PJM Proposal - Update

Seasonal Capacity Resources Senior Task Force

August 12, 2016

1. Proposed changes to existing rules for creating an Aggregate Resource

2. Proposed additional mechanism to aggregate seasonal capacity sell offers within auction clearing algorithm

- Capacity Resources which may not, alone, meet the requirements of a Capacity Performance product, may combine their capabilities and offer as a single Aggregate Resource
  - Applies to Intermittent Resources, Capacity Storage Resources, Demand Resources, Energy Efficiency Resources, and Environmentally-Limited resources
- Resources being combined must be located in the same modeled LDA and reside in a single Capacity Market Seller account
- Seller may offer the Aggregate Resource as Capacity Performance at a UCAP value that is representative of a capacity performance product (not to exceed the sum of the CIR value/UCAP value of the individual resources that make up the aggregate)

- The committed quantity of an Aggregate Resource must be allocated to the underlying capacity resources prior to the start of the Delivery Year with adjustments permitted up to 10:30 noon EPT of the day preceding the delivery day

  – The quantity allocated to an underlying resource is used to determine the Expected Performance of each underlying resource located in a PAH area

- Performance of an Aggregate Resource for a given PAH is based on the net of the performance of the individual underlying resource that were required to perform during the PAH (i.e. the resources located in the PAH area)

- Non-Performance Assessment Charges/Credits are assessed to the Aggregate Resource – not to the individual resources

- PJM proposes changes that would permit the aggregation of resources that are located in different modeled LDAs

- For BRA modeling and compensation, the Aggregate Resource would be located in the smallest LDA common to each individual resource

  Examples:
  - Aggregate Resource modeled in EMAAC if one resource in PECO zone and second resource in PSEG Zonal LDA
  - Aggregate Resource modeled in MAAC if one resource in EMAAC and second resource in SWMAAC
  - Aggregate Resource modeled in rest of RTO if one resource in ComEd Zonal LDA and second resource in EMAAC

- The Aggregate Resource would receive the RPM auction clearing price applicable to the common modeled location

- The non-performance charge rate for an under-performing Aggregate Resource is based on the rate associated with the LDA in which the under-performing underlying resources are located, weighted by the under-performance MW quantity of such resources

  – However, the stop-loss of the Aggregate Resource is based on the non-performance charge rate associated with the LDA in which the Aggregate Resource was modeled in the RPM auction

- An Aggregate Resource commitment may be removed or reduced via replacement transaction based on the modeled LDA of the Aggregate Resource

  – the allocation of the Aggregate Resource commitment to the individual resources may be updated to reflect new total commitment level upon submittal of the replacement transaction

- PJM proposes the following changes regarding the assignment of the Aggregate Resource commitment quantity to the individual underlying resources
  - assignment on a seasonal basis as opposed to daily (i.e. a summer-period allocation and a winter-period allocation, where each season is defined consistent with PJM's additional option being proposed*)
  - assignment must be done prior to start of delivery year and may be updated only if Aggregate Resource commitment MW changes as a result of a replacement transaction
- This change provides consistency with seasonal aspect of PJM's additional seasonal sell offer option, and prevents potential gaming of day-before updates to the commitment quantities

* Summer-Period: Jun – Oct and following May; Winter-Period: November through April

	Wind	Solar		Aggregate Resource
Nameplate Capacity	100 MW	100 MW		n/a
UCAP Value (CIR value)	13 MW	38 MW		51 MW
Zone	ComEd	JCPL		n/a
Modeled LDA	ComEd	EMAAC		Rest of RTO
Avg output: summer performance hours	13 MW	38 MW		51 MW
Avg output: winter performance hours	40 MW	2 MW		42 MW
Assumed CP Offer MW of Example (Avg output of most limited season)	13 MW	2 MW		42 MW

- Existing rules do not permit aggregation of above resources since located in different modeled LDAs
- Proposed changes would permit aggregation of above resources and would model the Aggregate Resource in the rest of RTO area for RPM auction clearing and pricing perspective

- **<u>Example</u>** – Assume Aggregate Resource above offers and clears 42 MW in BRA

- Assume Aggregate Resource of prior slide offers and clears 42 MW and allocates the 42 MW commitment to the individual resources based on expected seasonal performances as:

Resource	LDA	Commitment Allocation (UCAP MW)	
		Summer Period	Winter Period
Solar	EMAAC	32	29
Wind	ComEd	10	13*
Aggregate	**Rest of RTO**	**42**	**42**

* Performance expectation assigned to underlying resource cannot exceed the CIR value of the resource

Aggregate Resource PAH Example #1

Example #1: RTO-Wide Emergency Action in summer period
Assume Balancing Ratio = 1.0

Resource	LDA	Output (MW)	Expected Performance (MW)*	Actual Performance (MW)	Performance (MW)
Solar	EMAAC	34	32	34	2
Wind	ComEd	5	10	5	-5
Aggregate	**Rest of RTO**				**-3**

- Aggregate Resource performance based on net performance of all underlying individual resources since all were located in PAH area
- Aggregate Resource assessed non-performance charge based on 3 MW under-performance at non-performance charge rate associated with ComEd LDA (100% weighting of the LDA associated with the non-performing underlying resource in this example)

*Expected Performance equals Balancing Ratio times Allocated Commitment MW applicable to the season (see prior slide)

- The 2nd component of PJM's proposal provides an additional stand-alone participation mechanism for resources with seasonal capacity capability

- Proposed mechanism will permit seasonal capacity sell offers into RPM and will procure such offers consistent with the requirement that PJM procure 100% CP Resource commitments; procured at a single, uniform capacity clearing price that will be paid to all committed resources

- This mechanism would be available to the same resources that are eligible to form an Aggregate Resource but that do not do so prior a BRA:
  - Intermittent Resources, Capacity Storage Resources, Environmentally-Limited Resources, summer-only DR Resources and summer-only EE Resources

- Seasonal capacity sell offers consist of:
  - Summer-period sell offers which take on a commitment and performance obligation for months of June thru October and following May if cleared
  - Winter-period sell offer which takes on a commitment and performance obligation for months of November thru April if cleared

- Cleared seasonal capacity sell offers receive a daily auction credit for each day of the applicable commitment period based on cleared UCAP MW and the auction clearing price applicable to the resource

- non-performance charge rate based on the physical location of the resource that clears a seasonal capacity sell offer

- Intermittent Resources, Capacity Storage Resources and Environmentally-Limited Resources may submit a sell offer for CP capacity (i.e. annual capability) and a separate sell offer for either summer-period capacity or winter-period capacity
  - Up to total sell offer quantity for each season of no greater than the lower of the resource's UCAP Vale or the resource's CIR value
- Summer-only DR and summer-only EE may submit sell offers for summer-period capacity

- Auction clearing algorithm will clear all annual period CP capacity sell offers, summer-period capacity sell offers and winter-period capacity to minimize bid-based cost of satisfying PJM and modeled LDA reliability requirements subject to all applicable requirements and constraints, including:
    - LDA CETL values (same as today)
    - Total cleared summer-period sell offers must exactly equal total cleared winter-period sell offers across the entire RTO

- Equal matching of cleared opposite-season sell offer quantities is not enforced at the LDA level; however, only equally matched quantities of opposite-season sell offers within an LDA are considered as satisfying the LDA's reliability requirement
    - Unmatched cleared quantities are effectively "moved" to the next level LDA until a match is found