Electric Reliability in Ohio

ANALYSIS AND CONCLUSION

February 1, 2025

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Ohio
Electric Reliability Major Concerns

The Perfect Storm

Running Short of Power

Over the past decade, electric utilities and power producers have had a reasonably straight forward path to follow. Close coal plants and replace them with wind and solar generation. They make money from the depreciation and decommission expenses of closing the existing power plant and increase their return on investment by building renewable generation. In addition to the increased income from federal subsidies for wind and solar, the electric utility is rewarded by environmental groups, financial institutions and the media for being 'green'.

In 2021, the market dynamics changed. Due to Covid, there were delays in solar and wind components from China. Siting electric transmission lines to carry the power from rural wind farms to the big cities continues to be a major problem. Add to this the growing opposition from local groups to 'not in my backyard' opposition to wind and solar and the market dynamics started to shift. Perhaps the biggest change came after 247 people died in Texas during winter storm Uri which exposed a shortage of power during extreme weather.

The National Electric Reliability Corporation (NERC) just issued a report warning citizens and policymakers that certain sections of the U.S. are critically close to running out of power. *(map)*

Ohio is part of the PJM Regional Transmission Organization (RTO). As the NERC Long-term Electric Reliability Report showed, PJM will fall short of electricity during periods of extreme weather. NERC predicts an 'Elevated Risk' starting in 2026.

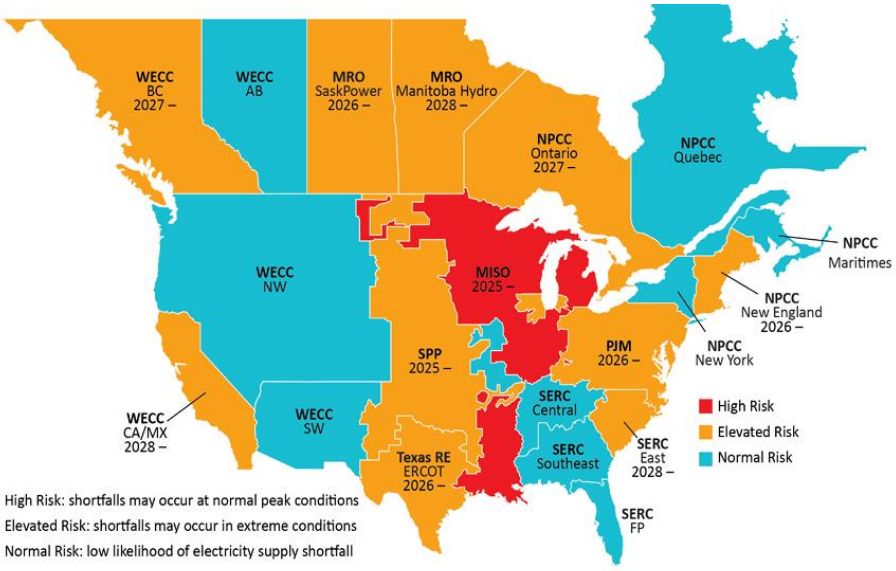
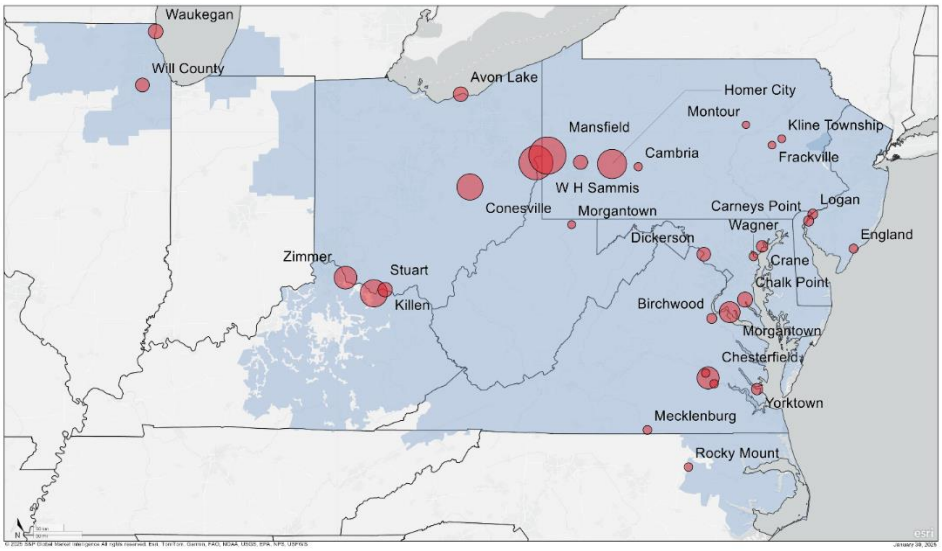


