August 1, 2016
Seasonal Capacity Resources Senior Task Force
PJM Staff Proposal

Updated Draft Business Rules for Aggregation of Seasonal Resources within Auction Clearing Mechanism

Effective with the 2020/2021 Delivery Year BRA, PJM will procure only Capacity Performance Resources to meet the PJM Region's reliability and resource adequacy needs. A Capacity Performance Resource ("CP Resource") must be capable of sustained, predictable operation that allows the resource to be available throughout the entire Delivery Year to provide energy and reserves whenever PJM determines an emergency condition exists.

A. Current Aggregation Rules

Starting with the 2020/2021 Delivery year, Intermittent Resources, Capacity Storage Resources, Environmentally-Limited Resources, and DR Resources and EE Resources that generally cannot satisfy the annual performance obligation of a CP Resource on a stand-alone basis are either ineligible to participate in RPM and/or are limited from a quantity perspective in their ability to participate in RPM due to the risk associated with their seasonal or intermittent capabilities. However, these resource types are eligible to combine their capabilities to create a single pseudo aggregated resource ("Aggregate Resource") that can satisfy the annual performance obligation of a CP Resource and may participate in RPM as components of the Aggregate Resource. Resources participating in this type of aggregation are required to have come to an agreement prior to the Base Residual Auction ("BRA"). Such resources are modeled in the auction as a single resource in an LDA.

The current requirements for resources to form an Aggregate Resource are defined in section 5.6.1(h) of Attachment DD of the PJM OATT, with further details described in section 4.9 of PJM Manual 18. Among these requirements, the resources that comprise an Aggregate Resource must be located in the same modeled LDA[1] and must reside in a single Capacity Market Seller account under the current aggregation rules.

B. PJM Proposed Changes to Existing Aggregation Rules

PJM believes existing rules regarding Aggregate Resources require additional detail and modifications to align with other PJM market and planning rules and to ensure the rules applied to Aggregate Resources are commensurate with rules applied to non-Aggregate Resources. As a result, PJM proposes the following rule changes.

1. The daily allocation of a CP commitment on an Aggregate Resource to the underlying resources must be **provided to PJM by 10:30 EPT** the day prior to the Operating Day.

[1] All references to LDA in the draft business rules are meant to be "modeled LDA."

The current rules require this information by noon the day before the Operating Day which is based on the old Day-ahead Market timeline. The update to 10:30 AM is to match the current timing.

2. An individual resource that is part of an Aggregate Resource may not receive a daily CP commitment allocation in excess of their CIRs.

3. Aggregate Resources **will be eligible to aggregate across modeled LDAs**, however, for the purpose of BRA modeling and compensation, the Aggregate Resource will be modeled in the highest level LDA of all individual resources comprising the Aggregate Resource. For example, if two resources aggregate together and one is physically located in EMAAC and the other is in the Rest of RTO, the Aggregate Resource will be modeled in the Rest of RTO and compensated at the Rest of RTO clearing price.

   If the individual resources are located in different modeled LDAs that are not nested, they will be modeled and compensated in the smallest LDA common to all of them. For example, an Aggregate Resource where the individual resources are physically located in EMAAC and SWMAAC would be modeled and compensated in MAAC. An Aggregate Resource with individual resources located in COMED and EMAAC would be modeled and compensated as if it were in the Rest of RTO.

4. Individual resources that are part of an Aggregate Resource will be expected to respond to a Performance Assessment Hour (PAH) in the area where they are physically located but its Non-Performance Charge Rate will be based on the location of the physical resources underlying the aggregate. If one or more individual resources that are part of an Aggregate Resource are in the same area where there is a PAH, the under-/over-performance of the Aggregate Resource will be based on the total commitment and performance of all of the individual resources included in the PAH.

5. Any replacement transactions on an Aggregate Resource must be based on the location where the resource was modeled and cleared in the RPM auction as described in 3 above. After the Aggregate Resource commitment is removed or reduced by a replacement transaction, the Capacity Market Seller responsible for the Aggregate Resource may update the allocation of the new CP commitment quantity on the Aggregate Resource to the underlying resources.

C. PJM Proposal for an Additional Method to Aggregate Seasonal Capacity Performance Resource Offers

The following draft business rules describe a PJM proposal that will permit certain resource types with seasonal capacity capability to be aggregated by PJM during the BRA clearing process if they have not done so prior to the auction. This proposal for seasonal aggregation will not replace the current business rules regarding aggregation (as may be modified in section B above); rather it is being proposed as an additional type of aggregation that PJM would offer.

Resources eligible for this type of seasonal aggregation are those Intermittent Resources, Capacity Storage Resources, Environmentally-Limited Resources, summer-only DR Resources and summer-only EE Resources that can demonstrate that they can only meet the qualifications of a CP Resource on a seasonal basis. Such resources that are eligible for seasonal aggregation but do not aggregate prior to the BRA will be able to submit sell offers of capacity into the BRA on a stand-alone basis, specifying a season in which they are seeking to commit, as described in more detail below.

Under this proposal, the requirement that PJM procure 100% CP Resource commitments is maintained by instructing the auction clearing engine to clear equal quantities of off-setting seasonal capacity sell offers thereby creating annual capacity commitments from the seasonal capacity sell offers. This methodology will also maintain a single, uniform, capacity clearing price that will be paid to all committed resources for the duration of the commitment period for which they cleared.

