

## **OA Schedule 1 Section 1.7.19A – Current Must Offer Language**

(a) Synchronized Reserve can be supplied from non-emergency generation resources and/or Demand Resources located within the metered boundaries of the PJM Region.

All on-line non-emergency generation resources providing energy are deemed to be available to provide Tier 1 Synchronized Reserve and Tier 2 Synchronized Reserve to the Office of the Interconnection, as applicable to the capacity resource's capability to provide these services.

During periods for which the Office of the Interconnection has issued a Primary Reserve Warning, Voltage Reduction Warning or Manual Load Dump Warning as described in Section 2.5(d) below, all other non-emergency generation capacity resources available to provide energy shall have submitted offers for Tier 2 Synchronized Reserves.

Generating Market Buyers, and Market Sellers offering Synchronized Reserve shall comply with applicable standards and requirements for Synchronized Reserve capability and dispatch specified in the PJM Manuals, the Operating Agreement and PJM Tariff.

## **Suggested Revisions to the Must Offer Requirement**

PJM and the IMM jointly offer the following revisions to the must offer requirement

- The tariff should include a requirement that all generation capacity resources with a capacity commitment for the operating day offer all available reserve capability at all times, whether online or offline. Generation resources without a capacity commitment that provide an offer in the Energy Market will have that offer serve as a joint offer for energy and reserves. The tariff should include a clear statement of this must offer requirement. The current statement is not clear enough.
  - In addition to clarifying the must offer requirement, this strengthens the must offer requirement for offline generation capacity resources and codifies the prior guidance that they should have a synchronized reserve offer in at all times in order to remain compliant with the requirement. Offline generation resources with a capacity commitment will be obligated by the tariff to offer their capability for reserves at all times when they are available for energy, not just during Primary Reserve Warnings, Voltage Reduction Warnings or Manual Load Dump Warnings.
  - The IMM further recommends that PJM revise the Demand Response market design such that capacity DR is held to the same standard as generation for the provision of reserves.

- Non-capacity resources do not carry a reserve must offer requirement, whether they are online or offline. However, any ramping capability offered into the energy market is assumed to be available for reserves (subject to ramping capability and eco max). They are not required to offer reserves on any ramping capability that has not been offered into the energy market.
- All resources should have a defined and enforceable obligation to provide actual, achievable ramp rates, subject to PJM's modeling limitations, and to update ramp rates as conditions change.
  - This is consistent with the component of the package that proposes tariff language that will require Market Sellers to submit ramp rates based on actual, physical operating capability and allow those ramp rates to be specified hourly and to be updated up to 65 minutes prior to start of the operating hour.

## Reserve Capability Determination

PJM and the IMM jointly offer the following bullets, which clarify how the reserve capability will be determined for various resources.

- Generating resources provide reserves between the current dispatch point and the economic maximum at the defined ramp rate for ten minutes.
- PJM will automatically calculate reserve offer MW for all generation resources that have offered into the energy market using the ramp rate and economic max submitted for their energy offer (with limited exceptions as noted in this section).
  - Some resources have physical limitations that prevent them from providing reserves above a given MW output. Resources which have a documented physical limitation, as described in the PJM Market Rules, will be able to offer a reduced operating range for reserves. In this case a Spin Max value, which is less than Eco Max, will be used to determine the upper bound on reserve capability. Resources are expected to maintain an accurate Spin Max value at all times based on anticipated operating mode.
  - Documentation of physical limitations that are the basis for a reduced operating range for reserves must be submitted to PJM and the IMM and be validated by PJM prior to use in offers and must include detailed explanation as part of that validation process.
    - Documentation can still be in the form of an email, but should include the reasons for the limitation and the ranges in which the limitations are expected to occur (recognizing it may change based on ambient

conditions and other factors). Future enhancements to the tool used for documentation will be considered.

- Condensers:
  - Resources capable of condensing have reserve capability equal to economic maximum output, subject to ramp and condense to gen time constraints. (PJM will require the condense to gen time parameter to be submitted by Participants.)
    - Condense to Gen Time is a new parameter that will be required
  - Consistent with the logic for other resource types, units that have the ability to condense will be considered available to provide reserves whenever they are online in generating mode. Condensers also have a 'Spin as Condenser' flag which specifies their ability to provide reserves in condensing mode. This is separate from their general availability to provide reserves. Unless they have a physical restriction that will not allow them to operate in condensing mode, they must offer the resource as available to provide reserves in condensing mode when it is available for energy.
- Resources belonging to certain classes will be able to specify a reserve offer MW (compared to the default of PJM calculating it for them based on submitted energy parameters) given modeling limitations that apply to these classes.
  - This applies to the following resource types:
    - Run of river hydro
    - Pumped storage hydro
    - Demand Resources
    - Energy Storage
  - These resources must update their offered reserves to reflect the full reserve capability based on their realistically achievable ramp rate and current operating conditions.
    - This strengthens the tariff language to make it clear that resources subject to the must offer requirement are required to offer 100% of their reserve capability. This is consistent with the fact that PJM will be calculating reserve offer MW equal to 100% capability for all other resources.

- A resource's choice to self-schedule or provide fixed output does not alter its capability to provide reserves. Self-scheduled units must provide reserves like all other online generating resources.
  - PJM will calculate a self-scheduled/fixed output unit's reserve capability using the lesser of spin max or eco max, and the unit's 10 minute ramping capability, consistent with the calculations for PJM-scheduled resources.
  - If a resource that has a reserve must offer requirement chooses to not make its reserve capability available, for example through self-scheduling or offering a fixed output, when the resource is otherwise able to operate with a dispatchable range, the resource is defined to be violating the reserve must offer requirement.
- Some resources, like combined cycles, have discontinuities in dispatch that should be recognized. This can be modeled via the use of the Spin Max parameter or segmented ramp rate.
- Wind, solar, and nuclear resources cannot reliably provide reserves. Any wind, solar or nuclear resource that can reliably provide reserves would be required to opt in to participate in the reserve market and submit offers. PJM would grant the opt in if it agreed. PJM would calculate the available reserve MW based on the energy ramp rate and eco max (which uses a forecast in the case of wind and solar) or spin max (if a documented physical limitation exists). Nuclear, wind, and solar would not submit a MW level for reserves as part of its offer.
  - This strengthens the current must offer requirement by requiring that they opt in to provide reserves if the unit is capable of doing so.

## Must Offer Compliance

The IMM proposes the following language to include a financial penalty for violations of the reserve must offer requirement.

- PJM and the IMM will check compliance with the must offer requirement on a continuous basis, including accuracy of ramp rates and available reserves. There will be defined penalties for non-compliance, equal to the reserve clearing price times the withheld MW for all market intervals of noncompliance. In addition, the IMM will evaluate market impacts and the potential for further actions by the IMM and FERC on that basis.

- Withheld MW equal the resource's physical capability to provide reserves minus offered MW.

This penalty is not an element of the PJM proposal. Resources found in violation of the must offer requirement are subject to referral to the FERC office of enforcement.

## **Non-performance Penalties for Reserves**

The IMM proposes the following language to strengthen the non-performance penalties for synchronized reserve events.

- Penalties for non-performance need to be strengthened. Penalties should be based on the period since the last spinning event of greater than or equal to 10 minutes (last enforceable event). The penalty would be to return 100 percent of the revenue received for supplying reserves during that period. Penalties should be for individual resource performance without the option to offset within a portfolio.

PJM is not proposing to change to the non-performance penalty.