Figure 1: Risk Area Summary 2025–2029

"Power Plants are retiring faster than they're being replaced. The arithmetic doesn't work."
FERC Chairman Mark Christy

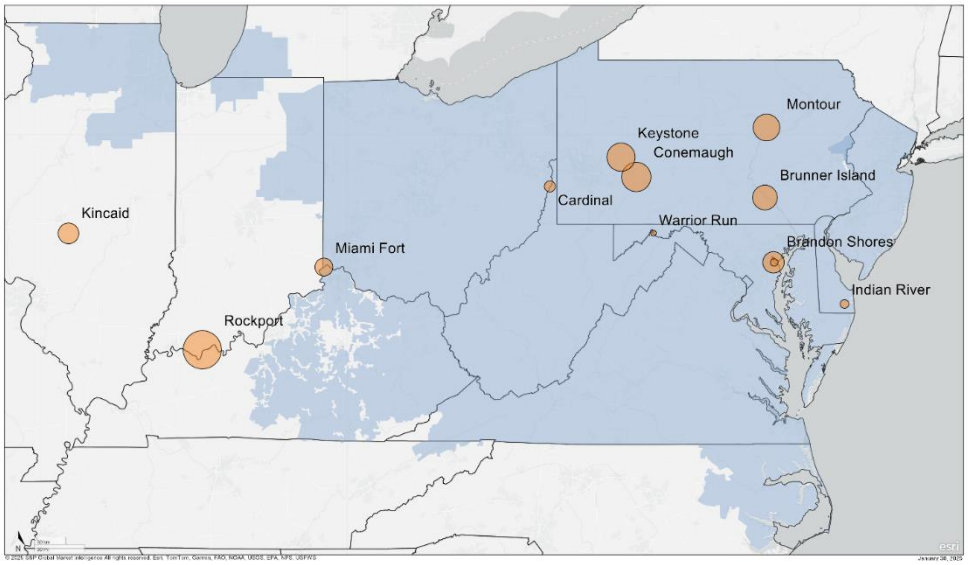
PJM's Major Problem

Over the past six years (since 2018), electric utilities and power producers in PJM have closed **nearly 400 electric generators** amounting to **over 30 GW** of capacity (22.2 GW coal, 3.1 GW natural gas, 1.5 GW nuclear, and 3.2 GW other) The electricity provided by these generators would be enough to power **over <u>14 million</u>** average-sized homes.



Map of PJM coal plants that retired (2018-2023)

What's more shocking is that electric utilities and power producers in PJM have announced the closure of **43 more electric generators** amounting to **14.5 GW** (11.7 GW coal, 1.1 GW natural gas, 1 GW nuclear, and 0.7 GW of other technologies) electricity – enough to power **over 7 million homes.**



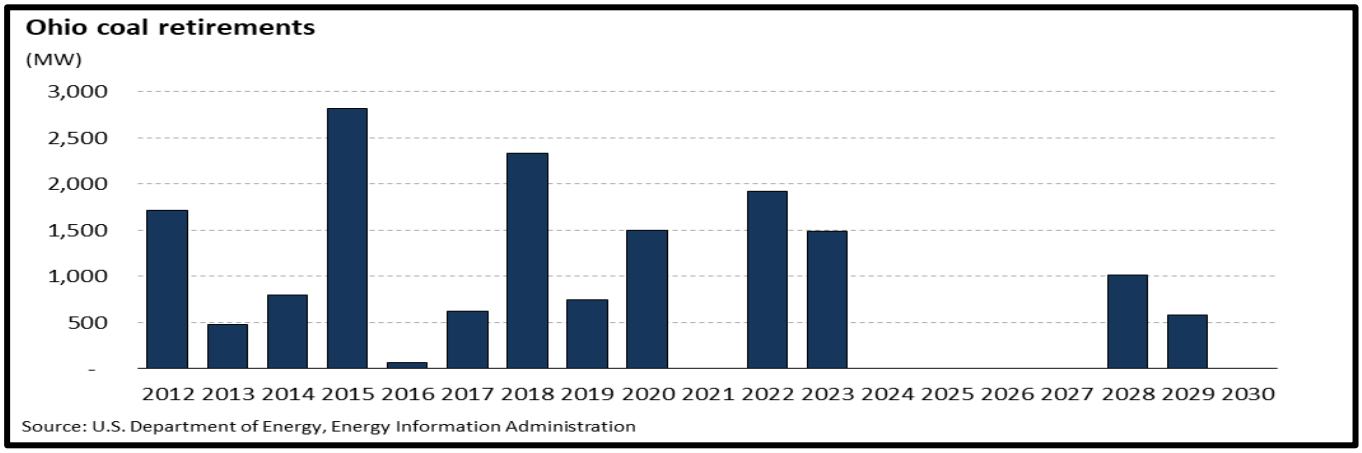
Map of PJM coal plants retiring before 2030

Last year, PJM published a study titled Energy Transition in PJM: Resource Retirements, Replacements & Risks, also known as the 4Rs study. The study covered thirteen states, including Ohio, and discussed concerns with the ISO-RTO region's overall reliability. Analysis from the study revealed that **40,000 MW of the existing generation is at risk of retirement by 2030**.

