

“Facts are stubborn things; and whatever may be our wishes, our inclinations, or the dictates of our passion, they cannot alter the state of facts and evidence.”
– Former U.S. President John Adams (December 1770)

HOW FUELS PERFORMED WINTER 2018: MYTHS VS. FACTS

Competitive wholesale power markets, such as those in the PJM Interconnection, are under false attacks by vested interests that are seeking to regain the market share they lost to their more affordable and efficient competitors, including EPSA members. Those that would undermine competitive markets and consumers to regain market share by force of law through discriminatory federal and state subsidies continue to claim that somehow their coal and nuclear assets are uniquely indispensable to a reliable and resilient power grid.

Those who seek such costly and market-distorting subsidies attempt to make much out of a paper released by the National Energy Technology Laboratory (NETL) earlier this year. The NETL paper focuses on the “Bomb Cyclone” storm this past winter. During that time, demand for electricity and natural gas surged during bitterly cold temperatures. The paper purports to show that coal plants increased generation more than other generator types in six U.S. RTO/ISO regions during this time. From this data, NETL improperly concludes that coal plants contributed more to resilience than other fuels, especially more so than natural gas. However, as a wide variety of experts pointed out, the NETL paper misses the mark as summarized below. In sum, the NETL paper is not a basis for subsidies.

➤ NETL Confuses Changing Economics of Fuel Types with Actual Reliability Needs

- ❖ “[T]he report erroneously concludes that the relative economics of coal and nuclear vs. natural gas during the cold snap, which drove the dispatch of coal units (i.e., that the cost of coal was lower), indicates that the system would have faced “shortfalls leading to interconnect-wide blackouts” during this period. As PJM demonstrated in its own report on system performance during the cold snap, PJM had adequate amounts of resources to supply power – the price of natural gas relative to coal and nuclear during the cold snap drove the dispatch decisions. During the cold snap, the region experienced an increase in the price of natural gas, which made coal resources (which often did not run under periods of lower natural gas prices) the more economic choice during times of high gas prices. But one cannot extrapolate from these economic facts a conclusion as to future reliability within PJM.” *Perspective and Response of PJM Interconnection to National Energy Technology Laboratories Report Issued March 13, 2018*. PJM Interconnection, 2018, p. 1, available at: <http://www.pjm.com/~media/library/reports-notices/weather-related/20180413-pjm-response-to-netl-report.ashx>.
- ❖ “Rather than dig into indicators of availability, such as forced outage rates and maximum economic offers, the NETL study focuses on generation output. As such, the increases in coal-fired generation that NETL identifies during the storm are not a signal of disproportionate contribution to system resilience, but rather are an outcome of power generation economics and how energy [markets favor the lowest-cost resources available to meet demand](#).

As NETL itself points out, large increases in natural gas demand for a combination of home heating and electricity production caused natural gas prices to spike during the Bomb Cyclone. This spike, in turn, contributed to [a price inversion](#) in short-term electricity markets, making coal- and oil-fired generation temporarily more economic than gas-fired generation. At the same time, electricity demand surged, which further contributed to increased dispatch of both coal-fired and oil-fired generation – the latter of which occurred largely at dual-fueled facilities.” ***Understanding Grid Resilience Implications for Market Design: Beyond the NETL Study.*** Karen Palmer and Daniel Shawhan of Resources for the Future and Devin Hartman of R Street Institute, <https://www.utilitydive.com/news/understanding-grid-resilience-implications-for-market-design-beyond-the-ne/522052/>.

- ❖ “The increased coal output is not a metric of resilience, but rather just a testament to the poor economics of coal generation that so much capacity had been idle or only partially utilized. While coal generation increased 36% during the Bomb Cyclone event relative to December versus a 14% increase for gas, the report notes that oil and dual fueled generation increased by over 1000%. Of course, that is only because oil was infrequently used for electricity generation in December because it costs an order of magnitude more than natural gas.” ***Fossil Lab Misses Mark in Cold Weather “resilience” Report.*** Michael Goggin, Vice President at Grid Strategies LLC - for the Sustainable FERC Project, <http://sustainableferc.org/fossil-lab-misses-mark-in-cold-weather-resilience-report/>.
- ❖ “NETL decided to consider the incremental generation from each fuel source—that is, how much *more* electricity was produced by each fuel during the bomb cyclone—as a metric for which fuel provides the grid with resilient services. As they put it: “...we examine resilience afforded by each source of power generation by assessing the incremental daily average gigawatt hours during the BC event above those of a typical winter day.” This is a bogus metric not only because it simply reflects the amount of unused or idle generation in the system, but also because the reference time period (the first 26 days of December) is a period when there wasn’t much generation from coal and oil. Turns out, there is a lot of coal-fired capacity sitting around because it is more expensive to run compared to natural gas. The only time it makes economic sense to call on these more expensive resources is when demand pushes electricity prices high enough, as it did during the bomb cyclone.” ***Department of Energy Releases Bogus Study to Prop Up Coal Plants.*** Jeremy Richardson, Union of Concerned Scientists, <https://blog.ucsusa.org/jeremy-richardson/department-of-energy-releases-bogus-coal-study>.

