Resource Adequacy Package Summary[1]

Constellation largely supports the RPM (Reliability Pricing Model) reform framework as directed by the PJM Board and the CIFP-RA (Critical Issue Fast Path – Resource Adequacy) stakeholder process. Subject to making the improvements noted below, the PJM Board should direct PJM to file these important reliability changes at FERC no later than October 1, 2023, for application in next Base Residual Auction for Delivery Year 2025/26.

The following elements of the PJM proposal are of key importance to reliability:

- **Improve Risk Modeling:** Implement the best possible modeling of reliability risk in all periods of the year by moving to an EUE-based (Expected Unserved Energy), rather than LOLE-based (Loss of Load Expectation), reliability standard.
- **Accredit Resources Properly:** Apply marginal ELCC (Effective Load Carrying Capability) to all resource types.
- **Reward Top Performance:** Maintain robust performance incentives tightly linked to the highest-risk periods of the year.

However, there are a few areas where PJM's proposal should be modified or maintained to produce improved reliability and/or greater economic efficiency:

- **Move to a Prompt Auction:** Conduct BRA (Base Residual Auction) 6 - 12 months prior to delivery year with Incremental Auctions eliminated or reduced to one depending on timing recommended by the Board. Pre-auction timeline/signposts otherwise remain unchanged. Auction mechanics (demand, offers, clearing) remain unchanged.
- **Move to Seasonal Market:** Implement the two-season capacity market from PJM Package 1 to best reflect modeling changes and provide price transparency in support of reliability.
- **Improve Modeling Assumptions:**
  - Extend history of useful data observations regarding the impact of extreme weather with empirical evidence - recommend use of 50-year history.
  - Remove modeling of demand response and storage which is overly optimistic and doesn't reflect operational realities.
- **Reform the Energy/Ancillary Services Markets:** Commit (PJM, IMM, and stakeholders) to energy and ancillary service market reforms to support the resource adequacy reforms.

Constellation Rationale

PJM markets, including the capacity market, are challenged by the changing resource mix and evolving trends in electricity usage. Consumer preferences for emissions-free electricity continue to grow, and those preferences are also driving rapid changes in the way businesses and consumers use electricity. Taken together, these public and private actions are challenging the supply-side and demand-side assumptions that have traditionally underpinned the wholesale electric markets, including the capacity markets.

[1] Constellation is also offering the "Constellation – Annual Option" package. The Annual Option mirrors the Constellation Package while substituting PJM Package 2 for all cells in the matrix that are currently PJM Package 1. The Annual Option includes a commitment to move to a seasonal market as soon as practicable.

The challenges brought by these changes in supply and demand are exacerbated by increasing weather volatility and extremes. Winter Storm Elliot provides a recent and particularly telling example of the challenges PJM and its capacity market currently face. During the storm, a dangerously high percentage of gas-fired resources (along with coal, some solar, and other resource types) failed to meet their performance obligations. At the same time, units that did not clear the capacity market and did not receive capacity payments provided significant reliability benefits to the region. For example, several of Constellation's nuclear units located in the ComEd zone that failed to clear due to the application of the Minimum Offer Price Rule (MOPR) or because the market did not clear at the level of their Independent Market Monitor and PJM-reviewed costs provided significant reliability contributions to the grid, keeping the lights on when other generators that were receiving capacity payments failed to perform. In hindsight, the auction simply did not clear the right set of resources for the operating conditions that materialized. Markets that were designed and may have worked well under prior load, supply, and weather conditions are struggling to provide the desired degree of reliability as the underlying conditions have evolved. To keep pace, these markets must also evolve.

Constellation generally supports PJM's proposals as common sense, beneficial improvements that will better align PJM's resource adequacy expectations with actual resource performance. Prior to the 2014 Polar Vortex and Winter Storm Elliott, PJM assumed it had sufficient resources based on significant reserve margins (over 20%) cleared in its capacity market. However, the expected resource performance did not match actual performance, as an alarming number of resources – particularly gas-fired resources – failed to deliver when it mattered most. If PJM's markets continue to encourage the wrong resources (i.e., those that cannot consistently deliver at times of system stress), the next Winter Storm Elliot, Polar Vortex, or similar event could be catastrophic. PJM's key proposed changes intend to better quantify winter risks that have not been effectively quantified previously and to correct the course so PJM can avoid any such catastrophe. PJM has identified an immediate problem and proposes reasonable and effective solutions in response.