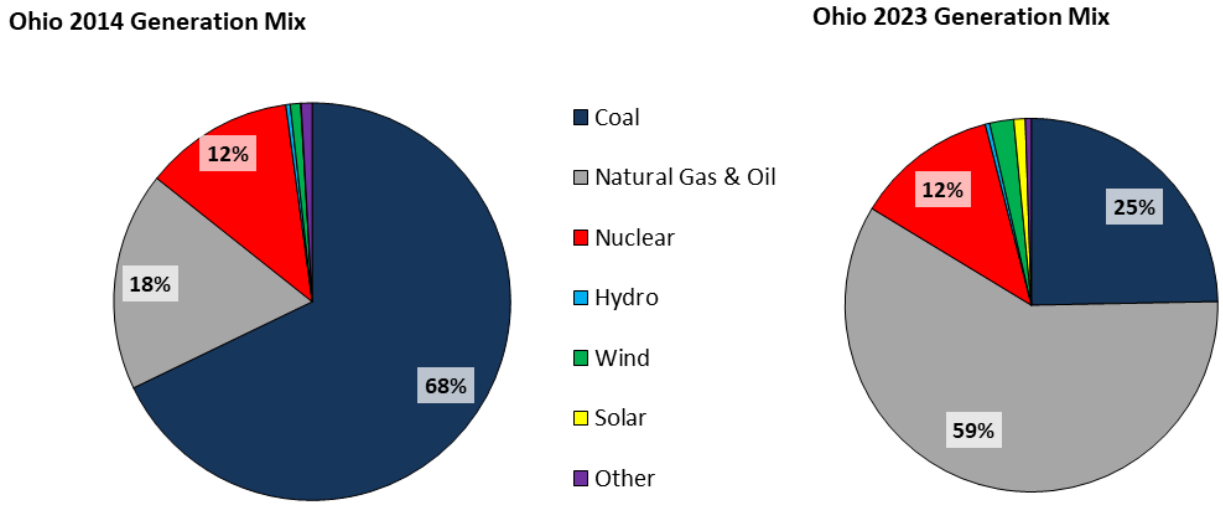
40,000 Megawatts is enough electricity to power 22 million average households

Ohio Heading for Power Shortage

The state of Ohio is following the PJM trend. Since 2012, electric utilities in Ohio have closed 14,500 MW of power. *(Enough to power 7.1 million homes)*



Ohio has lowered its electric reliability by closing coal power plants and replacing them with natural gas and renewables. Just ten years ago, 68% of the electric generation was coal. Today, they only represent 25% of the generation capacity. Wind and solar only perform when the weather is right, and natural gas is dependent on a 'just in time' from a pipeline. Both nuclear and coal have months of fuel at the power plant that can be called upon at a moment's notice.



Source: U.S. Department of Energy, Energy Information Administration

Based on the DOE Energy Information Agency, an additional 1,600 MW of power will be closed in Ohio.

OHIO PLANNED RETIREMENTS			
Owner	**Name**	**Capacity (MW)**	**Year**
AEP	Cardinal 1	585	2029
Vistra	Miami Fort 7 & 8	1,020	2028

Replacement Power is not Reliable

The U.S. Energy Information Administration reports that **61.6 % of all new generation** scheduled to be constructed between 2023 and 2030 will be wind and solar. Intermittent resources depend on weather conditions to produce power.

