental impact. Thanks to technological advancements, the costs associated with renewable energy are decreasing over time. This trend is supported by numerous studies and reports from reputable organizations such as the International Renewable Energy Agency (IRENA) and the International Energy Agency (IEA). This makes them a more dependable, cost-effective, and sustainable choice for meeting our energy needs and addressing the challenges of climate change.

The price of electricity from new power plants

Electricity prices are expressed in 'levelized costs of energy' (LCOE). LCOE captures the cost of building the power plant itself as well as the ongoing costs for fuel and operating the power plant over its lifetime.

Our World
in Data



Data: Lazard Levelized Cost of Energy Analysis, Version 13.0

OurWorldinData.org – Research and data to make progress against the world's largest problems. Licensed under CC-BY by the author Max Roser.

Energy Freedom: Reliability

Duke Energy's over-reliance on gas-generated electricity (almost half their generating capacity) played a significant role in the blackout experience during the winter storm in North Carolina in 2022.⁶ In this case, the winter storm led to freezing temperatures, which affected the gas supply and transportation infrastructure, causing supply shortages and making it challenging for gas plants to operate at full capacity. As a result, the gas-generated power plants couldn't meet the increased demand for electricity due to heating needs, equipment failures, and fuel delivery difficulties, contributing to widespread blackouts.

Duke Energy cuts power as extreme cold taxes grid on holiday weekend

The Washington Post
Democracy Dies in Darkness



'Rolling blackouts' end across the Carolinas, power restoration continues: Duke Energy



Gas-generated power plants, while considered relatively cleaner than coal-fired plants, are still significant polluters, and are similarly vulnerable to disruptions caused by extreme weather conditions like heavy snow and ice. This situation exposed the risks of relying heavily on fossil fuel energy sources and underscored the importance of diversifying the energy mix with more resilient and weather-independent sources like renewables and energy storage systems to ensure grid stability in adverse weather conditions.

Both Duke Energy and, consequently, the residents of North Carolina, could have greatly benefited from a distributed grid, primarily powered by solar energy, to avoid the blackout experienced during the winter storm in 2022. A distributed grid integrates localized power generation, such as rooftop solar panels and local arrays, that are more resilient to extreme weather events. Solar power, even in colder climates and seasons, continues to generate electricity during daylight hours, ensuring a steady power supply. By incorporating a distributed solar network, the dependence on centralized gas-generated power plants would have been reduced, minimizing the vulnerability of the energy system to gas supply disruptions and equipment failures caused by freezing temperatures.

Additionally, energy storage systems like batteries could have been integrated into the distributed solar setup to store excess energy generated during sunlight hours and release it when needed, especially during periods of increased demand for heating. This would have provided a reliable backup power source during the winter storm, ensuring that critical facilities and essential services remained operational and minimizing the impact of blackouts on residents.

North Carolina has the opportunity to learn valuable lessons from this experience, and enhance the reliability of the grid by harnessing renewable energy through a series of measures:

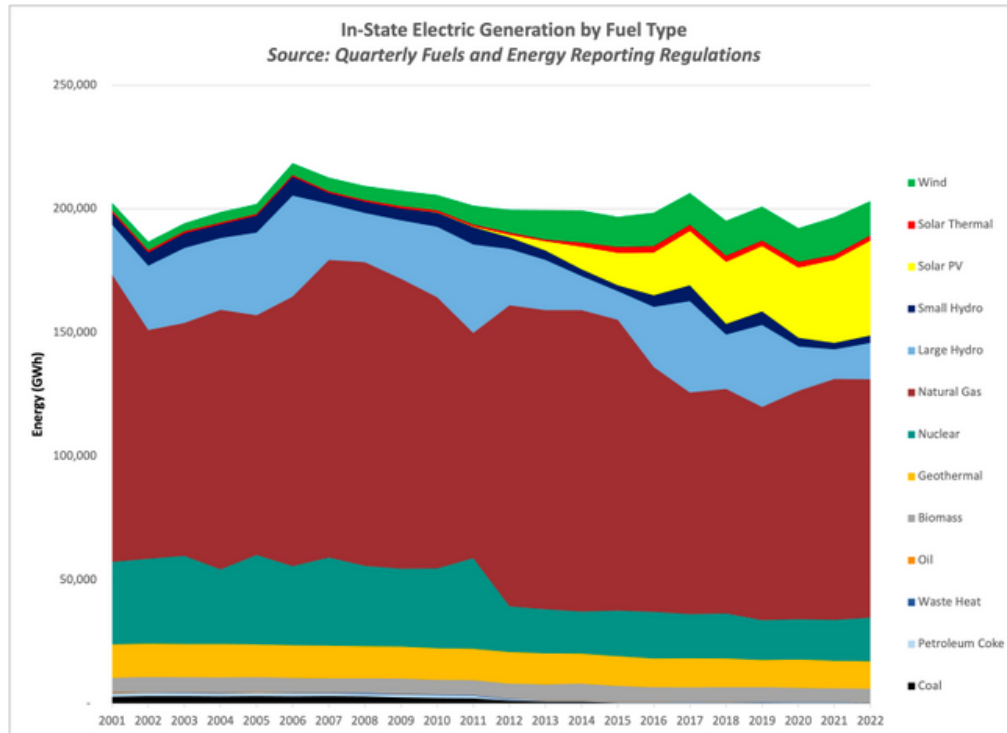
- **Diversified Renewable Portfolio:** Expanding the utilization of various renewable energy sources, such as solar, wind, and hydropower, across the state will reduce the grid's vulnerability to disruptions caused by specific weather conditions.
- **Distributed Energy Resources:** Encouraging the adoption of decentralized energy resources like rooftop solar panels, small wind turbines, and residential energy storage systems can provide localized power during outages, alleviating strain on the central grid and enhancing overall resilience.
- **Microgrids:** Developing microgrids in critical areas such as hospitals, emergency centers, and essential services will enable these self-contained energy systems to operate independently during disruptions, relying on renewable sources and energy storage.
- **Energy Storage:** Investing in grid-scale and distributed energy storage solutions, such as batteries, allows excess energy to be stored during optimal conditions and released during high-demand periods or outages, serving as a reliable backup source.
- **Demand Response Programs:** Implementing demand response programs that incentivize consumers to reduce energy usage during peak demand periods helps alleviate strain on the grid during extreme weather events, ensuring stability.
- **Smart Grid Technology:** Upgrading the grid with smart technologies enables real-time monitoring, efficient load management, and rapid response to disruptions, optimizing renewable energy inputs and facilitating energy distribution.
- **Weather Forecast Integration:** Integrating accurate weather forecasting into grid management enables utilities to anticipate and effectively respond to potential weather-related disruptions, taking proactive measures when necessary.
- **Regulatory Support:** Establishing favorable regulatory frameworks that incentivize the adoption of renewable energy and resilience-enhancing technologies, such as financial incentives, streamlined permitting processes, and renewable energy integration targets.
- **Collaboration and Planning:** Fostering collaboration among utilities, government agencies, and communities is crucial in developing comprehensive resilience plans that address the unique challenges posed by extreme weather. These plans should prioritize renewable energy strategies as a core component.

