Review of PJM Interconnection Response to the Pennsylvania Public Utility Commission & Ohio Consumers' Counsel Requests to Analyze Certain Impacts of Nuclear Power Plant Retirements

On June 5, 2019, PJM released a report titled "PJM Interconnection Response to the Pennsylvania Public Utility Commission & Ohio Consumers' Counsel Requests to Analyze Certain Impacts of Nuclear Power Plant Retirements" (PJM report). The report confirms that the least-expensive way to maintain environmental progress is to preserve existing zero-emission nuclear plants and replace carbon-intensive coal generation with generation from renewables and natural gas. This is consistent with conclusions reached in multiple studies by academic experts, the Union of Concerned Scientists, Third Way, and independent consulting firms. The results of the report are summarized in the following table.

Case	Assumptions	Result compared to 2019
Base	• 11.9 GW coal retires • 21.9 GW gas additions • 5.4 GW nuclear retires[a] • 3.2 GW wind additions • 3.9 GW of solar additions	• $1.6B consumer savings • 4.3M tons carbon reduction
Retain Nuclear	• 11.9 GW coal retires • 21.9 GW gas additions • 1.5 GW nuclear retired[b] 3.9 GW nuclear preserved[c] • 3.2 GW wind additions • 3.9 GW of solar additions	• $2.1B consumer savings • 19.4M tons carbon reduction
Retain Nuclear w/ Fewer Natural Gas Additions	• 11.9 GW coal retires • 16.0 GW gas additions 4.6 GW gas cancelations • 1.5 GW nuclear retired[b] 3.9 GW nuclear preserved[c] • 3.2 GW wind additions • 3.9 GW of solar additions	• $1.7B consumer savings • 16.8M tons carbon reduction

[a] *Oyster Creek, TMI, Beaver Valley 1&2, Davis-Besse and Perry*

[b] *Oyster Creek retired in September 2018 and TMI will retire in September 2019*

[c] *Beaver Valley 1&2, Davis-Besse and Perry*

Key Points:

- Consumer savings in the Base Case results are driven by the replacement of almost 12 GW of retired coal with gas-fired generation that is going to happen regardless of whether the Pennsylvania and Ohio nuclear plants are preserved. It is therefore misleading to claim, as some have, that PJM's analysis shows that allowing the zero-carbon nuclear plants to retire saves consumers money and improves the environment. PJM's analysis demonstrates that preserving these nuclear plants would save customers $474M on top of the Base Case savings from coal-to-gas switching.
- The results of the Retain Nuclear Case (First Simulation) prove that retaining the remaining three nuclear plants at issue would reduce consumer payments by $474 million in addition to the $1.6B of savings driven by coal retirements. And keeping these nuclear plants online also would increase the CO_2 avoided from 4.3M tons to 19.4M tons. This is equivalent taking roughly half of the cars registered in Pennsylvania and Ohio off of the road. Keeping these nuclear plants online also results in further reductions of SO_2 (8,500 tons) and NO_x (9,700 tons), which are both significant contributors to poor air

quality, including smog and particulate pollution. Pairing these environmental benefits with consumer savings of almost $500M is big win for consumers in Pennsylvania, Ohio, and across PJM.

- In the Retain Nuclear w/ Lower Gas Additions Case (Second Simulation), the basis for PJM's assumption that 4.6 GW of new gas plants will be canceled is unclear. At the outset, we note that this scenario similarly demonstrates that preserving the three nuclear plants would result in a higher level of consumer savings and a lower level of harmful emissions. However, we question the usefulness of this scenario because developers committed to those plants before the relevant retirements were announced, and PJM has not disclosed which gas plants have supply obligations under capacity auctions already run for delivery years starting in 2020 and 2021. These obligations cement their commitment to development regardless of actions taken by states to preserve emissions-free nuclear power. It is also unclear how PJM could differentiate between discreet impacts of state action to retain nuclear versus organic development failures. PJM data demonstrates that roughly 20% of gas units that reach the assumed development stage (an executed Interconnection Services Agreement) do not get built.[1] Finally, PJM's auction data shows that, for years, PJM has attracted robust new investment despite thousands of megawatts of subsidized clean resources participating in the market. The Retain Nuclear Case is therefore more realistic in the event Pennsylvania and Ohio take action to preserve the nuclear plants in question.
- Although the report estimates emissions avoidance, it provides no information as to the benefits of doing so. The Regional Greenhouse Gas Initiative (RGGI) program and the federal Social Cost of Carbon provide examples of the value PJM states place on CO_2 emissions reductions. By 2023, 35% of PJM load will be covered by RGGI – Delaware and Maryland already participate and New Jersey and Virginia expect to join well before 2023. Using the RGGI price and an estimate of the federal Social Cost of Carbon, as incorporated into statute in Illinois and New Jersey, the value to consumers of preserving zero-emissions nuclear power becomes even more significant, as shown in the table below:

Comparison Case	**Net Tons CO_2 Avoided**	**Additional Consumer Value at $5.27/ton (RGGI[2])**	**Additional Consumer Value at $44/ton (Social Cost of Carbon[3])**
Retain Nuclear	19.4M	$102M	$776M
Retain Nuclear w/ Fewer Natural Gas Additions	15.1M	$80M	$604M

<u>Bottom line:</u> PJM's report finds that retaining Pennsylvania and Ohio's at-risk zero-emission nuclear provides significant environmental improvements while saving consumers billions of dollars.

[1] https://www.pjm.com/-/media/planning/res-adeq/2018-pjm-reserve-requirement-study.ashx?la=en, at pg. 31.
[2] https://www.rggi.org/auctions/auction-results.
[3] https://www2.illinois.gov/sites/ipa/Documents/2018ProcurementPlan/Zero-Emission-Standard-Procurement-Plan-Approved.PDF (citing Interagency Working Group on Social Cost of Greenhouse Gases, United States Government, "Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866," August 2016, available at https://www.epa.gov/sites/production/files/2016- 12/documents/sc_co2_tsd_august_2016.pdf).