

Prepared Remarks of
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President and Founder of
The Market and Financial Position of Nuclear Resources in Ohio
Presentation before the Ohio Senate Energy and Public Utilities Committee
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Good morning Mr. Chairman and distinguished Members of the Senate Energy and Public Utilities Committee. My name is Paul Sotkiewicz, and I am the President and Founder of E-Cubed Policy Associates, LLC (“E-Cubed”). E-Cubed is located at 5502 NW 81st Avenue Gainesville, Florida 32653. Overall, I have 23 years of experience working in the power industry or on power industry related issues going back to my initial dissertation work on the 1990 Clean Air Act Amendments and the creation of the Title IV Sulfur Dioxide Trading Program.

As the President of E-Cubed I provide expert advice testimony and policy research to private sector, non-profit, and government clients on a wide range of subjects relating to energy electric utilities electricity markets environmental issues and economic and regulatory policy relating to energy and electric issues. Since founding E-Cubed in March 2016 my clients have included wholesale market operators such as the New York Independent System Operator (“NYISO”) and the Alberta Electric System Operator (“AESO”) in Canada; industry trade associations including the Electric Power Supply Association (“EPSA”), New England Power Generators Association (“NEPGA”), and the American Petroleum Institute (“API”); and private sector companies merchant power plant developers and operators, natural gas midstream companies, merchant transmission developers, and integrated utilities.

Prior to founding E-Cubed I served as a Senior Economist (2008-2010) and later Chief Economist (2010-2015) and Senior Economic Policy Adviser (2015-2016) at the PJM interconnection. Prior to my tenure at PJM from 2000-2008 I was the Director of Energy Studies at the Public Utility Research Center (“PURC”) at the University of Florida, and from 1998 to 2000 I served as a staff economist and

later served on the Chief Economic Adviser's staff at the United States Federal Energy Regulatory Commission where I worked on wholesale market design issues and getting nascent wholesale market up and running.

I received a Bachelor of Arts degree in History and Economics from the University of Florida in 1991. I received my Master of Arts degree in economics from the University of Minnesota in 1995, and a Doctor of Philosophy (Ph.D.) degree in Economics from the University of Minnesota in 2003.

I have authored and co-authored numerous articles and chapters of books relating to electricity policy issues, electricity markets, energy and electric utility economics an environmental policy impacts on the electricity market in electricity regulation.

I am here today, at your generous invitation, to present my findings from my report on *The Market and Financial Position of Nuclear Resources on Ohio*. While the work was funded by API, all views expressed are my own.

The purpose of my analysis was to determine whether or not the nuclear resources in Ohio, namely the 894 MW Davis-Besse facility located outside of Toledo, and the 1294 MW Perry facility, located east of Cleveland have historically been operating profitably and could be expected to operate profitably into the near future. Moreover, given the financial condition of the Davis-Besse and Perry facilities, what would be the wholesale market, retail rate, and environmental abatement cost effects of out-of-market financial support (aka subsidies).

The main conclusions of the analysis are as follows:

- 1) Historically Ohio nuclear resources have been able to over their going forward costs and have significant operating margins that contribute toward the recovery of sunk costs plus a return on investment;
- 2) Over the next ten years, Ohio nuclear resources are projected to remain profitable on an operating basis, covering going forward costs and earning margins that contribute toward returns.

The bottom line is that Ohio nuclear resources are in no danger of retiring anytime soon and to do so would not only be economically irrational but would financially harm the equity shareholders of these nuclear assets.

I must say, I was surprised with this result. Of all the nuclear assets in PJM, I viewed single unit facilities such as Three Mile Island, Davis Besse, and Perry to be very much at risk for retirement given the Nuclear Energy Institutes (“NEI”) reported costs for single unit sites.