Case study: California

California has become a leader in renewable energy growth in the United States. Over the past few decades, the state has seen a remarkable increase in renewable energy production.

In 2000, renewables made up only 13% of California's electricity generation. However, by 2021, that number had risen to 37% and is projected to reach 50% by 2026. This shift is largely due to California's ambitious renewable portfolio standard, which aims for 60% renewable electricity generation by 2030.⁷

As a result, California now has one of the most reliable energy grids in the country, with a 99.99% reliability rate. The California Independent System Operator (ISO) manages the state's electric grid and reported a **20% reduction in outages since 2013**, along with a 30% decrease in the average outage duration. These improvements are attributed to factors such as smart grids and flexible renewable energy sources like wind and solar power. Demand response programs and other market mechanisms have also played a role in reducing peak demand and improving grid reliability.



The ISO's findings confirm that renewable energy enhances power grid reliability by acting as a buffer against demand fluctuations and reducing outages. The report highlights a 25% decrease in forced outages and a 10% reduction in planned outages due to renewable integration. As renewable energy continues to grow, grid reliability is expected to further improve, ensuring accessible and reliable electricity for all.

*Credit: California Energy Commission,
Electric Generation Capacity and Energy, 2022*

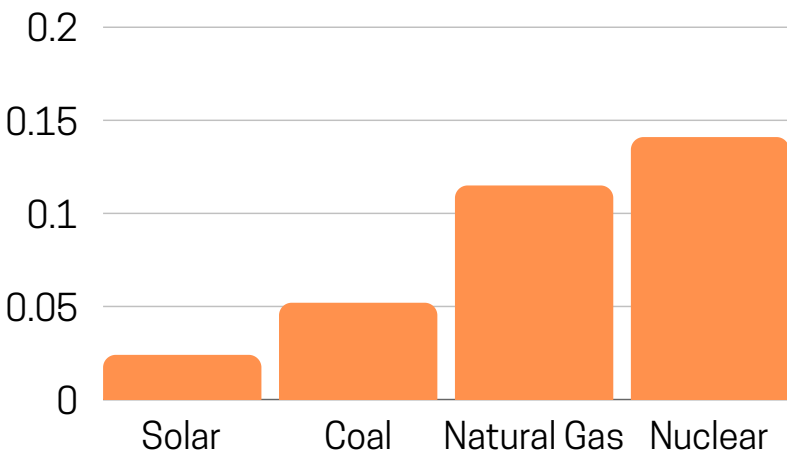
Energy Freedom: Affordability

Here in North Carolina, rates for electricity are rising due to the escalating fuel costs and infrastructure development driven by Duke Energy’s pursuit of maximizing shareholder return on equity. Residents of North Carolina also shoulder the responsibility of paying more to facilitate Duke Energy's continuous increase in shareholder dividends. This represents a fundamental conflict of interest for the company. The reliance on fossil fuel-based electricity generation keeps residents perpetually subject to the unpredictable fluctuations of the global commodity market, consistently bound by its capricious nature.⁸ By 2026, the average annual North Carolina residential electric bill could be between \$200 - \$300 more.

