

Constellation's Perspective on PJM CIFP Proposal

July 27, 2023

Constellation's perspective on Capacity Market Reform

- Constellation supports the RPM reform framework as directed by the PJM Board and the CIFP. We support the following elements of the PJM proposal:
 - Implement the best possible modeling of reliability risk in all periods of the year
 - Moving to an EUE-based, rather than LOLE-based, reliability standard
 - Resource accreditation based on marginal ELCC, applied to all resource types
 - Strong performance incentives tightly linked to the highest-risk periods of the year
- However, there are several areas where PJM's proposal should be modified to produce improved reliability and/or higher economic efficiency
- This presentation focuses on the areas where we propose to modify PJM's proposal and some initial thoughts on the discussed risk modeling revisions
- Constellation will bring a revised package to the CIFP on August 7

Constellation recommended five specific improvements to PJM's proposal

1. Shorten forward term of capacity auction to prompt
 - Continued support
2. Maintain meaningful performance incentives with a floor on the number of PAIs
 - Continued support (30 hour floor)
3. “Pay as you go” implemented as payment to resources at end of year
 - Considering removing from the Constellation package
4. Capacity suppliers should be able to reflect their assessment of all commercial risks of capacity obligation in their offers
 - Continued support
5. Meeting the reliability standard also requires energy and ancillary services market reform reflecting need for additional “uncertainty reserves.” PJM and stakeholders should commit to an energy market reform to support the CIFP.
 - Continued support - Reserve Certainty at MRC

1. Moving to prompt auction will improve reliability and market efficiency



Acknowledges change in construction timeline for new resources

- Prompt auction improves market efficiency and leads to a more predictable, reliable portfolio of resources because:
 - Physical investment and retirement decisions reflected in price signal
 - Resource accreditation more accurate, particularly with ELCC-based accreditation
 - Continued facilitation of demand response
 - Improved insight into interconnection status
 - Certainty of fuel supply arrangements
 - Less forecast risk around key parameters – load forecast, intermittent ELCC, load deliverability, etc.
 - Less subject to gaming around resource entry/exit
- Constellation proposes moving to a single prompt auction from the current 3-year forward
 - Base residual auction occurs 6 - 12 months prior to delivery year
 - Incremental auctions eliminated or reduced to one depending on timing
 - Pre-auction timeline/signposts otherwise unchanged
 - Auction mechanics (demand offers clearing) unchanged

2. Maintain meaningful performance incentives

- Performance penalty/bonus rate should continue to be based on Net CONE, not auction clearing price
 - Original logic of CP was that performance shortfalls should be based on the replacement cost of new capacity, or Net CONE; this logic is still valid
 - Performance penalty rate for actual PAIs should remain at its current level of Net CONE / 360
- Constellation supports a lower annual stop-loss
- Constellation also supports the previous proposal of a 360-interval floor on the number of PAIs
 - Infrequent PAIs under existing system do not discipline behavior well; more frequent assessment needed to provide ongoing incentives
 - Considering a reduction to from 30 to 20 hours (240 intervals) and a simplified metric for identifying the relevant intervals
 - Potentially fill the intervals beyond actual PAIs with up to the 120 highest load intervals for each of the summer and winter seasons

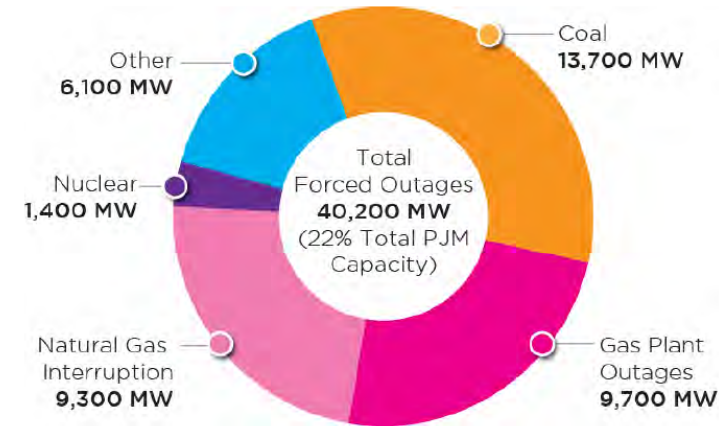
Resource Accreditation Should be Based All Historical Performance Data Including the 2014 Polar Vortex