The data used in this analysis comes entirely from publicly available sources. Historic or known capacity and energy price data are taken directly from PJM. Forward energy price data comes from the Intercontinental Exchange (“ICE”) Daily Reports and can be downloaded by the public. Unit specific cost data on all nuclear resources in the US is published by the United States Environmental Protection Agency’s (“EPA”) documentation to its Integrated Planning Model tool and is taken from the Energy Information Administration’s (“EIA”) Annual Energy Outlook documentation. Other data on capacity, historical capacity factors, and historical output comes from EIA. The forced outage rates come from the PJM Independent Market Monitor (“IMM”). Other information comes from FES Securities and Exchange Commission (“SEC”) filings. The analysis is performed using this publicly available data to allow any interested party to reproduce the results presented in this paper.

Publicly available fuel, capital, and going forward/avoidable cost data indicate Ohio nuclear unit costs, expressed on a \$/MWh basis, that range from a low of \$31.83/MWh for the Davis Besse facility outside of Toledo to \$34.03/MWh for Perry northeast of Cleveland. As single unit reactor sites, the costs of Davis Besse 1 and Perry 1 are nearly 25 percent below the industry average for single unit costs, making these units among the best single unit performers in the U.S. nuclear fleet when compared to industry averages from the Nuclear Energy Institute (“NEI”). The net annual unit operating profits looking into the future on average over the 2019 to 2028 period are \$28 million per year (\$3.85/MWh) for Davis Besse and \$44 million per year (\$4.40/MWh) for Perry. While the owners of these units would like to have higher profits, such high profits will be competed down to competitive levels when lower cost alternatives become available as any student can tell you from their Econ 101 class.

In my report, working on a previous version of House Bill 6, payments envisioned to be as much as \$300 million in the Ohio House Bill 6 would require rate increases of \$2.50/month for residential customers, \$20/month for commercial

customers, and \$250/month. for industrial customers. These charges are equivalent to a \$2.18/MWh increase in energy prices in Ohio, given historic end-use energy sales. This nearly erodes the benefits from participating PJM's markets that are \$2.85/MWh. For residential customers who are already having a hard time making ends meet, this additional \$30/year can buy groceries, or pay for prescription medication. And the money would be going to the owners of these resources who already turning positive margins on these resources in the PJM wholesale power market.