In the wake of the historic investments from the Inflation Reduction Act, solar and wind energy are now generally cheaper per kilowatt hour than coal and gas, especially for new projects (see page 12).⁹ According to a 2023 report by the think tank Energy Innovation, the cost of building new wind and solar projects is now lower than the cost of operating existing coal plants in most parts of the United States. The report also found that the cost of wind and solar is expected to continue to decline in the coming years, making them even more cost-competitive with fossil fuels.



Levelized cost of energy, cents per kWh



Source: Lazard, 2023 Levelized Cost of Energy Report¹¹

Here are some specific examples of the cost of solar and wind energy compared to coal and gas:

- In 2022, the cost of building a new solar project in the United States was \$0.05 per kilowatt hour (kWh). The cost of building a new coal plant was \$0.07 per kWh, and the cost of building a new gas plant was \$0.06 per kWh.
- In 2023, the cost of operating an existing coal plant in the United States is about \$0.06 per kWh. The cost of operating an existing gas plant is about \$0.05 per kWh.¹⁰

These prices are just averages, and the actual cost of solar and wind energy can vary depending on a number of factors, such as the location of the project, the size of the project, and the availability of government incentives. However, the trend is clear: solar and wind energy are increasingly lower-cost than fossil fuels for end consumers, and they are expected to continue to become even more affordable in the years to come.



In addition to being cheaper, solar and wind energy also have a number of other advantages over fossil fuels, including:

- They produce zero emissions, which helps reduce air pollution and greenhouse gas emissions.
- They are domestically produced by definition, which reduces consumer reliance on foreign fuel sources, risky, long-distance supply chains, and volatile global commodity markets.
- Utility-scale storage technologies allow them to provide electricity even when the sun is not shining or the wind is not blowing.

As the cost of solar and wind energy continues to decline, it is clear that they are becoming a formidable option for generating baseload electricity. This is a triple-win for consumers, the environment and for our economy, as it means that we can transition to a clean energy future without sacrificing either affordability or reliability.

Although shareholder-owned utilities may be inclined to depend on coal and gas plants to secure substantial dividends for shareholders, this strategy is not economically viable in the long run, nor good for consumers.

Firstly, as the costs of renewable energy sources continue to decrease, the case for fossil fuels over alternatives such as solar and wind power becomes progressively outdated. Therefore, maintaining the operation of more expensive fossil fuel plants is not a financially judicious choice.¹²

Secondly, the environmental impact of fossil fuel power plants cannot be overlooked. The negative externality costs associated with air pollution, climate change, and health impacts linked to coal and gas power plants are immense and can potentially lead to regulatory penalties or litigation expenses. These can additionally burden the balance sheet of the utility company, undermining the dividends for shareholders.



Coal ash spill in Rowan county. Credit: Les Stone/Greenpeace

For example, coal ash is a hazardous byproduct of burning coal for electricity. It contains harmful pollutants like arsenic, lead, mercury, and chromium. For years, Duke Energy disposed of coal ash in ponds and landfills near waterways, causing pollution. In 2014, a major coal ash spill (like the one shown above, from Rowan county) contaminated the Dan River, leading to water intake closures. This incident prompted action, and in 2017, a law was passed requiring closure of all unlined coal ash ponds by 2029 and cleanup of groundwater contamination. **The cleanup is a crucial and costly undertaking to protect the environment and public health - and it directly costs North Carolina ratepayers billions of dollars.**^{13 14}

Case study: Vermont

Where focusing on sustainable affordability works

The state of Vermont has been a trailblazer in the integration of renewable energy, serving as a model for others to emulate. In 2017, Vermont achieved a significant milestone by generating 55% of its electricity from renewable sources. This noteworthy accomplishment positions Vermont at the forefront of renewable energy adoption, surpassing all other states in the United States.¹⁵



The transition to renewable energy in Vermont has brought numerous advantages to its residents, including affordability. Despite the escalating electricity costs observed in other regions of the country, Vermont has managed to maintain relatively stable electricity prices. This can be attributed, in part, to the state's reliance on renewable energy sources, which inherently offer greater cost-effectiveness compared to fossil fuels.

For example, in 2019, the average residential electricity rate in Vermont was **an impressive 16.2 cents per kilowatt-hour (kWh), lower than the national average of 18.1 cents per kWh.**¹⁶ The affordability of renewable energy in Vermont can be attributed to several factors. Firstly, the declining cost of renewable energy technologies, particularly solar and wind power, has significantly contributed to their accessibility and economy compared to traditional fossil fuel-based energy sources. Additionally, as the scale of renewable energy generation has increased, economies of scale have further contributed to the declining costs of these technologies.

Moreover, the availability of government incentives at both the federal and state levels has played a pivotal role in making renewable energy projects more financially feasible for consumers. These financial incentives help reduce the overall cost of renewable energy projects, making them an appealing and viable option for consumers.



The case of Vermont serves as a testament to how the integration of renewable energy can lead to reduced electricity costs for consumers.¹⁷ As the cost of renewable energy technologies continues to decline, we can anticipate even greater benefits in terms of affordability in the future.

Energy Freedom: Sustainability

Relying on fossil fuels is fundamentally unsustainable for many reasons. Perhaps most obviously, fossil fuels themselves are finite resources, and our current consumption rate cannot continue at its current pace.¹⁸ Fossil fuels, being non-renewable, exhibit an intriguing characteristic: no matter the advancement in extraction techniques, the consumer rarely witnesses a significant decline in their cost, particularly the cost of petrochemicals.¹⁹ This has most clearly been true in the case of oil and gas.