1. Resources that are eligible for seasonal aggregation but do not do so prior to a BRA may instead submit sell offers of seasonal capacity into the BRA on a stand-alone basis. Seasonal capacity consists of summer-period capacity and winter-period capacity.

   (a) A cleared summer-period capacity sell offer takes on a capacity commitment and performance obligation for the months of June through October and the following May, inclusive, and receives a daily auction credit for each day of the same period based on the cleared UCAP quantity times the auction's resource clearing price applicable to the resource.

   (b) A cleared winter-period capacity sell offer takes on a capacity commitment and performance obligation for the months of November through April, inclusive, and receives a daily auction credit for each day of the same November through April period based on the cleared UCAP quantity times the auction's resource clearing price applicable to the resource.

   (c) Seasonal resources that receive a capacity commitment for either the summer or winter period of the Delivery Year will be responsible for the commitment and obligations of a CP Resource for that period. This includes performance during a PAH and the submission of offers into the Day-ahead Energy Market, where applicable, during the committed period. The Non-Performance Charge Rate will be based on the physical location of the resource that clears a seasonal capacity sell offer.

2. Intermittent Resources, Capacity Storage Resources, and Environmentally-Limited Resources are generally available throughout the entire delivery year to provide energy but may have expected capability in one season that exceeds expected capability in the other season. Such resources may submit a sell offer for CP capacity and a separate sell offer for either summer-period capacity or winter-period capacity up to a total sell offer quantity for each season no greater than the UCAP value of the resource.

   Summer-only DR and summer-only EE may submit sell offers for summer-period capacity.

3. Similar to Capacity Performance Resources with full-year commitments, generation resources that are eligible and wish to sell seasonal capacity will not be permitted to sell seasonal capacity in excess of their Capacity Interconnection Rights (CIR).

4. The BRA clearing algorithm will clear all annual period CP capacity sell offers, summer-period capacity sell offers, and winter-period capacity sell offers to minimize the bid-based cost of satisfying the reliability requirement of the PJM Region and each modeled LDA while respecting all applicable requirements and constraints. To ensure that seasonal capacity sell offers are cleared to form capacity resource commitments that in aggregate satisfy the year-round availability and performance requirements of a CP Resource, the clearing algorithm will include a constraint that requires the total cleared quantity of summer-period capacity to exactly equal the total cleared quantity of winter-period capacity across the entire RTO. To aid in the clearing of exactly equal quantities of opposite season sell offers, each segment of a seasonal sell offer must be submitted as a flexible sell offer (i.e., the minimum MW of each offer segment must be 0 MW).

   It will not be required that the total cleared quantity of opposite season sell offers be equal within each modeled LDA; however, the clearing algorithm will ensure that the reliability requirement of each LDA is properly respected by considering only the equally matched quantity of cleared opposite-season sell offers located within an LDA as satisfying that LDA's reliability requirement. For example, if the algorithm solution clears a 50 MW summer-period sell offer in EMAAC and a 50 MW winter-period sell offer in the rest of MAAC, then the algorithm would have considered the equally matched quantity of opposite-season sell offers of 50 MW fully contained in the MAAC LDA as satisfying the MAAC LDA reliability requirement, but the cleared unmatched 50 MW summer-period sell offer in EMAAC would not have been considered as satisfying the EMAAC LDA reliability requirement – both seasonal sell offers of this example will be considered to be located in the MAAC LDA from a clearing price perspective.

5. The locational resource clearing price that is applicable to each cleared seasonal sell offer is determined during the post-processing of the auction results consistent with the manner in which the auction clearing algorithm recognizes seasonal capacity sell offer contribution to satisfying LDA reliability requirements. For each constrained LDA and starting with the LDA with the highest clearing price, PJM determines the quantity of cleared equally matched opposite-season sell offers located within the LDA. Up to this quantity, the cleared summer-period sell offers located in this LDA with the lowest sell-offer price and the cleared winter-period sell offers with the lowest sell-offer price will be compensated at the auction clearing price of the LDA. Any cleared seasonal sell-offers located within the LDA that do not receive that LDA's clearing price are next effectively "moved" to the next higher level constrained LDA where they are considered in a similar manner for compensation at that LDA's clearing price.

   For example, assume that the least-cost auction solution clears a total summer-period sell offer quantity of 200 MW comprised of 100 MW in EMAAC, 50 MW in SWMAAC, and 50 MW in rest of RTO region, against a total cleared winter-period sell offer quantity of 200 MW comprised of 50 MW in EMAAC, 100 MW in SWMAAC and 50 MW in ComEd. Also assume that only the EMAAC, SWMAAC and ComEd LDAs were

constrained LDAs in the solution clearing at prices higher than the RTO clearing price. With this result, the lowest priced 50 MW of cleared summer-period sell offers in EMAAC will receive the EMAAC clearing price and the highest priced 50 MW of cleared summer-period sell offers in EMAAC will receive the RTO clearing price; all 50 MW of cleared winter-period sell offers in EMAAC will receive the EMAAC LDA clearing price. The lowest priced 50 MW of cleared winter-period sell offers in SWMAAC will receive the SWMAAC clearing price and the highest priced 50 MW of cleared winter-period sell offers in SWMAAC will receive the RTO clearing price; all 50 MW of cleared summer-period sell offers in SWMAAC will receive the SWMAAC LDA clearing price. The unmatched cleared winter-period sell offer in ComEd will receive the RTO clearing price.

6. A capacity resource with a summer-period commitment or winter-period commitment may replace that commitment based on the physical location of the resource.