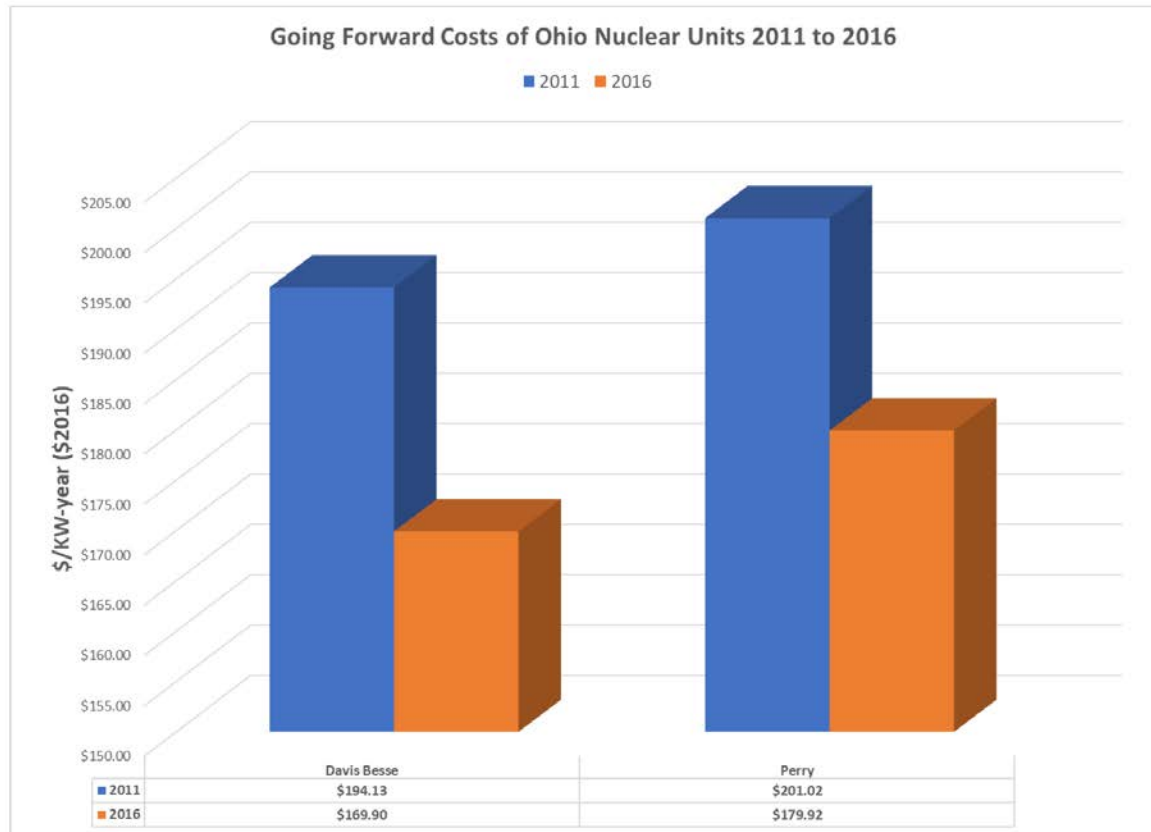
In the as passed version of House Bill 6, the projected revenue is \$198 million for qualified electric generating facilities and the distribution of rate increases is shifted. For residential customers in 2020, the fixed charge would be \$0.50/month and from 2021-2026 \$1/month after that. For commercial customers that charge is \$10/month in 2020 increasing to \$15/month in 2021-2026. In general, industrial customers will face the same \$250/month charge. However, large users, with more than 45 million kWh (0.045 million MWh) of use at one site, will face a charge of \$2,500/month. Over a year, this charge could pay for 1 full time employee.

And speaking of PJM's markets, as the former Chief Economist at PJM, it is amazing how well PJM's markets have performed over time. And yes, while there have been problems and issues that needed to be resolved, and there are issues that remain, PJM's markets have been successful. What is it that power markets are supposed to do to be successful?

First, markets provide incentives to reduce costs. PJM's markets have done exactly that with generation resources of all types as they continue to find ways to keep reducing costs. As Figure 1 from my report shows, Ohio nuclear resources have found ways to reduce costs over time.

Figure 1: Ohio Nuclear Going Forward Costs over Time

Figure 1: Evolution of Going Forward Costs of Ohio Nuclear Units as Reported in the US EPA IPM Model



Those resources that are unable to reduce costs can no longer compete and they should be driven from the market to the benefit of electricity customers. We have also seen the cost of new combined cycle gas resources come down through innovations that make installation a turn-key operation.