Furthermore, the combustion of fossil fuels releases greenhouse gases into the atmosphere, which contribute to climate change.²⁰ This phenomenon has already triggered numerous adverse impacts on our planet, including rising sea levels, more frequent extreme weather events, and disruptions to plant and animal life.²¹

In addition to their environmental consequences, fossil fuels also pose significant health hazards. When burned, they emit pollutants like smog, soot, and mercury, which can lead to respiratory problems, heart disease, and even cancer. Not only do fossil fuels pollute the air, but they also contaminate water resources during extraction and combustion processes.²²

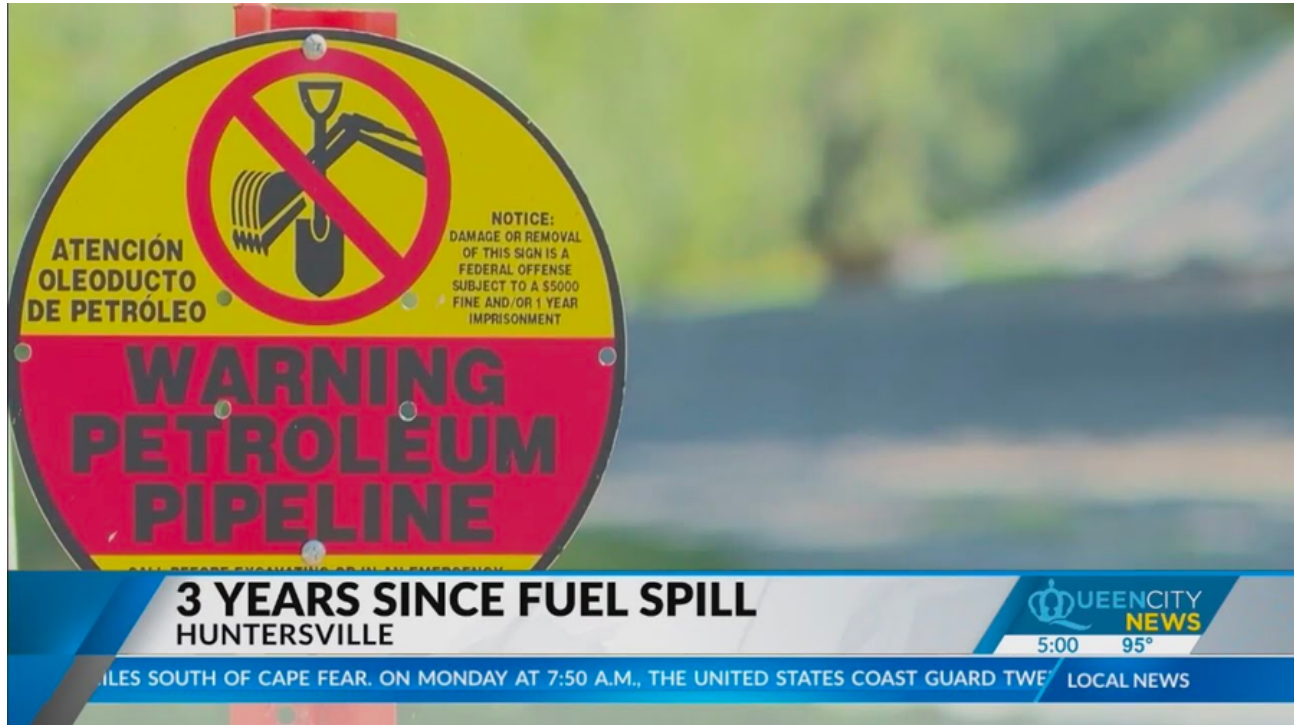


Beach homes collapsing into the ocean due to climate change have become common along the NC coast.

Moreover, the cost of fossil fuels is continuously on the rise. Factors such as growing demand, depletion of reserves, and the need for environmental protections (and cleanup when they fail) all contribute to this upward trend. Consequently, this dependency becomes a financial burden on societies worldwide.

Setting aside climate concerns, relying on an energy source that necessitates the transportation of fuel over long distances not only poses sustainability challenges but also contributes to environmental degradation. This unsustainable approach not only increases carbon emissions but also heightens the risks associated with fuel transportation, such as accidents and spills. It is imperative that we explore alternative energy solutions that are locally available and renewable to ensure a more sustainable and cleaner future for generations to come. As one of the largest oil importers (and, paradoxically, exporters) globally, the United States becomes vulnerable to supply disruptions. For instance, the Gulf of Mexico oil production was severely affected by a natural disaster in 2010, leading to escalated gas prices and economic uncertainty.

Taking all these factors into account, it becomes evident that our dependence on fossil fuels is not sustainable. What we urgently need is a transition towards a clean energy future, harnessing renewable sources such as solar and wind power. By doing so, we can secure an affordable, stable, and sustainable energy future for our planet.



The 2020 gasoline pipeline breach in Huntersville, NC was potentially the largest inland fuel spill in the nation, dumping 2 million gallons of gasoline into the local water supply.