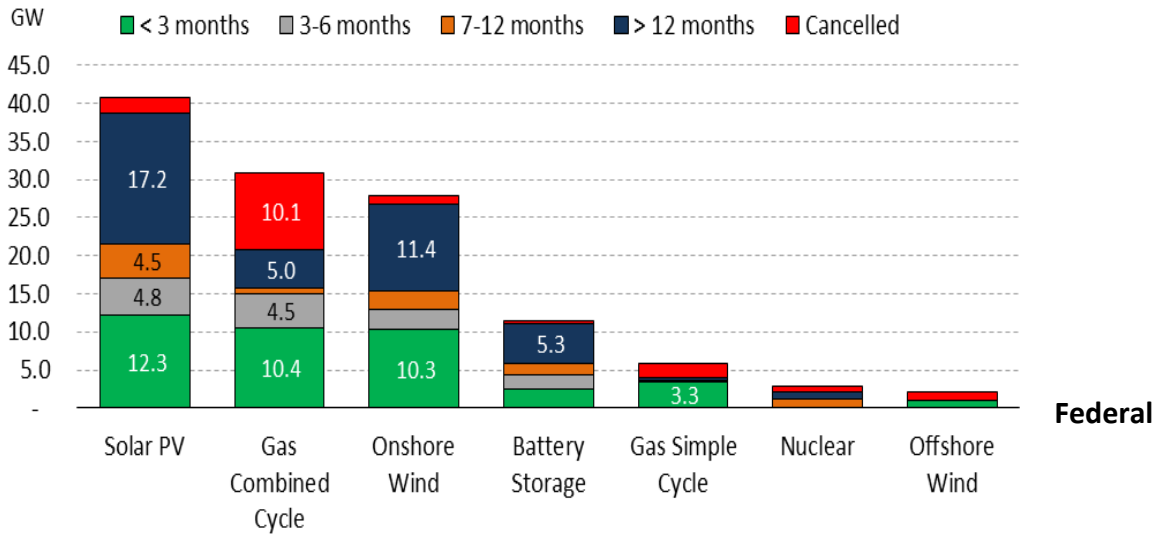
Of the **36,400 MW** of electric generation scheduled to be built in PJM, only **5,300 MW** is dispatchable (natural gas) generation. This means **only 14%** of the new generation in PJM will be baseload or dispatchable power. The remaining 86% will be wind, solar, and battery storage.

- PJM currently rates the average **Wind** capacity factor at **35**%. (This means wind turbines generate their rated capacity an average of **35%** of the summer and winter months).
- Large-scale **Solar** capacity factor is rated at **9%** percent.
- PJM places **nuclear** power at **95 %**, **coal** power plants at **84 %** capacity factor, and **natural gas** at **79%**.

Power Source	Nuclear	Coal	Natural Gas	Solar	Wind
PJM Average	95%	84%	79%	9%	35%

Delay in Building New Electric Generation

Adding to the problem is the delay in constructing new electric generation. As the chart below indicates, every type of new electrical generation has either been cancelled or delayed. Of particular note is the **10,000 Megawatts of proposed Natural Gas plants that have been cancelled.**



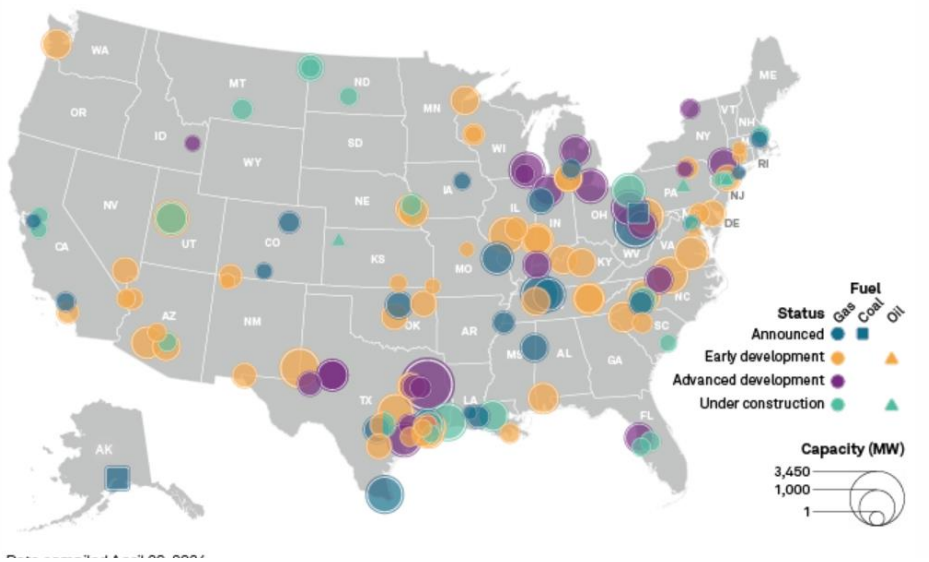
Source: Energy Ventures Analysis Power Plant Tracking Database

Federal

Is Natural Gas the Panacea?