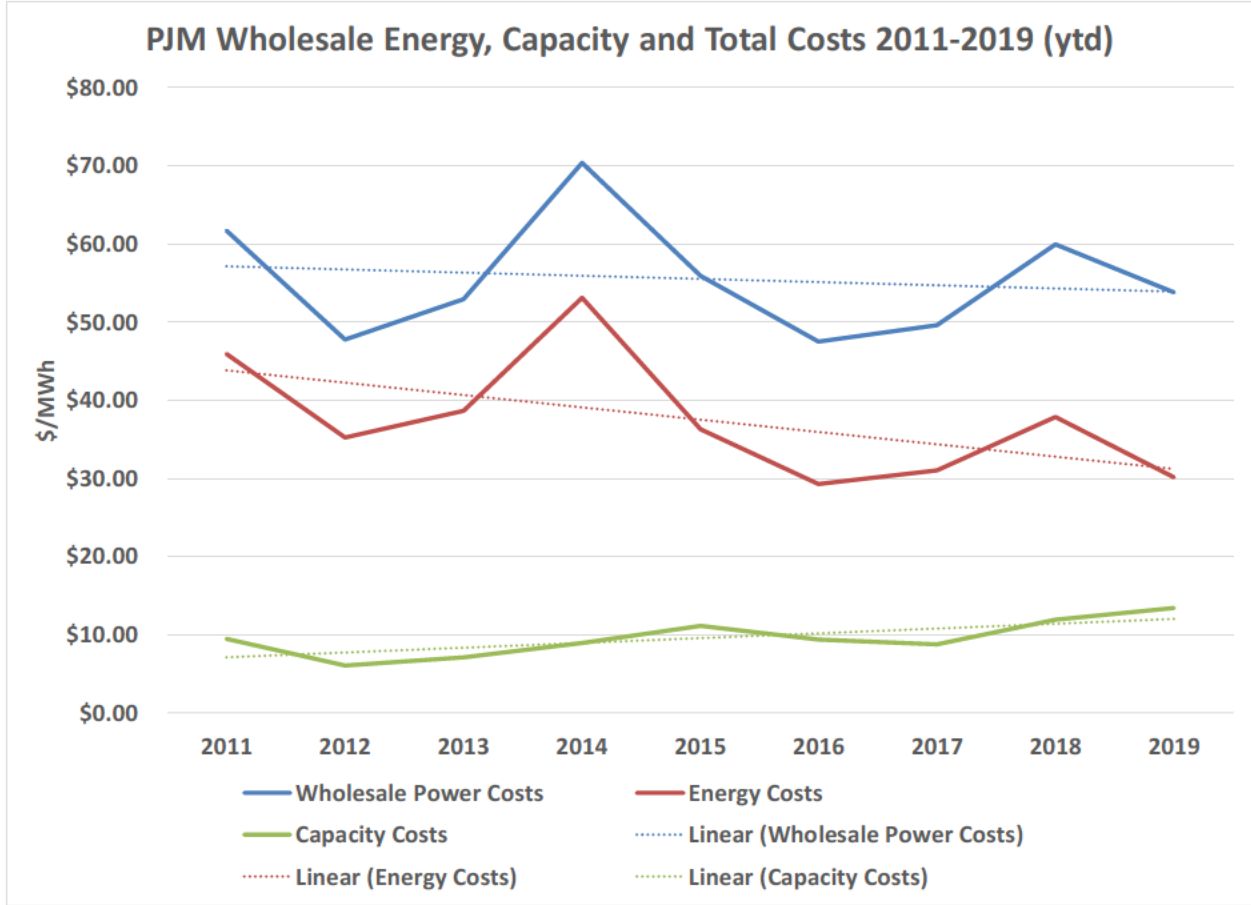
Second, markets provide incentives to innovate. Innovation has come in the form of continually improving hydraulic fracturing (“fracking”) to unlock and bring to market shale gas deposits in the Utica Shale play in Eastern Ohio. Innovation has also come in the form of continually improving efficiencies for combined cycle gas resources which are 40 percent more efficient at turning fuel into electricity than conventional coal and nuclear resources.

Third, competitive wholesale markets shift risk to the owners of generation resources who are best positioned to manage that risk. That is, if generation

owners do a poor job of maintaining their units that result in major breakdowns, the shareholders are on the hook for those poor practices, not customers. Similarly, there is an incentive to build and maintain the lowest cost technologies, and not gamble with money from captive customers on projects that are high risk such as what we have observed in Mississippi, Georgia, and South Carolina in recent years with Integrated Gasification Combined Cycle (“IGCC”) coal plants and new nuclear units, of which no new construction had started in decades.