North Carolina has abundant renewable energy resources, including solar, wind, and hydropower. Here are some compelling reasons why:

- North Carolina boasts significant solar potential. With an average of 213 days of sunshine per year, surpassing the national average, solar panels can generate substantial electricity in the state.²³
- The wind potential in North Carolina is noteworthy. The state is already home to several wind farms, and there is promising potential for further development. Wind turbines can efficiently generate electricity even when the wind is not blowing at its strongest.²⁴ The state's offshore wind potential is among the strongest in the nation.
- North Carolina possesses numerous rivers and lakes that can be utilized for hydroelectric power. This clean and reliable energy source has the capacity to generate substantial electricity.

By prioritizing the development of these renewable energy resources, North Carolina has the potential to meet its energy needs locally. This approach would decrease reliance on fossil fuels, yielding numerous environmental and economic benefits. Additionally, it would enhance the state's resilience to supply disruptions caused by natural disasters or political instability.

Case study: Colorado

Where focusing on sustainability works

Boulder, Colorado serves as an exemplary model showcasing how renewable energy can bolster sustainability.

In 2019, Boulder set an ambitious target to achieve 100% renewable energy by 2030. Since then, significant progress has been made, putting the city on track to meet its goal.²⁵



Boulder's progress has been multifaceted, with investments in renewable energy projects, including the development of solar and wind farms. Additionally, the city has implemented policies promoting the use of renewable energy, such as mandating the inclusion of solar panels in all new homes.

The integration of renewable energy has yielded numerous benefits for Boulder, notably reducing dependence on fossil fuels. This reduction enhances the city's resilience to price fluctuations and supply disruptions. Furthermore, renewable energy sources like solar and wind power have significantly improved air quality by eliminating harmful emissions.

From an economic standpoint, Boulder has experienced remarkable growth and job creation as a result of its investment in the renewable energy industry.²⁶ This sector has not only stimulated local economic development but has also made a valuable contribution to the broader national economy.



Boulder, Colorado wind farm

What about nuclear power?



Nuclear power is a safe, carbon-free power source. It is a proven, decades-old energy technology. Roughly a third of all electricity in North Carolina is generated by nuclear power today, from five different reactors operated in the state.

As policymakers search for sustainable, carbon-free energy, nuclear power is a clear candidate. Yet it is not without major drawbacks. Conventional nuclear reactors are incredibly capital intensive, and require enormous up-front costs and vigilant maintenance. The first two nuclear reactors built in the U.S. in several decades went online in Georgia just in 2023 - seven years late, and \$17 billion over budget.

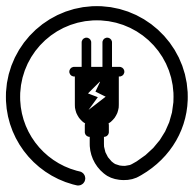


There are certainly improvements that could be made about how nuclear energy is regulated. But regulation is not primarily what makes nuclear reactors complex and hard to build, nor is deregulating them safe or advisable. Next-generation small modular reactors (SMRs) hold great promise for making safe and clean nuclear power more affordable to build. But that technology is still developmental, and far from mature.

While nuclear power has many compelling advantages, it also has several less appealing ones. There is the radioactive waste that it creates, which is currently not recycled in most parts of the United States. And while nuclear power is generally extremely safe, when things do go wrong, the results can be catastrophic, as in the case of the Fukushima plant in Japan, or the partial meltdown on Three Mile Island.

Nuclear power also has key structural elements that are undesirable. It is fundamentally the opposite of a distributed, resilient grid. Instead, it is the very definition of centralized, with a single point of failure. As such, it locks-in the power - economic, corporate and political - of the producer. As we've seen with other centralized generation technologies like coal and gas, this can lead to a misalignment of interests between producer and consumers. Another aspect is that advanced nuclear power is an attempt to address an issue otherwise solvable by far lower-cost, off-the-shelf technology. Dozens of utility-scale solar grids and battery storage, scattered across the state, would cost only a tiny fraction of one single nuclear reactor, and involve far less costly maintenance.

Once again, energy generation is fundamentally a technology choice. Each option has its own tradeoffs, with advantages and disadvantages. Existing nuclear power plants should be maintained as long as possible, because with their very long operational lives (North Carolina's own plants are all almost 60 years old), their per-unit cost of energy is quite low. Building new ones could be a compelling option, but only if their cost-to-benefit ratio is properly weighed against renewable alternatives.

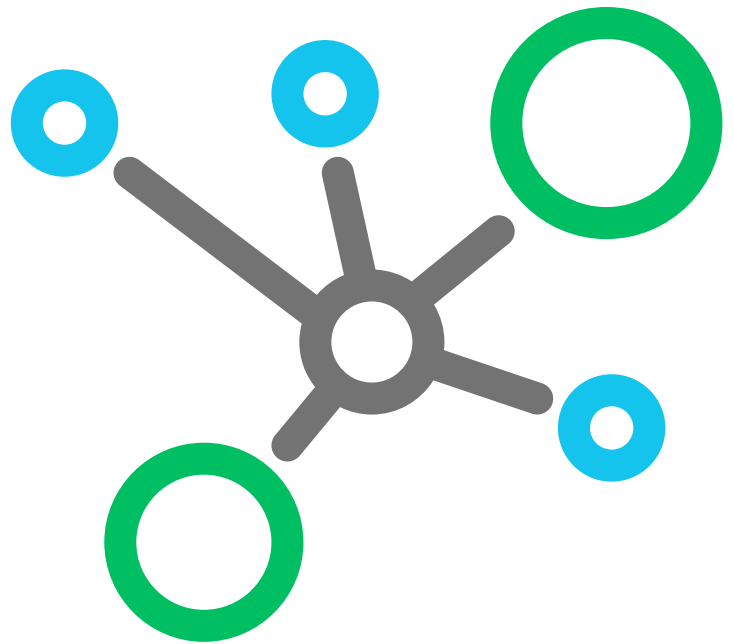


What Energy Freedom Looks Like

#1: Join (or create) a Regional Transmission Organization (RTO)

