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Testimony of Michelle Bloodworth
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before the Senate Energy & Public Utilities Committee
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Good morning Chairman Wilson, Vice Chair McColley, Ranking Member Williams and members of the Senate Energy and Public Utilities Committee. My name is Michelle Bloodworth. I am President and CEO of America's Power, a national trade association representing coal-fired electric power generation. America's Power membership covers the full value chain of coal-fueled generation, and includes mining companies, mining equipment and service providers, rail and barge transportation, and owners and operators of coal-fired power plants.

I thank you for the opportunity to address the Committee and discuss the value of Ohio's coal-fueled power plants to the state and the region. I commend your efforts to engage experts and organizations with diverse insights on the important and often complicated issues surrounding the electric power sector. Providing affordable electricity while maintaining a reliable and resilient electricity grid is no simple task, and your efforts to examine the challenges caused by the continued loss of fuel-secure power generation is critically important both for Ohio and nationwide.

The coal fleet has long provided low-cost power while promoting electricity grid reliability and resilience, both in Ohio and nationally. We believe that this value is difficult to replace with other generating technology, and that doing so may leave Ohio with both higher electricity rates and a less resilient power grid.

Over the past 13 years, more than 160,000 MW of natural gas-fired generation, wind and solar have been added to the grid nationwide. Since 2010, more than 133,000 MW of coal generation has retired or announced plans to retire. This marks a significant departure from resources that are fuel-secure and maintain enough fuel onsite to operate for weeks or months—such as coal and nuclear generating units—to resources that are less fuel-secure or not fuel-secure at all. Natural gas plants require just-in-time fuel deliveries from pipelines, while wind turbines and solar photovoltaic generators require a breeze or

sunshine to provide any electricity. In 2000, more than 70 percent of the nation's electric generating capacity was comprised of fuel-secure resources. By the end of 2020, the percentage represented by fuel-secure generating resources will have dropped to 30 percent.[1]

A reliable grid means having an adequate supply of electricity 24/7 under relatively normal circumstances. A resilient grid, on the other hand, means that the grid can withstand and recover quickly from unusual disturbances—such as extreme weather, cyber threats or physical threats—that can have severe consequences. The grid's increasing dependence on natural gas and renewables, along with the retirement of fuel-secure coal and nuclear power plants have raised concerns that these trends may be jeopardizing both the reliability and resilience of the grid. Such concerns have been raised by DOE, FERC, NERC, ISO/RTOs, the National Academy of Sciences, and the National Energy Technology Laboratory (NETL), among others.[2] PJM, the electricity market that includes Ohio, is currently studying whether a market mechanism is necessary to ensure it maintains enough fuel-secure resources on its system. ISO New England has already enacted a tariff that will compensate generators that provide fuel security. NERC is currently developing reliability guidelines to help grid operators identify and manage fuel security risks.

Unfortunately, Ohio's power generation has followed the national trend and grown less fuel secure in recent years. As recently as 2010, 86% of the state's generating capacity was made up of coal and nuclear power plants. Today that number has fallen to 46%.[3] This decline in fuel-secure generation is made more troubling by Ohio's declining ability to meet its own power demand internally. As recently as 2006, the state was a net exporter of electricity to neighboring states. By 2016, it imported 21% of its electricity supply, a number that stands at 17% in the most recently available 2018 data.[4]

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[1] EIA, *Electric Power Annual*, October 22, 2018, and EIA, *Annual Energy Outlook 2019*, January 24, 2019.
[2] These include DOE's "Notice of Proposed Rulemaking, Grid Resiliency Pricing Rule," Docket RM17-3-000, Sept. 28, 2017; NERC's *Generation Retirement Scenario Special Reliability Assessment*, Dec. 18, 2018; NETL's *Reliability, Resilience and the Oncoming Wave of Retiring Baseload Units, Volume I: The Critical Role of Thermal Units During Extreme Weather Events*, DOE/NETL-2018/1883, Mar. 13, 2018; FERC's Docket AD18-7-000, "Grid Resilience in Regional Transmission Organizations and Independent System Operators,", opened January 8, 2018; National Academy of Sciences' *Enhancing the Resilience of the Nation's Electricity System*, 2017; Western Electricity Coordinating Council's *Western Interconnection Gas – Electric Interface Study*, prepared by Wood Mackenzie, June 2018; and PJM's *Fuel Security: Analyzing Fuel Supply Resilience in the PJM Region, Summary of Results, Conclusions and Next Steps*, Nov. 1, 2018.
[3] Historic data is from EIA (https://www.eia.gov/electricity/data/state/). Current data is from S&P Global Market Intelligence data service, queried January 16,2020.
[4] EIA Form 923.

Coal units in Ohio are particularly fuel secure as they primarily use coal from Ohio and neighboring states. In 2018 and 2019, Ohio's coal generators received over 32% of their fuel from Ohio mines, with an additional 60% coming from the neighboring states of West Virginia, Indiana, Pennsylvania, and Kentucky.[5] We do not have to look long ago or far away to see why this fuel security is particularly valuable.

One year ago, a winter weather event that you may remember as the "polar vortex" brought extreme cold weather and soaring power demand to much of the Midwest. The Midcontinent Independent System Operator—MISO—was tasked with meeting this power demand in a region that includes Indiana, Michigan, Wisconsin, and Minnesota. Nearly all of the generating capacity added in MISO this decade has been wind turbines, which have grown from a total of 8,000 MW in 2010 to over 18,000 MW today, and now represents ten percent of MISO's total electricity supply.[6] However, during the polar vortex, this wind power disappeared. A lack of wind and turbine outages caused by extreme temperatures resulted in wind turbines providing only 2.5 percent of the system's demand. MISO's coal capacity was able to pick up the slack and provide 44 percent of the region's power demand, despite only accounting for 31 percent of installed capacity.[7] That is a prime example of fuel-secure generation promoting grid resilience.