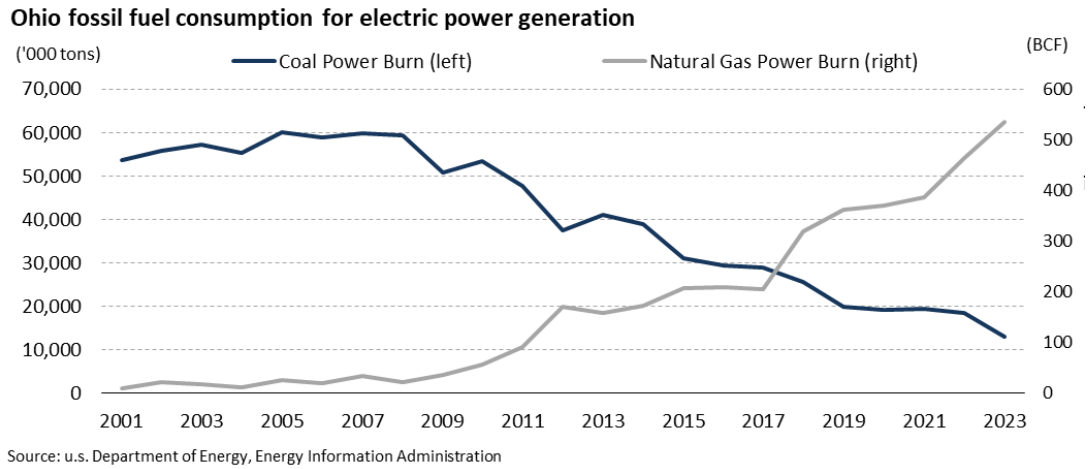
Even with the cancelations in natural gas generation projects there are still some 133 natural gas plants that have been announced or in the siting, permitting and construction stage. Much of it planned in PJM (S&P Global Map)

It should be noted however, that according to U.S. EIA, the average time to site, permit and construct a baseload Combined Cycle natural gas plant is approximately **four years.**



Over-Reliant on Natural Gas

Another reliability concern for Ohio is the rapid buildout of natural gas generation. Ohio is now the 5th largest state for natural gas electric generation. As experienced in winter storms Uri in 2021 and Elliott in 2023, delivery of natural gas can be a major problem. Well heads and pumping stations froze, which halted the flow of natural gas to the power plants.



Source: u.s. Department of Energy, Energy Information Administration

Transmission Problems

PJM operates one of the largest and most complex transmission systems in North America, spanning over 84,000 miles. This network includes high-voltage transmission lines that connect various parts of the power grid across 13 states and the District of Columbia. While PJM coordinates the operation of the transmission system, the actual lines and equipment are owned by numerous different utilities. PJM is responsible for ensuring that this diverse infrastructure works cohesively to maintain grid stability and reliability.

As more generators seek to connect to the grid, PJM faces challenges in managing these interconnections efficiently. The process involves detailed studies to assess the impact of new connections on the existing grid and requires infrastructure enhancements to accommodate new sources.

Rapid Electricity Demand

Power demand in the PJM Interconnection region is growing at an unprecedented rate, driven by the proliferation of power-intensive industries such as data centers and the increasing electrification of transportation and heating. Concurrently, as the generation mix in the region evolves, utilities are concentrating on expanding the transmission network. This focus is facilitating the rapid capitalization and development of new projects

As our economy continues to grow and with the introduction of AI, electric grids are becoming **increasingly strained and overloaded.** All businesses and industries seek reliable electricity, but due to the critical operations of a data center, AI demands large amounts of reliable generation.

Report from FERC –

- Nationwide electricity demand to **grow 4.7 %** over the next five years.
- Peak demand is expected to **grow to 38 GW** over the next five years.
- Data centers across the US are likely to reach **35GW** by 2030, up from 17GW in 2022
- The nation's 2,700 data centers sapped more than **4 % of the country's total electricity** in 2022, with projections to **consume 6 % by 2026.**

Electric utilities are faced with a new dilemma, keep the fossil-fuel power plants and serve the new economic and AI load, or close their fossil-fuel plants and turn the data centers away. Many electric utilities are trying to do both, close the power plant and build new natural gas generation to meet the economic load.

Environmental Regulations

It is no secret that the Biden EPA push major environmental regulations aimed at killing coal fueled power. As mentioned in the “4Rs” report and analysis by PJM last year, a significant amount of operational capacity in the ISO-RTO region faces the risk of retirement due to policy-driven reasons. The environmental policies affecting plant retirements include the suite of environmental regulations published by the EPA in the second quarter of 2024. These include the Greenhouse Gas (GHG) Rule, the Effluent Limitation Guidelines (ELG) Update, and the Mercury & Air Toxics Standard (MATS) Update. Each of these rules are currently being litigated and the Greenhouse Gas rule could be before the US Supreme Court this summer.

New Day under the Trump Administration

The Trump Administration has issued two executive orders that promote fossil-fuels and start the process of walking back these rules. We should see a different regulatory climate for coal-fueled power by the end of 2025.