- PJM risk modeling must include observed data especially for calculation of ELCC values
 - If only looking back to 2012 now for resource performance, we could lose valuable information in just a few years.
 - PJM’s proposal to base ELCC on 10 years of performance data is the bare minimum and ideally should be double that. Going forward the start date lookback period for performance data should remain 2012 until a full 20 years of historical data is included.
- According to PJM’s published reports:
 - 2014 Polar Vortex – 40,200 MW of forced outages – 22% of the total PJM capacity
 - 2022 Winter Storm Elliott – 46,959 MW of forced outages – 24% of the total PJM capacity



Analysis of Operational Events and Market Impacts
During the January 2014 Cold Weather Events

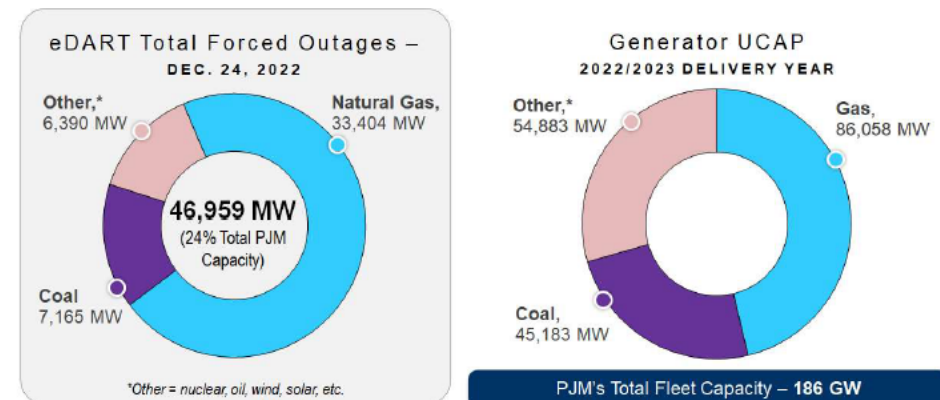
Figure 17: Outages by Primary Fuel – January 7, 7:00 p.m.



Forced Outage Analysis

As presented in Figure 29, the majority of forced outage MW were from natural gas facilities. Approximately 70% of all outages were natural gas, about 16% coal, and the remainder were oil, nuclear, hydro, wind and solar.