Energy choice fosters competition and empowers consumers to select their preferred provider or source. While you typically have the freedom to choose your cable, cell service, and internet providers when relocating within North Carolina, the same flexibility is not afforded when it comes to selecting your electricity provider. This absence of competition creates an imbalance of power between the provider and the "consumer," which is far from ideal. In certain instances, a family may relocate just a few blocks within their town and encounter completely contrasting outcomes in terms of reliability, cost, and even the ability to install their own solar panel system without any options to change providers or clear avenues for due process.²⁷

As such, North Carolina policymakers should consider joining a regional transmission organization (RTO) with neighboring states - or even starting our own.²⁸ The implementation of an RTO or similar type of independent market design would benefit North Carolina customers by increasing the number of energy choices available. Customers could choose from a variety of electricity suppliers, giving them more control over their energy costs and usage options. Ratepayers would also benefit by having access to competitively priced services that improve reliability and bring greater transparency.²⁹



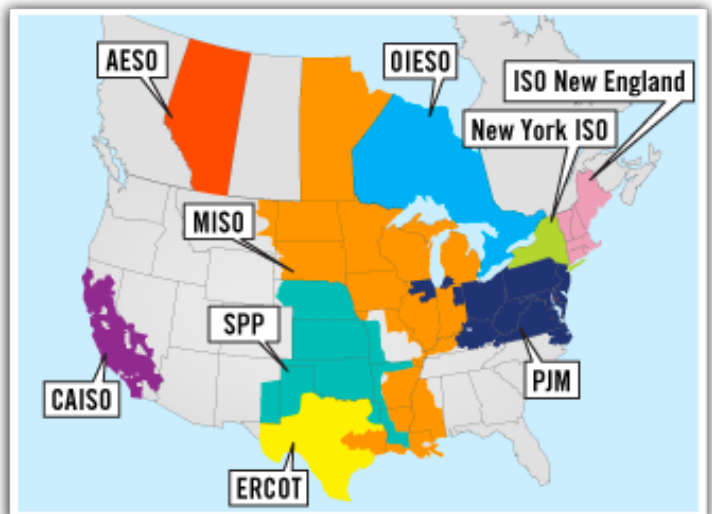
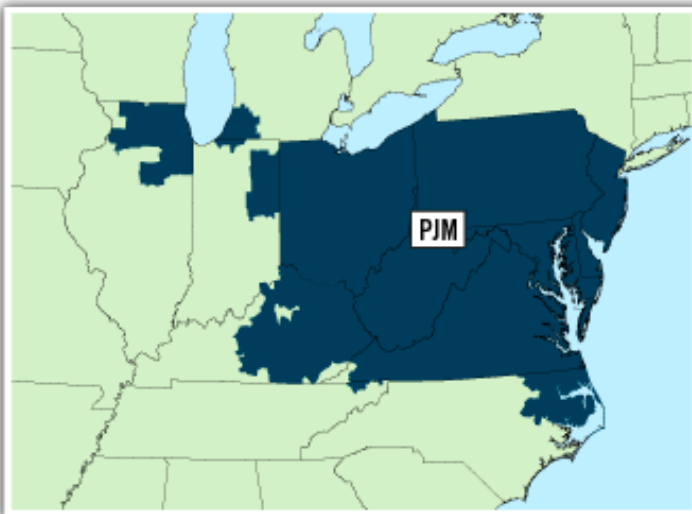
Recognizing these inherent benefits, the Commonwealth of Virginia became part of a Regional Transmission Organization (RTO) through integrating with PJM Interconnection. PJM Interconnection is a regional transmission organization that coordinates the movement of wholesale electricity in 13 states and the District of Columbia. Virginia has witnessed numerous quantitative benefits since becoming a member of PJM Interconnection, a regional transmission organization (RTO).³⁰

These advantages include:

- **Lower electricity prices:** PJM's competitive wholesale electricity market has led to reduced electricity costs for residents of Virginia. According to a study conducted by the Virginia State Corporation Commission, Dominion customers in Virginia could potentially save nearly \$500 million by joining PJM.
- **Improved reliability:** PJM's expansive and interconnected grid ensures reliable electricity service for Virginians. With a robust track record of reliability, PJM has implemented various programs to prevent and mitigate power outages.³¹
- **Increased access to renewable energy:** PJM's open access transmission rules facilitate Virginians' access to renewable energy from neighboring states. This is of utmost importance as Virginia progresses towards a cleaner and more sustainable energy future.³²
- **Enhanced economic development:** PJM's competitive wholesale electricity market attracts new businesses to Virginia. Companies that have substantial electricity consumption can benefit from lower electricity prices and utilize PJM's open access transmission rules to procure electricity from cost-effective generators.