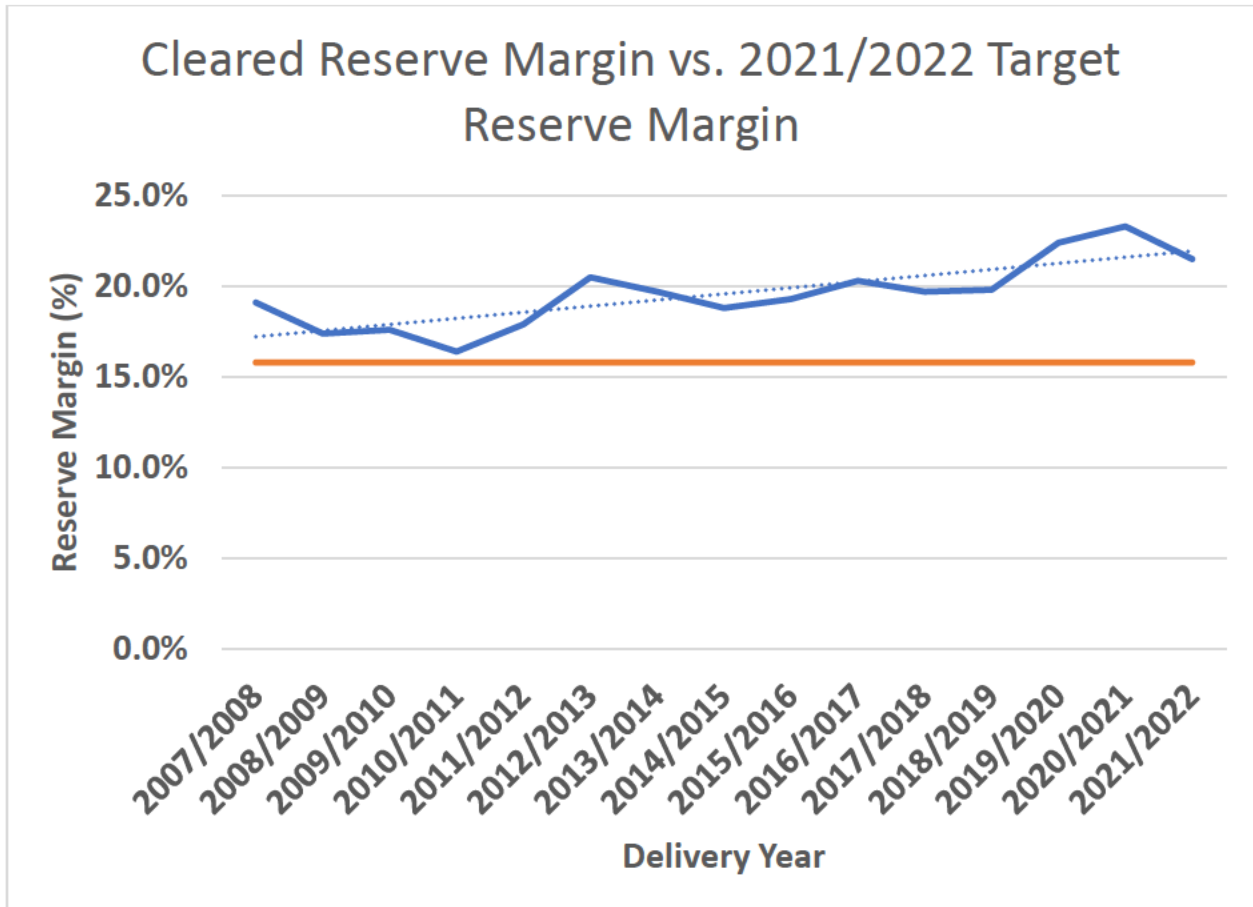
Fourth, competitive markets reflect underlying conditions with commodity prices, trends in demand, and technological innovation. We can see this as combined wholesale prices have come down in PJM from their peak in 2008. When power demand and gas prices were at their highest. That is the wholesale portion of the power costs have been declining, especially energy prices as shown in the figure below using PJM data. Overall, PJM wholesale power costs (which also include transmission) have been trending down since 2011 mostly carried by the downward trend in wholesale energy prices during this period as shown in Figure 2

