Counterflow

By Steve Huntoon

Fuel Security: PJM Does 'Seinfeld'

By Steve Huntoon

Jerry: "Well what's the show about?"

George: "It's about nothing."

— "Seinfeld"[1]

Setting the Stage

PJM's capacity market (the "Reliability Pricing Model") reversed a deteriorating reserve margin, efficiently assuring resource adequacy years into the future while integrating demand response and renewable resources.

It's been a bulwark against bailout claims for coal and nuclear units by enabling a transition from dirty coal and inefficient nuclear to cleaner natural gas and clean renewables. And the Capacity Performance refinement to RPM incents resources to be available when needed, further enhancing reliability.[2]

Notwithstanding all this, the coal/nuclear bailout lobby has created doubt about the "security" of generation resources that lack fuel on site, i.e., natural gas generators without oil storage backup and of course renewable (intermittent) resources generally. This has led to a new buzzword, "resiliency," as something other than "reliability" and resulted in a broad inquiry into "fuel security" at PJM.

Solution in Search of a Problem

Let's start by putting "fuel security" as a risk in context. Please recall what the Rhodium Group figured out for us in 2017 and nobody has refuted (emphasis added):[3]

"Between 2012 and 2016, there were roughly 3.4 billion customer-hours impacted by major electricity disruptions. Of that, 2,382 hours, or *0.00007%* of the total, was *due to fuel supply problems*. Interestingly, 2,333 of those customer-hours were due to one event in Northern Minnesota in 2014. And it involved a coal-fired power plant."

Thanks again, Rhodium Group, for this great emperor-has-no-clothes exposé.

Risk, or Lack Thereof, in PJM

So how can PJM come up with a "fuel security" problem? PJM acknowledges there's no problem now. But it creates worst-case scenarios for a potential problem in the future, say 2023-2024.

Here's how it goes. PJM created 324 scenarios, and in some of the most extreme, it found load shedding (outages) could occur.

Let's look at the *worst of the worst-case scenarios*, where PJM finds that there could be 83 hours of load shed for an average of 2,452.8 MW. Now 83 hours sounds like a lot, but we need to remember that load/demand during this peak period is about 140,000 MW. So when load shed is spread across the system, it's an average of 1.5 hours for any given customer.[4] So this worst of the worst-case scenarios is *tiny*.

Now, how *likely* is this worst of the worst-case scenarios to occur in any given year? For starters it's based on a 1-in-20-years extreme-winter condition. And it's based on a "high pipeline disruption," meaning the loss of an entire pipeline flow in a right of way. This is an extremely rare event and has never caused a major detrimental gas supply loss to PJM generation,[5] but let's be very conservative and assume there's a 1-in-10-year chance of that both happening in PJM and happening in the winter. Now, what's the chance of that disruption occurring at the same time as the extreme 14-day winter condition? About 1 in 6, because 14 days are about one-sixth of a three-month winter period.

OK, here's the math: 1/20 times 1/10 times 1/6 equals 1/1,200. Yes, you got that right. Once every 1,200 years we might experience a tiny 1.5 hours of outage for the average PJM customer. We should live so long.

But Wait, There's More

If you can believe it, this tiny risk overstates the real risk. Here's a few reasons why:

1. Winter generation capability is much more than summer capability. PJM doesn't appear to gather that data, but we know from New England that aggregate winter capability is about 8% more than aggregate summer capability.[6] In PJM, 8% more than summer capacity amounts to about 13,300 MW,[7] which is more than five times the 2,452.8 MW of projected average load shed in the worst of the worst-case scenarios discussed above.
2. It is not clear how PJM reflected, if at all, (1) load reductions in response to what would be very high prices in its worst-case scenarios, or (2) load management under PJM's direct control.[8]
3. PJM assumes system load reduction from voltage reduction is 1 to 2%, but elsewhere it says system load reduction capability is 2 to 3%.
4. PJM assumes no load reduction from public calls for voluntary conservation. This is not reasonable, especially in the context of the hypothesized emergency conditions.
5. PJM's assumed forced outage rate includes historical data that are obsolete in the wake of CP incentives/penalties that have increased generation availability.[10]
6. PJM appears to assume no import assistance from neighboring regions despite a history of such assistance, such as during the polar vortex.[11]

