Capacity Accreditation Enhancements – Unit-Specific Performance

Problem / Opportunity Statement

After the FERC approved the new marginal ELCC capacity accreditation methodology for all resources in Docket ER24-99, PJM provided significant additional detail related to the calculation methodology in response to Stakeholder request. Based on that information, certain assumptions used in that methodology should be reexamined. Given the large adjustments recently announced to near-term load growth expectations and continued retirement declarations, it has become increasingly important to determine whether and how the accreditation approach as currently implemented will incent needed investment in new and existing resources to maintain resource adequacy.

Based on the information PJM published after approval of the marginal ELCC accreditation methodology, the following aspects of the ELCC methodology warrant further investigation:

1. The use of the historical look-back period that extends to 2012 for unit performance and 1994 for historical load and weather patterns.
2. The unit-specific performance adjustment methodology and the use of a class-based ELCC approach vs. unit-specific ELCC accreditation with consideration of the pros and cons of each.
3. The accreditation of new resources using their respective class average values.
4. The use of transmission system headroom in calculating ELCC accreditations.

1. Historical Look-back Period

As part of the additional education after FERC approval, PJM showed that its newly approved methodology concentrates the accreditation calculation for resources in a limited number of load and performance days. As a practical matter, most of performance attribution for resources comes from two days in January 2014 during the Polar Vortex. Similarly, the largest concentration of weather/load days used in resource accreditation stems from observations captured in 1994. These observations occur at the beginning of the unit performance history, which extends back to 2012 and the Load history, which extends back to 1994, respectively.

Key Historical Load and Performance Days Based on LOLH contribution

Load Day	LOLH Share
1/15/1994	8.2%
1/21/1994	7.3%
1/16/1994	6.0%
1/20/1994	5.4%
1/19/1994	4.4%
2/19/2015	4.0%
2/20/2015	2.9%
2/16/2015	2.4%
1/8/2014	2.3%
7/29/2006	2.1%
1/18/1994	2.1%
1/7/2018	2.0%
7/17/2011	2.0%
1/6/2018	1.9%
2/3/1996	1.8%
7/21/2011	1.8%
7/17/1995	1.7%
7/15/2011	1.7%
1/28/2014	1.6%
7/8/1995	1.5%

About 60% of the LOLH is concentrated in 20 **load days**:

- 14 in the winter
- 6 in the summer

Performance Day	LOLH Share
1/7/2014	43.2%
12/24/2022	11.9%
1/8/2014	4.2%
1/28/2014	2.1%
12/26/2022	1.9%
1/22/2014	1.8%
7/18/2012	1.7%
12/25/2022	1.5%
7/17/2012	1.2%
6/29/2012	0.9%
10/30/2012	0.9%
1/31/2019	0.7%
12/23/2022	0.5%
6/29/2021	0.4%
7/25/2016	0.4%
8/25/2020	0.4%
7/7/2012	0.4%
7/19/2012	0.3%
7/18/2013	0.3%
7/17/2013	0.3%

About 75% of the LOLH is concentrated in 20 **performance days**:

- 9 in the winter
- 11 in the summer

In describing these results, PJM explained that for this result to materially change over time, the model would need to incorporate a weather/load history and unit performance history that reflects similar conditions to those experienced during the dates used for resource accreditation. The mere fact that those dates are the basis for such a large proportion of resource capacity accreditation indicates that such change will be slow if not unlikely, given that the history of both weather/load and resource performance that has been experienced since 1994 and 2014, respectively, has not recurred to any meaningful extent.

Under PJM's prior Capacity Market accreditation that used EFORd for dispatchable resources, those resources had the ability to improve resource accreditation through investment in equipment and changes to asset management practices. Over time, the improved forced outage performance achieved by resources making those investments would be reflected in their capacity accreditation numbers, resulting in a positive incentive to make those incremental investments.

Under the ELCC accreditation regime where the assessed accreditation of a resource does not directly reflect historical investments made to improve resource performance, that incentive is significantly diluted. Because under the new approach, where accreditation is heavily concentrated in 10-year-old performance data, investments made since that time to improve performance may not be reflected, simply because there have been no weather/load days like those that occurred in 1994. This has two profound effects on the incentives in the market. First, resource owners will need to assess the likelihood of a recurrence of 1994 weather/load conditions to determine if a material change in resource accreditation is likely to occur. If not, resource owners' incentive to invest in additional performance improvements is minimized, given those numbers will remain fixed. Second, resource owners may look for opportunities to shed costs that may have been previously incurred to improve resource outage performance, if they perceive that those costs are not required to maintain the current ELCC accreditation value. While investments previously made to increase performance are now sunk costs, the costs associated with their maintenance are ongoing, which under the current methodology may no longer be worth carrying.