EXECUTIVE ORDERS

- Declaring a National Energy Emergency
    - Declares that current energy supplies are inadequate to meet rising demand.
- Unleashing America's Energy
    - "Terminates" the "Green New Deal" orders agencies to "immediately pause the disbursement of funds appropriated through the Inflation Reduction Act & Infrastructure Investment and Jobs Act"

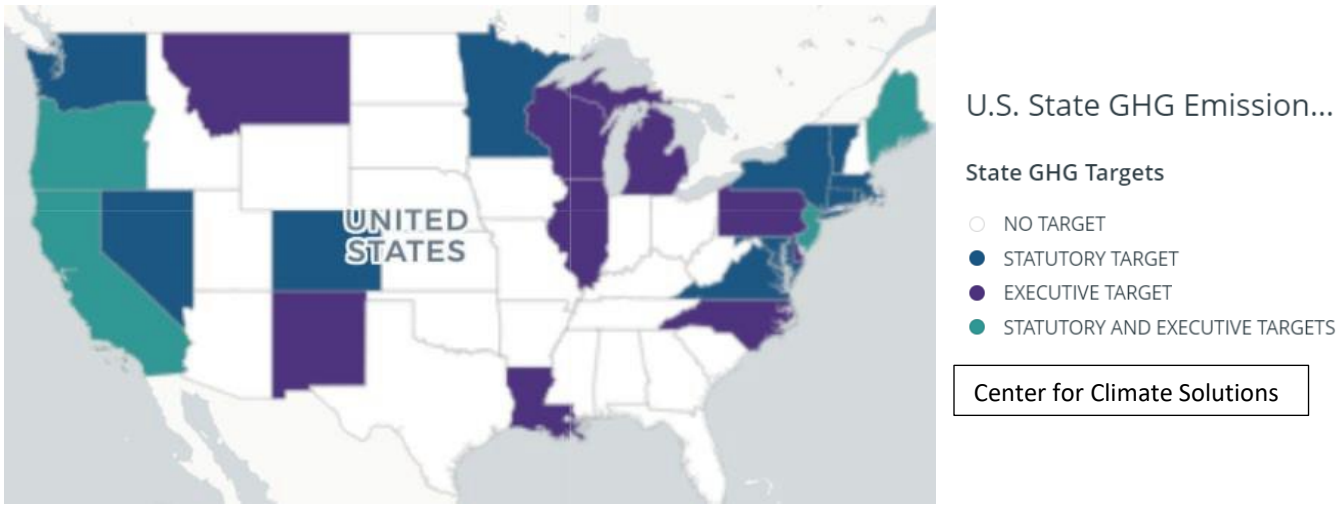
EPA Rules for Walking Back

- **Greenhouse Gas Regulations**
    - EGUs (111 (b) & (d))
    - Methane Rules
- **Other Air Regulations**
    - Ozone Transport
    - Mercury & Air Toxics Standards Rule
    - Regional Haze
    - NAAQS (ozone & PM)
- **Other Coal-Specific Rules**
    - Coal Combustion Residuals Rule

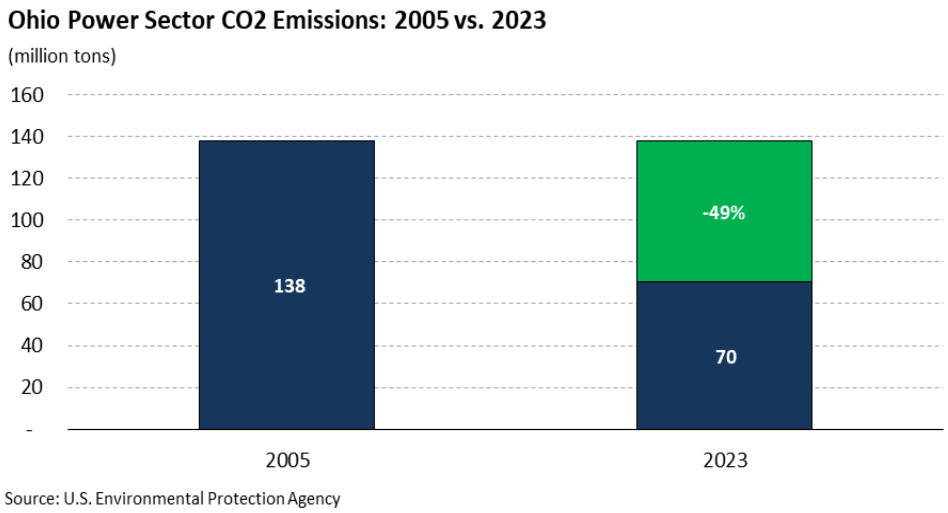
State Environmental Policy

As the map below shows, eight of the PJM states (DE, IL, MD, MI, NC, NJ, PA, VA), have 'Zero-Carbon' laws or goals. A 'Zero-carbon' standard means the state is to be off fossil-fuel power by no later than the year 2050.