➤ **NETL Erroneously Suggests Having “Onsite Fuel” is a Singularly Relevant Aspect of Resilience**

- ❖ “The NETL report does note that nuclear plants did not significantly increase their output during the Bomb Cyclone event, despite the fact that nuclear plants meet the report’s criteria of being “baseload” and having onsite fuel, while the oil generators that did increase their output do not meet those criteria. That confusion clearly shows that none of those metrics (increased utilization during times of high demand, having onsite fuel, or being “baseload”) are a meaningful measure of resilience.

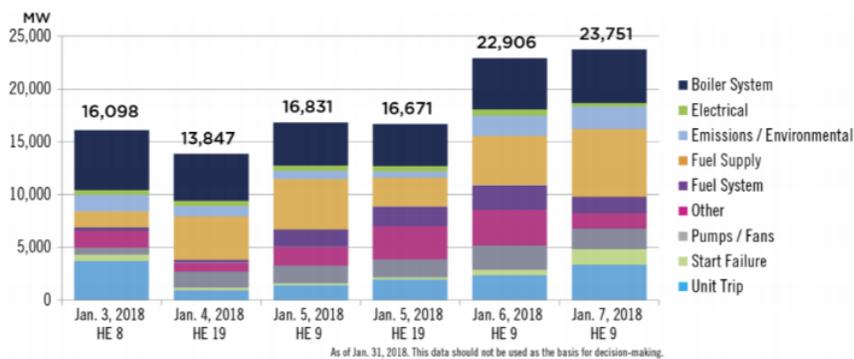
A more accurate way to assess the performance of resources is their rate of failure during the Bomb Cyclone event. The following table from [a report on the Bomb Cyclone](#) (page 21) by PJM, the grid operator for the Mid-Atlantic and Great Lakes region, shows that in many cases coal plants experienced higher failure rates than natural gas and other resources, particularly during the early part of the event.

PJM generator forced outage rate as a percent of committed capacity during Bomb Cyclone

	Jan. 7, 2014 HE 8		Jan. 3, 2018 HE 8	Jan. 4, 2018 HE 19	Jan. 5, 2018 HE 9	Jan. 5, 2018 HE 19	Jan. 6, 2018 HE 9	Jan. 7, 2018 HE 9
Coal	18.6%	Capacity Performance	13.3%	9.0%	11.3%	10.6%	12.9%	12.4%
		Non-Capacity Performance	13.3%	7.6%	6.6%	7.0%	8.5%	8.7%
Gas	32.7%	Capacity Performance	7.1%	4.5%	8.2%	10.8%	16.9%	18.3%
		Non-Capacity Performance	7.7%	19.8%	19.9%	14.6%	17.2%	19.4%
Oil	27.3%	Capacity Performance	26.7%	5.3%	6.9%	18.8%	22.6%	21.5%
		Non-Capacity Performance	13.3%	5.3%	6.6%	6.5%	22.0%	25.9%
Other	15.2%	Capacity Performance	0.9%	0.7%	0.7%	0.5%	1.9%	1.7%
		Non-Capacity Performance	4.9%	3.9%	5.0%	4.0%	5.0%	3.4%

Coal generators were no more reliable than other resources because equipment failures, not fuel supply issues, were the primary cause of generator outages during the Bomb Cyclone, as shown in the chart below (from page 19 of PJM’s report).” *Sustainable FERC Project.*