In addition to these quantifiable benefits, Virginia has also experienced qualitative advantages from its association with PJM. For instance, PJM's regional approach to grid planning and operations ensures a sustainable and efficient energy supply for the state. Moreover, PJM is committed to environmental stewardship, actively working to reduce carbon emissions and promote the utilization of renewable energy.

Overall, Virginia has greatly benefited from its affiliation with PJM Interconnection. This RTO has contributed to lower electricity prices, improved reliability, increased access to renewable energy, and enhanced economic development. As Virginia continues its transition to a clean energy future, PJM remains an indispensable partner in ensuring a reliable, affordable, and sustainable electricity supply for the state.



Left: Where the PJM RTO operates; Right: Map of RTOs/ISOs across the United States

#2: Align energy infrastructure with ratepayers' interests (instead of Duke Energy's)

There are several effective strategies available to align energy infrastructure in North Carolina with the interests of ratepayers, rather than solely focusing on the priorities of Duke Energy. By exploring alternative models, such as community-owned renewable energy projects, incentivizing energy efficiency initiatives, and promoting consumer choice through competitive energy markets, we can create a more equitable and sustainable energy landscape that benefits all stakeholders.

- **Pass legislation that allows municipal power utilities to generate their own power.** By expanding the array of options available, this would provide consumers with a wider range of choices, enabling them to select the most suitable electricity plan that aligns with their specific needs and preferences. In addition to the increased flexibility, this could potentially result in significant cost savings on their monthly electricity bills, allowing consumers to allocate their resources towards other important aspects of their lives.
- **Support community-owned renewable energy projects.** These innovative projects have the potential to harness renewable energy sources, such as solar or wind power, to deliver clean and affordable energy solutions to both local residents and businesses. By tapping into sustainable resources, we can reduce our carbon footprint and contribute to a greener future for our communities.
- **Demand that Duke Energy reduce its reliance on fossil fuels.** Duke Energy has been identified as the single largest polluter in the region. To address the pressing issue of environmental sustainability, it is imperative for Duke Energy to embark on a strategic transition towards cleaner and more sustainable sources of energy. By embracing renewable energy technologies and adopting modern practices, Duke Energy can play a pivotal role in mitigating the adverse effects of pollution and fostering a greener future for North Carolina.
- **Invest in energy efficiency.** Improving energy efficiency not only reduces our demand for electricity, but it also has several other benefits. By using energy more efficiently, we can save money on utility bills and reduce our carbon footprint. Additionally, energy-efficient practices contribute to a healthier environment by minimizing pollution and conserving natural resources. Embracing energy efficiency is a win-win situation that brings both economic and environmental advantages.
- **Legislators should focus on policies that align with ratepayers' interests.** In order to safeguard our interests, it is imperative that we prioritize the election of officials who are committed to protecting the welfare of the public. It is crucial that they prioritize our needs over the interests of powerful entities such as Duke Energy, ensuring a fair and equitable representation for all.



Fayetteville operates its own, specially-negotiated municipal solar farm that can power over 100 homes.

It is important to remember that Duke Energy is a private company, and as such, its primary directive is to maximize its profit for the benefit of its shareholders. This is plainly not aligned with the interests of ratepayers, who want to pay the lowest possible prices for electricity and have access to clean, reliable energy. We need to take action to ensure that our energy infrastructure is aligned with our interests, not Duke Energy's.

#3: Toughen oversight in the public's name

The North Carolina Utility Commission (NCUC) plays a crucial role in regulating the state's investor-owned electric utilities, including, but not limited to, Duke Energy. With its mandate to ensure fair and reasonable rates, the NCUC serves as an important advocate for electricity ratepayers. However, in recent years, concerns have emerged regarding the effectiveness of the NCUC in fulfilling this role and addressing the evolving needs of consumers.

To establish itself as a more reliable advocate, the NCUC should consider the following measures:

- **Pass legislation that enhances transparency and accountability:**

The NCUC should actively engage ratepayers by conducting public hearings and seeking their input before making decisions on electricity rates and other related matters. Additionally, the NCUC should strive to make its decision-making process more transparent, ensuring that ratepayers understand how their interests are being represented.



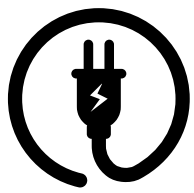
- **Demonstrate more independence from the utility companies the commission regulates:** It is crucial for the NCUC to maintain independence from the utilities it regulates. This can be achieved by providing the NCUC with the necessary resources and autonomy to prioritize the best interests of ratepayers, rather than succumbing to undue influence from utility companies.
- **Encourage competition in the electricity market:** The NCUC should promote a competitive environment within the electricity market. This can be accomplished by allowing municipal power utilities to generate their own electricity and by actively supporting the development of renewable energy projects. By fostering competition, the NCUC can help drive down prices and improve service quality for ratepayers.