A second example I will mention is from PJM, the electricity market that serves Ohio. During the polar vortex storm of the prior year—in January 2018—high electricity demand drove natural gas prices to levels nearly 40 times higher than they had been the previous month due to demand for power generation. A retrospective report from NETL concluded that there simply was not enough gas available at the time to supply all the power stations that needed it, at any price. Instead, an additional 26,000 MW of coal generation came online—raising the total to 45,000 MW of coal—to keep the lights on. In fact, in the six regional power markets affected by this polar vortex, coal generation provided 63 percent of the incremental generation needed to meet surging demand.[8] PJM's CEO later noted in Congressional testimony that PJM "could not have served customers without coal-fired assets."[9]

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[5] EIA Form 923 reports (data for 2019 is through October).
[6] S&P Global Market Intelligence data service.
[7] https://www.misoenergy.org/markets-and-operations/real-time--market-data/market-reports/#nt=%2FMarketReportType%3ASummary%2FMarketReportName%3AHistorical%20Generation%20Fuel%20Mix%20(xls)&t=10&p=0&s=MarketReportPublished&sd=desc
[8] National Energy Technology Laboratory (NETL), *A Review of PJM Interconnection's April 13, 2018, Response to National Energy Technology Laboratory's Report on Reliability, Resilience and the Oncoming Wave of Retiring Baseload Units*. Report DOE/NETL-2019/1912, November 7, 2018.
[9] Senate Energy and Natural Resources Committee, "Full Committee Hearing to Examine the Performance of the Electric Power System Under Certain Weather Conditions," 23 January 2018,

Not only does coal-fueled generation promote reliability and resilience, it does so affordably. Electricity rates in Ohio increased by 7% between 2010 and 2018, just under the national average of 7.6%.[10] For states with accelerated movement away from coal and fuel-secure generation, the story is worse. On average, the top 15 states with reduced generation from fuel-secure resources between 2010 and 2018 found their average electricity rates increase by 9.2%. We believe that continued movement away from coal-fired electricity generation could lead to further increases in electricity rates in Ohio. On one level this is intuitive, as it would require replacing coal-fired power plants that already exist with generating capacity that has yet to be built and its unnecessary construction costs yet to be spent.

On another level, it is difficult to determine the relative costs of providing reliable electricity from different generating alternatives. First, their cost structures can differ dramatically. Conventional thermal generators use fuels such as coal, oil, and natural gas to provide power when the customer requires it, and they incur costs when they consume fuel. Renewable generators such as wind turbines and solar power have no fuel cost. Most of their costs are up-front construction costs and ongoing maintenance costs.

Second, generators operate in different duty cycles. Conventional generators can be called on to run when needed, but renewables only operate as weather permits. For solar, this is obviously during daylight hours. Wind generation typically peaks in the overnight hours. Not being able to generate power when needed to meet electricity demand means that conventional generators must be available to supplement and support renewables. This leads to my third point.

Comparing generation sources requires they be on equal footing, providing the same reliability of service and including all relevant costs. This can be an area of concern for renewable power in particular. Prices quoted for wind and solar often omit the substantial cost of transmission upgrades required to connect them to the grid. They also typically ignore the significant costs "imposed" on other generators on the system. These imposed costs are the additional costs of running other generators uneconomically—ranging from the significant ramping needed to balance fluctuations in renewable output, to providing extra ancillary services that renewables cannot

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https://www.energy.senate.gov/public/index.cfm/hearings-and-business-meetings?ID=9AEFC551-DFEC-450F-B0A9-15D23C90CA5F.

[10] EIA Form 861.

provide, to keeping units online that operate very little but must be maintained to meet reliability reserve margin targets. These imposed costs must be credited back to the generators that are responsible for them in order to allow meaningful comparisons of different power plant alternatives.

Last year my organization, America's Power, conducted a study along with the Institute for Energy Research, in which we calculated the cost of different generating alternatives on such an equal footing. We compared existing conventional resources to new resources, both conventional and renewable. For renewable wind and solar projects, this included calculating imposed costs and including those in the total cost of wind and solar power.

The metric we used was the levelized cost of electricity. This commonly used approach yields a single number for each generating alternative, in dollars per megawatt-hour. That single number represents the average total cost of generating electricity over the facility's lifetime, including capital costs, financing costs, fixed and variable costs, and fuel costs. We found that, on average, existing units are less expensive options than new construction. That is no surprise—it is much like finding out that it is cheaper to keep driving your current car than to buy a new car. Among the new generating alternatives, we found both wind and solar to be significantly more expensive on average than new natural gas generators.

In summary, Ohio's coal fleet has long provided affordable, reliable, and resilient electricity to consumers. Moving away from these generating resources might put all three of these attributes at risk. We recommend that this Committee and the State carefully consider the impacts to reliability and resilience that could result if Ohio replaces its coal generation with electricity from less fuel-secure resources such as natural gas and wind generation. We also believe it is extremely important to look at the full cost of generating alternatives that are being considered. This includes the direct costs of the generator, but also includes the indirect costs of required transmission infrastructure and the costs imposed on the rest of the system to provide additional needed services the generator might not be able to provide by itself.

I want to thank you again for allowing me to opportunity to address you today as you explore these issues, and I am more than happy to answer any questions you may have of me.