As these states have a directive to close dispatchable thermal plants, they look to states like Ohio to provide the reliability they need. Ohio has an obligation to its citizens first and should place the electricity needs of the state above those states that have chosen to be carbon free.



While other states continue to struggle with climate change goals, Ohio has already met them. The Obama Administration published a rule to reduce Carbon Dioxide (CO2) by 32% from the 2005 levels by 2035. The Biden Administration upped the CO2 rule to 52% reduction by 2030. As the chart below indicates, Ohio has already lowered CO2 by 49% from the 2005 levels.

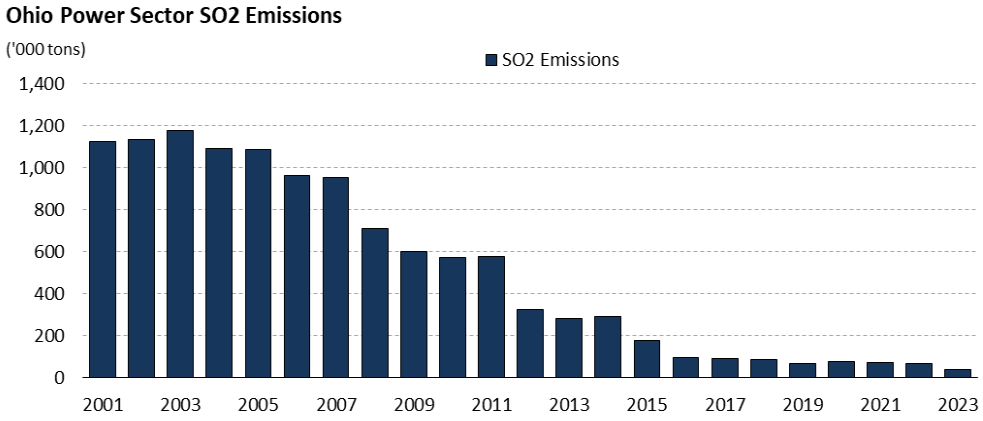


Source: U.S. Environmental Protection Agency

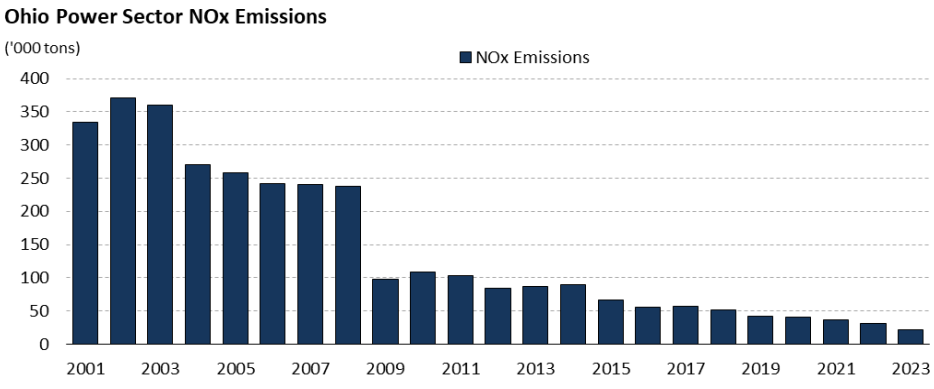
Ohio's Environmental Achievement

When deciding what electric resource mix is best for the state, the environment must be considered. Fortunately, health related air emissions have dropped dramatically over the past decade.

Since 2013, Sulfur Dioxide (SO2) emissions have decreased by 86%.