- **Safeguard ratepayers from excessive charges:** The NCUC should diligently scrutinize rate proposals put forth by utilities to ensure that ratepayers are not burdened with unreasonable or unfair charges. By rejecting such proposals, the NCUC can effectively protect ratepayers from being exploited.
- **Emphasize energy efficiency investments:** The NCUC should encourage utilities to invest in energy efficiency initiatives, as this can help reduce the overall demand for electricity and save ratepayers money. The NCUC could accomplish this by setting energy efficiency goals for utilities or by providing financial incentives for energy-saving projects.

By implementing these measures, the NCUC can establish itself as a trustworthy advocate for electricity ratepayers in North Carolina, safeguarding their interests and promoting a fair and sustainable energy landscape.



*Fact: since the Clean Air Act was passed in 1970, American air quality has improved enormously. Combined emissions of the six most common pollutants has dropped by 78%; fine particulate pollution (the most dangerous form) has dropped 41%; ozone pollution has dropped by 22%. A 2020 study by the National Resources Defense Council found that cleaner air resulting from the Clean Air Act results in 370,000 fewer premature deaths **every single year** in the United States.*



Conclusion

On September 14, 2018, Hurricane Florence struck North Carolina, bringing torrential rainfall and fierce winds as a Category 1 hurricane. The impact was devastating, with widespread flooding and significant damage to homes, businesses, and infrastructure. Over 1 million people experienced power outages, and tragically, the storm claimed the lives of 54 individuals, with 42 fatalities in North Carolina alone. The estimated cost of the destruction caused by Hurricane Florence was a staggering \$24.2 billion.³³

The severity of the flooding in North Carolina was unparalleled since Hurricane Floyd in 1999.³⁴ The city of Wilmington bore the brunt of the storm, suffering extensive damage that temporarily isolated residents and necessitated evacuations. The Outer Banks region also experienced significant destruction, resulting in the loss of numerous homes and businesses. The flooding led to the closure of several parks and visitor centers by the National Park Service.

The aftermath of Hurricane Florence left thousands of North Carolina residents displaced and the state facing a long and arduous recovery process. It is imperative for North Carolina to take proactive measures to prepare for future natural disasters by investing in renewable energy sources. By doing so, North Carolina can emerge as a pioneer of energy freedom, not only within the Southeast region but also throughout the United States.



Photo credit: Jason Miczek/Reuters

Embracing solar power and other renewables not only reduces emissions, but also creates employment opportunities and provides sustainable access to electricity that remains resilient in the face of severe weather events like Hurricane Florence. Furthermore, renewable energy sources offer the potential for long-term economic benefits, as they are often more cost-effective than traditional fuels. North Carolina will continue to face extreme weather events, like Hurricane Florence. Now is the opportune moment to make a tangible commitment to energy freedom and renewable energy sources. By investing in a clean energy future, North Carolina can ensure long-term sustainability and resilience, safeguarding against similar climate-related disasters in the future.



The pursuit of a clean energy future in North Carolina hinges on three critical factors: reliability, affordability, and sustainability. Establishing a dependable and affordable supply of clean energy not only protects North Carolinians from the unpredictability of severe weather events, but also ensures economic stability and growth. Moreover, sustainability is vital in guaranteeing long-term resilience and reducing dependence on non-renewable resources. These three pillars of reliability, affordability, and sustainability form the foundation of North Carolina's journey towards a greener and more secure energy future.

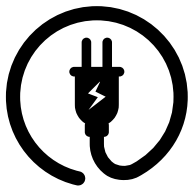
It is crucial for North Carolinians to take proactive steps rather than waiting for times of disaster. This document outlines policy proposals that offer a comprehensive framework for strengthening the role of the North Carolina Utilities Commission in protecting the interests of electricity ratepayers in the state. Firstly, joining or creating a regional transmission organization provides North Carolina with an opportunity to optimize the allocation and distribution of renewable energy resources, fostering a more resilient and efficient energy framework. Secondly, aligning infrastructure with ratepayers' interests through an RTO could ensure that energy costs remain affordable without compromising reliability and sustainability. Additionally, enhancing the oversight of the NCUC is critical for protecting the public interest. Stricter regulations on non-renewable energy sources and stronger incentives for renewable energy development can be achieved through enhanced NCUC oversight, enabling the state to meet its sustainability goals. Together, these measures provide a pathway for North Carolina to lead the way towards a cleaner, more affordable, and reliable energy future.

By ensuring that the NCUC has sufficient resources and independence, we aim to minimize the undue influence of utility companies. The call for a more competitive electricity market underscores the necessity of diversifying our energy sources and promoting renewable energy development. Rigorous scrutiny of rate proposals serves as a safeguard against excessive charges, protecting ratepayers from exploitation. Lastly, emphasizing energy efficiency investments not only addresses the immediate need for sustainable energy practices but also offers a practical approach to cost management for ratepayers. We anticipate and trust that implementing these measures will reinforce the NCUC's role as a dependable and credible advocate for ratepayers, fostering a reliable, affordable and sustainable energy landscape in North Carolina - and energy freedom for its people.

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a brighter future..



ELECTRICITY ON EVERY FARM



About the Author

Dr. William Munn is a longtime energy policy analyst, sustainability advocate and scholar. He has worked in technical, economic and policy roles for several decades focusing on clean energy technology and economic development. He holds a bachelors degree from Fayetteville State University and a Ph.D. from North Carolina Agricultural and Technical State University. He lives in southeastern North Carolina with his family.



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