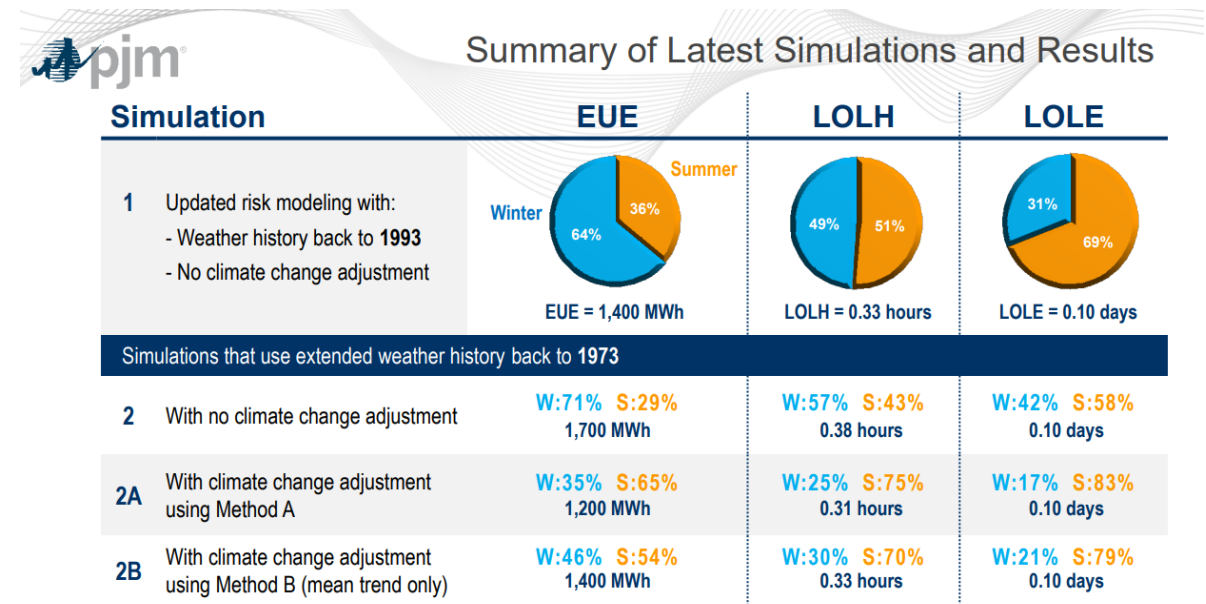
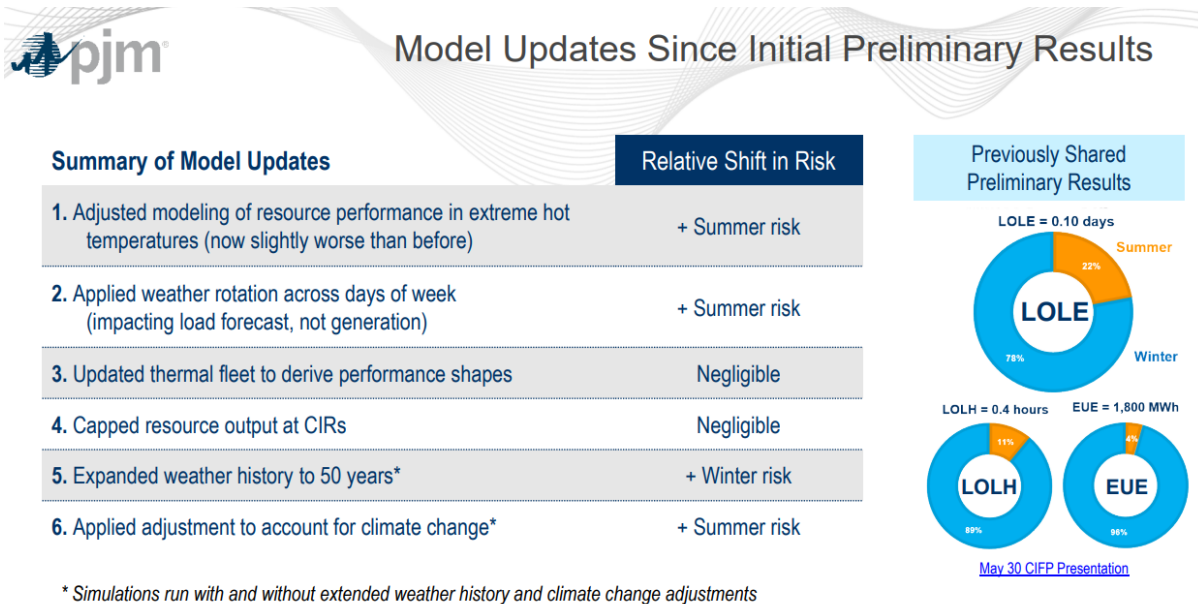
Figure 29. Forced Outages



As shown in the Figure 30, forced outages increased significantly and quickly throughout the day on Dec. 23 and peaked at over 46,000 MW at 07:00 on Dec. 24. Even as forced outage rates declined from the peak, they remained at an unacceptably high level through Dec. 25.

Risk Modeling to Include All Data Observations

- Extended history provides useful data observations regarding the impact of extreme weather
- Move to 50-year history without the climate change adjustment
- Agree that it can't be known how the different weather events from the 70s and 80s would look today, but incorporating them into the models still provides beneficial insights
- Use of the actual data without the climate change adjustments best approach at this time



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