Even if there were a realistic scenario that

Columnist Steve Huntoon says PJM's fuel-security "problem" is like "Seinfeld": a show about nothing. | *NBC*

Counterflow

By Steve Huntoon

projects load shed, we would then need to ask what it would cost to avoid an incremental X MWh of lost load relative to the value of lost load of those megawatt-hours. It would be obvious that making consumers pay for more "fuel security" makes no sense.

And it's more than just money. Devoting time and attention to things that don't matter takes time and attention away from things that do, like cybersecurity.

At the end of the day, PJM has hypothesized a tiny risk that has a tiny chance of happening and could not possibly justify significant consumer costs.

It's our version of "Seinfeld": a show about nothing. ■

[1] https://www.youtube.com/watch?v=EQnaRtNMGMI.

[2] https://www.pjm.com/-/media/library/reports-notices/capacity-performance/20180620-capacity-performance-analysis.ashx?la=en (see for example conclusion at pdf page 34).

[3] https://rhg.com/research/the-real-electricity-reliability-crisis-doe-nopr

[4] The math is 83 load-shed hours times average load shed of 2,452.8 MW divided by 140,000 MW of peak load.

[5] "In general, the interstate pipelines have experienced very few major line failures over the last several decades. The frequency and severity of disruptions have not created any major detrimental loss of natural gas supply to PJM generation, in part because the majority of events have occurred during the time of year when demand on the natural gas system is low." https://www.pjm.com/-/media/library/reports-notices/fuel-security/fuel-security-technical-appendix.ashx?la=en (pdf page 12). I am aware of only one "high pipeline disruption" in PJM, the 2016 explosion on a Texas Eastern line in Westmoreland County, Pa.; this event apparently did not affect generation.

[6] https://iso-ne.com/static-assets/documents/2018/04/2018_celt_report.xls ("Seasonal Claimed Capability" in Table 1.1 (Summer) and Table 1.2 (Winter). Monthly capability reports are here, https://www.iso-ne.com/isoexpress/web/reports/operations/-/tree/seasonal-claimed-capability.

[7] If we assume that summer capacity resources are only equal to the reliability requirement of 166,355 MW, https://www.pjm.com/-/media/markets-ops/rpm/rpm-auction-info/2021-2022/2021-2022-bra-planning-period-parameters.ashx?la=en, then 8% of those resources is 13,308 MW.

[8] PJM does, of course, include programmatic DR as a resource but does not include any other load response to what would be very high prices. With regard to direct control load management, there are 2,593 MW of such summer capacity, some but not all of which is air conditioning load control not relevant to the winter https://www.pjm.com/-/media/library/reports-notices/load-forecast/2019-load-report.ashx?la=en (pdf page 65, column for year 2013-2014).

[9] https://www.pjm.com/-/media/training/nerc-certifications/gen-exam-materials/gof/20160104-capacity-emergencies.ashx?la=en (slide 46). After that range was developed, American Electric Power added voltage reduction capability in Ohio.

[10] "During the cold snap of 2017-18, Capacity Performance resources' forced outage rates were significantly lower than the same resources' outage rates during the 2014 polar vortex (5.5% vs. 12.4%)." https://www.pjm.com/-/media/library/reports-notices/capacity-performance/20180620-capacity-performance-analysis.ashx?la=en (pdf page 4).

[11] "Data Request for January 2014 Weather Events," Letter from PJM Counsel James M. Burlew to FERC Representative David J. Burnham, Jan. 10, 2014 (pdf pages 18-19).