Figure 2: PJM Wholesale Costs 2011-2019 (ytd)



Fifth, competitive wholesale power markets ensure resource adequacy. Resource adequacy is a form of reliability that ensures there are enough resources to meet peak demands in both summer and winter. PJM has seen 35,719 MW of resource retirements since the start of 2010, while new entry including uprates to existing resources has been 43,884 MW since the start of the 2010/2011 Delivery year. Not only have costs come down, but reliability margins have exceeded the target reserve margin that currently stands at 15.8% as shown in Figure 3.

Figure 3: Reserve Margins Over Time in PJM



By any measure, PJM’s markets have provided enough new entry to counter the retirements seen while also improving resource adequacy and reducing wholesale costs to customers.

But what **A MARKET IS NOT** is a perpetual cash machine for existing/incumbent generation owners that prevents lower cost technologies for entering the market to compete away profits above competitive levels, prevents lower prices from new and innovative technologies and process to be reflected in the market, shifts risks back to customers going back to the “bad old days” of regulated generation, and cannot maintain reliability. **THAT IS A BROKEN MARKET.** That is not a competitive market, that is crony capitalism in which profits are privatized and losses are socialized.

So, keep in mind, the Ohio nuclear resources are profitable on an operating basis and do not need subsidies for the foreseeable future. The FES that emerges from bankruptcy will no longer have the debt service that it once had and has stated that the revised bankruptcy plan just announced April 21, “will significantly strengthen our financial position and allow FES to emerge as a fully integrated independent power producer.” This statement reveals much. First, FES entire portfolio but for West Lorain has submitted retirement notices which means that the new FES would be an IPP with one plant. That seems highly implausible. Second, since the bond holders appear to the new equity holders, why would they agree to become equity holders in a single peaking plant? Other resources slated for retirement are likely to “rise like Lazarus”, but only those with the most to offer competitively. Perry and Davis Besse are good candidates given their profitability.

Third, public PJM auction data from indicates that a significant amount of FES capacity slated for retirement must have cleared in the previous 2021/2022 capacity auction to meet the clearing price and quantity seen in the auction...Some of this capacity is slated to retire after June 1, 2022 (Sammis 5, 6, and 7). That leaves cleared capacity coming from retired resources, and FES claims Davis Besse and Perry did not clear, so the capacity had to come from elsewhere. Coincidentally, the amount of capacity not cleared is about the capacity of the two nuclear units combined. This is another sign that would indicate the Ohio nuclear units are not going away anytime soon.

In some ways it appears to be a shell game, hiding cleared capacity in units slated for retirement (or already retired) to eventually be transferred over to nuclear plants when they remain in service.

What would the \$9.00/MWh Clean Air Credit under House Bill 6 do for FES? It would simply increase the profitability of Davis Bess 240 percent and Perry by 210 percent.

Would it reduce emissions? No. The Ohio nuclear resources are not going away and if anything, by providing money to the OVEC coal units, may increase emissions from a coal plant that is at best break even in the current market environment.

Would PJM energy market prices increase if Ohio nuclear retired? Since these resources are not likely to retire, we won't ever find out. But hypothetically, let's say 14 GW of nuclear capacity disappeared. A 2016 PJM Study on the Clean Power Plan showed that total generation costs would come down, led by lower energy prices, but higher capacity prices. So overall the answer is still, "No".

And hypothetically, if the nuclear units were to retire, would paying them an additional \$9.00/MWh be a cost-effective way to avoid carbon dioxide emissions? No. Let the market work and bring in cleaner renewable or combined cycle resources which will enter regardless and have an effective abatement cost of zero to reduce emissions at the margin.

This concludes my prepared remarks, I thank you for your time, and I look forward to your questions on this paper and on any other issues related to the functioning of PJM's markets as it relates to the Perry and Davis Besse facilities.