PJM's effort to improve its modeling will ensure that winter risk (which is growing and was largely ignored in the past) is more accurately reflected in the capacity that is committed. Moving to the expected unserved energy metric provides a more accurate means for assessing risk as this metric accounts for the potentially longer duration events seen during winter cold spells, where there is little warming during the daytime. Removing the capacity benefit of imports also will allow PJM to more accurately count only capacity that is meaningfully able to perform under stress, e.g., by reflecting the observed reality that imports are unlikely to materialize during widespread weather events.

Consistent with the modeling corrections, PJM's proposed updates to its ELCC mechanism will more closely align actual supply performance with expectations and reduce instances where capacity that is not capable of performing is nonetheless accepted as a capacity resource. Specifically, reflecting winter risk for thermal resources, deployment limitations for demand response, duration-based limitations for storage, and intermittency limitations for wind and solar will all work to ensure that capacity valuations more accurately reflect the actual capability of the resources. This will help address concerns raised by PJM that fuel assurance be valued, acquired, and compensated to prevent retirements or inadequate investments of resources necessary to serve load. Further, moving to a marginal accreditation metric will also more accurately reflect the next increment of capacity and is consistent with PJM's marginal approach for other market products.

PJM should retain robust capacity performance penalties/bonuses, performance assessment interval (PAI) triggers, and related mechanisms as this structure will incent resources to deliver when called on and ensure that customers receive the capacity services they have paid for. Relatedly, Constellation also agrees that suppliers should have a clear and meaningful mechanism for including the costs and risks of assuming a capacity supply obligation in their offers. Continuing PJM's robust set of performance incentives is necessary to ensure the lights stay on and customers get the reliability service they paid for; it is only fair that suppliers' offers can reflect the costs and risks for providing these services.

PJM's capacity market would benefit from shifting to a prompt auction conducted six to twelve months ahead of the Delivery Year. This will ensure that offers reflect more accurate cost, risk, and other assumptions given they are prepared significantly closer in time to when performance begins. Similarly, many of the assumptions PJM uses as inputs to the auction (e.g., load assumptions) will be more closely matched in time to when load is served. A prompt auction also will improve market efficiency and lead to a more predictable, reliable portfolio of resources because, among other things: (i) resource investment and retirement decisions can be more accurately reflected in price signals; (ii) resource accreditations will be more accurate, particularly after PJM implements its improved, marginal ELCC accreditation mechanism; (iii) developers will have improved insight into commercial operation timing, including interconnection completion; (iv) suppliers will have greater certainty as to their fuel supply arrangements and costs; and (v) PJM will have greater forecast certainty around key parameters such as load forecast (which some PJM stakeholders have expressed concern is frequently over-forecast), intermittent ELCC, load deliverability, etc.

PJM's move to the improved risk modeling and resource accreditation will now acknowledge previously ignored winter risks. PJM should implement the two-season capacity market from PJM Package 1 to best reflect the modeling improvements and provide price transparency in support of reliability. The seasonal market is more intuitive and transparent. PJM should consider additional granularity in the future after beginning with the two-season market.

While PJM's risk modeling assumptions seem accurate for the most part, certain assumptions related to demand response and storage that PJM proposes appear overly optimistic and should be corrected; these assumptions don't reflect the operational realities for those resources. When it comes to modeling expected unserved energy, PJM should rely on 50 years of data as this is readily available and provides a robust representation of extreme weather events.

Evolving capacity markets to match current energy preferences is not enough; PJM must similarly evolve its energy and ancillary services markets so they align more effectively with evolving system needs. As PJM completes the resource adequacy reforms, focus must shift from the capacity markets to improvements in the more significant energy and ancillary services markets. In particular, ensuring sufficient operating reserves and reserve-like products is critical for ensuring reliability in the operating day. PJM has acknowledged that its mechanism for incenting operating reserves is proving to be inadequate and needs reforming. In reaction to deficient performance by synchronized reserve resources, in May PJM began including a static adder, currently 30%, to its synchronized reserve requirement and has recently proposed a new senior task force to further consider improvements in reserves markets. Reserve certainty is critical to ensuring reliability, and we support these PJM efforts. PJM should commit to follow through in improving its energy and ancillary services markets through this new stakeholder process.