Figure 17. Forced Outage Causes



- ❖ PJM also outlines that having on-site fuel did not guarantee reliability: “Data obtained through generator outreach indicates that about 28 percent of combined coal and oil units (by ICAP MW) with on-site fuel inventories reported issues with fuel resupply due to fuel transportation constraints. For coal-fired units, the most frequently reported transportation issues were barge resupply delays due to frozen rivers and increased barge traffic. For oil units, the most frequently reported transportation issues were truck resupply delays due to reduced availability of fuel trucks at bulk terminals and road closures. To a lesser extent, barge resupply delays due to frozen rivers were also reported. Coal supply issues were also reported as “coal quality” issues and these “coal quality” issues are mostly freezing issues that occur in the conveyance of coal from the pile to the boiler. The “other” category is primarily landfill gas and hydroelectric.” *PJM Cold Snap Performance Dec. 28, 2017 to Jan. 7, 2018. PJM Interconnection, 2018, p. 16, available at: <http://www.pjm.com/-/media/library/reports-notice/weather-related/20180226-january-2018-cold-weather-event-report.ashx>.*
- ❖ “Instead of using NETL’s flawed analysis, looking at the actual failures rate of different generation resources during the extreme weather event provides a more accurate picture of the reliability and resiliency impacts. PJM did this, it turns out. As shown in [Figure 1 on p2.], PJM’s analysis finds that coal plants experienced similar failure rates as natural gas power plants during both the 2014 and 2018 cold snaps. For example, on January 7, 2018, a peak winter demand day, PJM reported 8,096 MW of natural gas plant outages, 6,935 MW of coal outages, 5,913 MW of natural gas supply outages, and 2,807 MW of “other” outages (which includes wind, solar, hydro, and methane units).

The NETL study completely ignores the fact that baseload resources like coal and nuclear [also pose challenges to reliability](#)—because of limited flexibility, [vulnerability to extreme weather events](#) (like the polar vortex and bomb cyclone), extreme heat and drought [affecting cooling water](#), and [storm surge](#). During extreme cold, pipes and even piles of coal can freeze, meaning that coal plants can't fire up.” *Union of Concerned Scientists*.

➤ **NETL Fails to Recognize the Improvements that Came with PJM’s Capacity Performance Plan**

- ❖ “Capacity Performance was designed to ensure that generators are available when required. PJM has seen significant new entry (nearly 40,000 MW) of a diverse mix of fuel types since the inception of the capacity market. PJM has experienced over 20,000 MW of coal retirements in the same period, and the average age of the coal units that have retired was over 50 years. In short, the markets have helped to incent new efficient generation of all fuel types and helped to retain existing generation needed to serve electric needs of customers in the PJM footprint. Overall, there was a significant reduction of forced/unplanned outages when comparing the winter of 2014 to the recent cold snap. The reduction in forced outages is partially due to the lower impact of wind chill during the cold snap compared to the 2014 cold weather events.” *PJM Cold Snap Analysis at p. 2*.
- ❖ “Unlike the assessments of these extreme weather events conducted by the RTOs themselves, the NETL study offers only a cursory discussion of generator availability (the converse of generator outage rates) and does so only for the 2014 Polar Vortex event, not the Bomb Cyclone. Furthermore, it fails to note major market-design changes in ISO-NE and PJM after the Polar Vortex that incented and achieved greater cold-weather fuel assurance by gas-fired generators. It is also important to recognize that availability is not homogeneous within fuel types, as a fuel-focused analysis might suggest, but instead can vary importantly with plant location, condition and maintenance measures, weatherization status, [fuel arrangements](#) and other factors.” *Resources for the Future and R Street Institute*.
- ❖ “[R]egional transmission organizations (RTOs) and independent system operators (ISOs) were prepared for the cold snap, and the markets performed as expected. PJM in particular put systems in place to prepare for extreme cold weather following the [2014 Polar Vortex](#), and electricity markets in the Eastern U.S. are organized to provide payments to power plants for providing either energy (electrons to the grid) or capacity (the ability to switch on and provide a certain level of output if called upon). As fossil generators retire because they are uneconomic, plenty of other resources are under construction or in advanced planning stages and will be ready at the time they’re needed. This is why planning for future electricity needs is critical, and this is the responsibility of regional grid operators—one they take quite seriously.” *Union of Concerned Scientists*.

➤ **NETL Focuses on the Wrong Issue**

- ❖ “More importantly, the Bomb Cyclone event shows that the focus should be on the power lines and equipment that deliver electricity to customers, not the power plants that supply the generation. While no customers lost power during the Bomb Cyclone because of generation shortages, the sole focus of the NETL report, hundreds of thousands did lose power when electricity distribution lines and equipment failed in the extreme weather. This confirms [previous analysis](#) that over 96% of customer outage hours result from severe weather, while only 1 in 10,000 are related to generation supply issues.” *Sustainable FERC Project*.