Problem/Opportunity Statement

In order to reinforce resource adequacy, as a matter of principle, capacity resources should remain incentivized to continue to invest in performance improvements in their facilities, and not rely on performance dictated by several days over a decade ago. The accreditation approach should be structured to create those incentives.

Unit-specific performance adjustments

A key component of PJM's new ELCC accreditation methodology is the unit-specific performance adjustment that modifies the unit-specific accreditation based on how the unit performed in comparison to the class during periods of system stress. While the class accreditation uses the marginal ELCC methodology, the unit-specific adjustment adopts a different approach in comparing performance between units and the class. Simply stated, the unit-specific adjustment compares the performance of the unit and class in all temperature bins in which a loss of load occurs. Notably, not all the temperature/performance pairs in a bin lead to loss of load. For that reason, the unit-specific adjustment methodology dampens differences between unit performance and class performance.

Under the prior accreditation approach, a resource owner could improve operational performance through capital investments in reliability and changes in asset management with the unit accreditation reflecting those improvements over time. However, under the new ELCC accreditation approach, even though the class accreditation relies solely on the class performance during expected loss of load events, a resource that has made those investments and overperforms relative to the class during a projected loss of load temperature/performance occurrence, will nonetheless be penalized through its unit-specific performance adjustment if it experiences poorer performance during a non-critical performance observation during the same temperature bin.

Moreover, using the current methodology, because of the limited observations of performance in the temperature bins that contain the loss of load occurrence, underperformance during just one non-critical observation has a significant impact on the adjustment, while the low sample size means the adjustment is not likely to materially change over time. As a result, the divergence between class accreditation and unit-specific performance adjustments will dampen the incentives needed to encourage investment in continuous performance improvement of capacity resources over the long-term. Stated differently, the use of an accreditation approach that relates directly to a unit's performance during a critical period would more accurately assess the individual unit's contribution to reliability, rather than relying on the class average and an adjustment factor.

New resource accreditation

The ELCC accreditation methodology's treatment of new and recently constructed facilities makes certain assumptions about the expected performance of those resources that may reduce or eliminate incentives to invest in them. PJM's ELCC accreditation methodology for newer resources manufactures a performance history for those that do not have their own history back to the beginning of the performance measurement period in 2012. That imputed performance history is simply the class average performance for the new resource's class. In practice, that approach will create perverse incentives in the Capacity Market.

There are several reasons that newer resources should not be assumed to perform according to the class average. First, newer resources are, by definition, more advanced and less prone to mechanical failure. Assuming that those resources will perform during stress conditions in accordance with the class average ignores the technological and reliability advancement that exists between the class average resource and a new resource.

Moreover, high performing resources that do have a significant performance history (even if not all the way back to 2012) will (because of the accreditation methodology) have a higher accreditation than newer resources that are dependent on the class average for the bulk of their accreditation.

Next, because the cost of a new resource is higher than that relative to the class average resource, using a class average accreditation disadvantages an investment in newer resources as compared to a resource that has an above-average accreditation.

Finally, new resources seeking to enter the PJM capacity market face a queue process that does not align with the current auction calendar, which is a disincentive to market participation of entirely new resources. Given the pressing need for additional dispatchable capacity, the market design must accommodate the addition of incremental dispatchable capacity on a faster track that will allow for a supply-side market response to capacity market price signals.

For those reasons, the new resource accreditation methodology discourages investment in new resources, keeping capital locked up in existing resources at or above the class average accreditation, which adds an incremental hurdle to maintaining resource adequacy as load growth increases and retirements accelerate.

Use of Transmission System Headroom to Accredit Non-Dispatchable Resources

In accrediting intermittent and environmentally limited resources using the marginal ELCC model, PJM calculates their deliverability and resulting contribution to reliability based on the use of system transmission system headroom. Importantly, under the current methodology, only those resources are eligible to apply to receive the benefit of winter Capacity Injection Rights (CIRs). Dispatchable resources do not receive the same treatment in the ELCC model, instead being limited in production in the model to the level of CIRs the unit already owns. While non-dispatchable resources are not able to sell UCAP over the amount of CIRs they own, their ELCC accreditations are affected by the credit they receive for production above that amount when PJM conducts the ELCC analysis.

Like non-dispatchable resources, dispatchable resources also can provide more capacity to the system under different system conditions. This is particularly relevant given the move toward higher risk in winter periods under PJM's ELCC modelling, when certain dispatchable resources can provide capacity meaningfully above their CIR values in those periods.

For that reason, PJM should make the ELCC calculation methodology consistent with respect to the treatment of CIRs and system headroom, regardless of resource type.