More Proof That We Need A Coal Fleet

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Recently, DOE's National Energy Technology Laboratory (NETL) issued a report analyzing the resilience of different electricity resources — coal, oil, natural gas, nuclear and renewables — in six RTOs/ISOs during the Bomb Cyclone (December 27, 2017 through January 8, 2018).[1] To evaluate their resilience, NETL used the National Infrastructure Advisory Council's definition of resilience which says in part, *"… The effectiveness of a resilient infrastructure or enterprise depends on its ability to anticipate, absorb, adapt to, and/or rapidly recover from a potentially disruptive event."* In this case, NETL evaluated resilience based on the contribution of each electricity source to meeting incremental electricity demand during the Bomb Cyclone. Incremental refers to the additional demand for electricity during the Bomb Cyclone as compared to a typical winter day. Here are just a few things in the report that we thought are worth mentioning.

The coal fleet was the most resilient source of electricity.

- *"… across RTOs, coal is the most resilient form of generation …" (p. 18 of NETL report)*
- *"In PJM, the largest of the ISOs, coal provided the most resilient form of generation, due to available reserve capacity and on-site fuel availability, far exceeding all other sources … without available capacity from partially utilized coal units, PJM would have experienced … blackouts." (p. 1)*
- *"In PJM, of the three major sources of electricity generation, only coal-fired generation exhibited significant resilience in response to the extreme weather event." (p. 4)*
- *"The most prominent example of generation resilience occurred in PJM … some coal-fired units were suddenly brought on line and others ramped up to accommodate the rapid increase in PJM electricity demand … coal units in PJM were uniquely positioned to provide the resilience needed at this critical point in time." (p. 12)*
- *Chart 1 (all six RTOs) and Chart 2 (PJM only) below show the percentage contribution of electricity sources to meeting incremental electricity demand during the Bomb Cyclone. These charts are based on data in the NETL report.*

NETL valued resilience at $3.5 billion in PJM alone.

- *In PJM "… it was primarily coal that responded resiliently, with some contribution from oil-firing units." (p. 16)*
- *In PJM, "The increase in the cost of energy services [during the Bomb Cyclone]…was $288M per day … This, in effect, represents a value of resilience … [of] $3.5 billion. Simulating the event … with future coal retirements is expected to produce higher energy costs and subsequently a higher value of resilience." (p.16)*

Natural gas prices were very high.

- *"… in eastern PJM, ISO-NE, and NYISO, gas and electric transmission were severely constrained, leading to all-time high gas prices in New York and elevated natural gas and electricity prices across each region." (p. 6)*
- *"… spot [gas] prices in New York reached $175/MMBtu …." (p. 8)*
- *"… natural gas prices in PJM spiked from a normal level near $3/MMBtu to $96/MMBtu at the Texas Eastern M3 interface … on January 5." (p. 14)*
- *Increases in spot gas prices for ISO-NE, PJM and NYISO were higher during the Bomb Cyclone than during the Polar Vortex. See Exhibit 1-20, p. 23.*

Renewables were detrimental to resilience.

- *"… cloud cover and wind speeds outside of operational parameters caused a reduction in average daily contribution from intermittent renewables … essentially imparting a resilience penalty to the system. This resulted in a need for dispatchable fossil generation to make up this generation in addition to its resiliency role in meeting the greater demand during the [Bomb Cyclone]." (p. 4)*
- *"Available wind energy was 12% lower during the Bomb Cyclone than for a typical winter day …." (p. 2)*
- *"Wind and solar had declines of 19% in MISO, 29% in SPP and 32% in ERCOT." (p. 5)*

Retirements may be underestimated.

- *"Retirement of aging coal and nuclear generation infrastructure may be underestimated which could give rise to reliability concerns and an inability to meet projected electricity demand …" (p. 2)*
- *"… coal units will experience repeated cycling … as cycling increases, economic damage escalates, leading to premature retirement." (pp. 25, 28)*

To our way of thinking, the NETL report demonstrates two things. First, the coal fleet performed very well, that is, it was very resilient. In fact, the coal fleet performed better than other resources when electricity was needed the most. This seems like an incontrovertible argument for preserving

the coal fleet. Second, a diverse mix of resources is really the best “source” of electricity. As we have said before, there is no single source of electricity that is the best all, or even most, of the time. Each resource has its own relative advantages. However, the continued retirement of coal-fueled generation leads inevitably to less resource diversity.

[1] *Reliability, Resilience and the Oncoming Wave of Retiring Baseload Units Volume 1: The Critical Role of Thermal Units During Extreme Weather Events,* March 13, 2018, DOE/NETL-2018/1881.