Source: U.S. Environmental Protection Agency



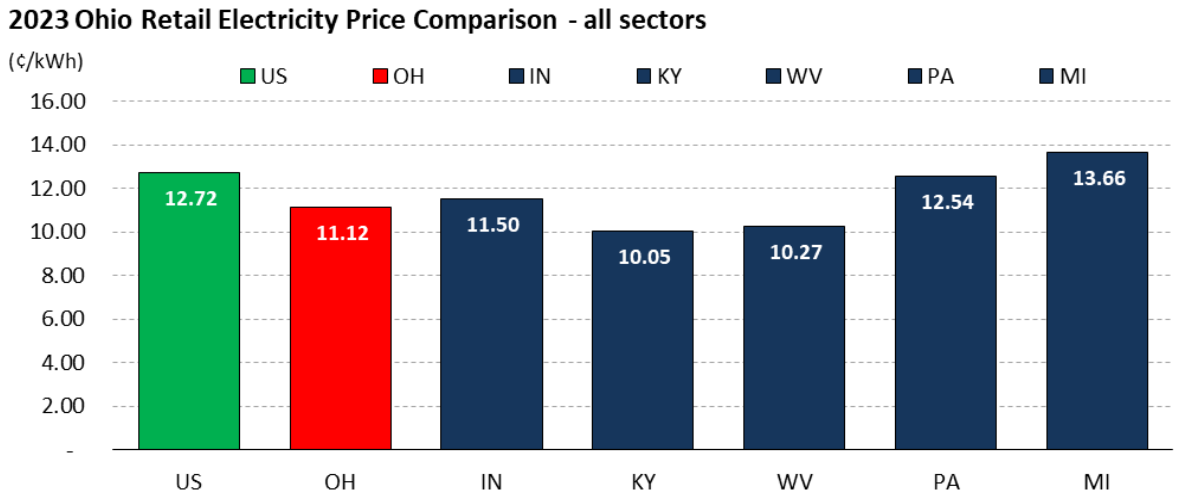
Source: U.S. Environmental Protection Agency

Likewise, Oxides of Nitrogen (NOx) have decreased by 74% since 2013.

Price Does Matter

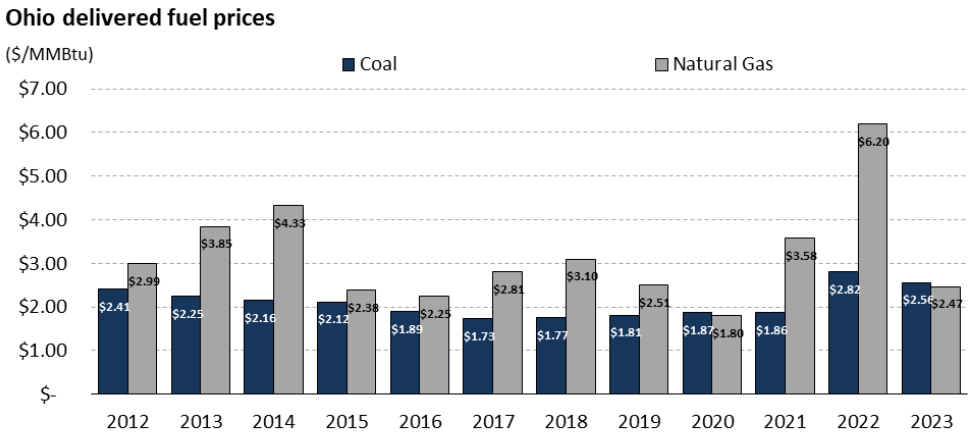
Although this report is focused on the issues surrounding electric reliability in Ohio, the price of electricity plays a key role in both the growth in the state's economy (electrical demand) and the cost of fuel for the power plants.

Although Ohio's retail electric price is 13% below the national average, it is higher than two of its neighboring states of Kentucky and West Virginia. Both states have a higher percentage of coal generation.



Source: U.S. Department of Energy, Energy Information Administration

The fuel price of uranium and coal is very stable. As the graph below indicates, coal prices haven't risen above $3.00/MMBtu while natural gas prices have increased to over $6.00/MMBtu.



Source: U.S. Department of Energy, Energy Information Administration

PJM Does Not have the Authority to Fix the Problem

PJM will admit that they have no authority to tell an electric utility not to close a power plant. The states and the electric utilities have primacy over the closure and building of power generation. PJM does regulate the flow of electricity and study the impact of the closure of a plant on the transmission system. They also require electric providers to maintain a specific reserve margin. However, you should note that the reserve margin can be subjective. Meeting the reserve margin can include 'Time of Day Rates', 'Retail Energy Efficiency' and 'Demand Response and Time-Variable Pricing' programs.

States Can Fix the Problem

Three steps can provide a more secure electric system in Ohio.

1) Prohibit the closing of a dispatchable power plant until the new electric generation is entirely constructed and tied into the Ohio electric transmission grid.
2) Require the new electric generation to be equal to or greater than the full nameplate capacity of the power plant the utility is closing.
3) New renewable generation must be backed up with at least 50 percent dispatchable power generation. With 8 ½ percent of the electric generation required to come from renewable generation, this firming requirement will ensure the state can meet reliability needs.

Conclusion

Ohio cannot afford to lose any more reliable dispatchable electric generation. Although Ohio is deregulated, it does not relieve the State of its obligation to provide reliable energy to its citizens. It is up to Ohio to ensure electric reliability.

The general assembly should consider passing laws that protect electric reliability.