PJM Straw Proposal: Ancillary Services for “Net Excess” DER Behind a Customer Meter

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• Treatment of positive and negative power for Ancillary Services from PJM generators located behind a customer meter

• Ancillary service assignment quantities:
  – Remove current logic that links energy market parameters (like ECOMIN) to Ancillary Service quantities
  – Responsibility on market participant to ensure that the cleared Ancillary Services quantities are achievable given physical constraints and competing services

• Performance measurement:
  – For Synch Reserve—consider both positive and negative values at the Point Of Interconnection (POI) meter
  – For Reg—either POI (both positive and negative) or gen submeter plus telemetered basepoint

• Generator submeter required to audit “on” status
• Must offer the gen headroom capability not offered for energy in Synch Reserve Market
PROPOSAL FOR INFLEXIBLE SYNCHRONIZED RESERVES
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min Net Output</td>
<td>Lowest MW value the POI meter would read when the Gen is offline</td>
</tr>
<tr>
<td>DERmin</td>
<td>Minimum gross MW the generator must operate at when online</td>
</tr>
<tr>
<td>DERmax</td>
<td>The maximum gross MW capacity of the generator</td>
</tr>
<tr>
<td>Gen headroom</td>
<td>Difference between the DERmax and the current generator output</td>
</tr>
<tr>
<td>DER dispatchable range</td>
<td>The difference between DERmax and DERmin</td>
</tr>
<tr>
<td>SR capability range</td>
<td>Maximum range of MW from the generator headroom plus load drop that can be offered into the SR Market</td>
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</tbody>
</table>
Synch Reserve Proposal: Before Spin Event

LOAD 9MW

GEN OUTPUT 6MW

GEN HEADROOM 4 MW

LOAD DROP 1 MW

Current POI meter reads -3 MW
Synch Reserve Proposal: During Spin Event

Current POI meter reads +2 MW
Proposal: Allow SR Capability Below Ecomin

- **GEN OUTPUT 6MW**
- **LOAD DROP 1 MW**
- **LOAD 9MW**
- **GEN HEADROOM 4 MW**
- **LOAD DROP 1 MW**
- **Max net output**
- **Net output**
- **Net POI MW**
- **SR Capability – Status Quo** 2 MW
- **SR Capability – Proposed** 5 MW

Net load = 0
Net gen = 0
Ecomin = 0

SR Capability – Status Quo 2 MW
SR Capability – Proposed 5 MW
Does the Resource Need to Be Synchronized?

- Synch Reserve capability is measured as the sum of:
  - (1) Generator headroom and (2) ability to physically curtail or “drop” load
- Load curtailment is assumed to always be synchronized
- Generator must be synchronized if any SR assignment MW come from the generator
- PJM requires interval submeter on generator and reserves the right to ex-post audit

SR Offer MW = 1 since Gen will be offline

LOAD 9MW

SR Capability
Proposal: Interaction between SR and Energy

- No PJM co-optimization or Lost Opportunity Cost (LOC)
- Ramp will not be used as part of capability evaluation
- DER will offer SR MW quantity and price into SR Market
- DER will be responsible for managing energy and SR offers to avoid conflicts & meet physical limits
  - Assigned SR MW should not be offered into the Energy Market
  - DER required to offer SR commensurate with gen headroom + available load drop & desired energy market availability.
- PJM will implement logic to ensure that SR assignment + energy offer quantity <= total registered capability (gen dispatchable range + load drop)
SR and Energy Offer Quantity Limit Logic

- **Registered Max Flexible Range** = Total generator dispatchable range + registered load drop
- SR offers limited to the Max Flexible Range
- Current Energy Market participation limited to the range above Net POI = 0 (positive values)

![Diagram showing SR and Energy Offer Quantity Limit Logic](image-url)
Must Offer Requirement

Status quo: online, non-emergency capacity generators must offer 90% of the ramp limited quantity into the Synchronized Reserve Market. DR is currently exempt from the SR must offer requirement.

Proposal for DER: must offer requirement will apply to DER with capacity obligation (cleared in RPM)

• Specific amount of must offer MW to be determined
SR Performance Measurement

- Telemetry required at the Point Of Interconnection (status quo)
- SR performance includes positive and negative numbers
- Use status quo for non-performance penalties
  - Clawback the amount of non-performance MW at the SRMCP the day of the event
  - Retroactive compensation refund for every hour cleared in the past 19 days (or since last non-performance, whichever is less)
• DER is excluded from Tier I
  – Because PJM not using ramp rate
  – Because PJM not monitoring load offset capability in real time
• Market Participant responsible for offering into the Synchronized Reserve Market only when the resource is online and synchronized
  – PJM requires interval submeter and reserves the right to ex-post audit
• Process for registration of load curtailment portion of DER similar to existing Demand Resource load curtailment qualification process
PROPOSAL FOR REGULATION
Proposal: Allow RegLo Below Ecomin

Status Quo Regulation Range – bound by economic limits

Proposed Regulation Range – RegLo below Ecomin
DER Providing Regulation

- No co-optimization of Regulation and energy
  - No LOC will be calculated
- Will allow the RegLo limit to go below ecomin
  - DER is responsible for ensuring that the MW amount offered into Regulation is achievable considering the DER’s operating parameters (ie: DERmin, DERmax, dispatchable range, desired net operating basepoint)
• Provide option to directly measure the generator performance at a submeter
  – Allows uncontrolled load to float around without impacting performance score
• Real-time telemetry at submeter
• Basepoint telemetered to PJM (similar to Demand Response)
SUBMETER PROPOSAL
<table>
<thead>
<tr>
<th></th>
<th><strong>Design Component</strong></th>
<th><strong>Status Quo</strong></th>
<th><strong>PJM Proposal</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Submeter ownership</td>
<td>Third party ownership of POI meters allowed for PJM generators.</td>
<td>Third party submeter allowed as per Demand Response status quo for Regulation submeter</td>
</tr>
<tr>
<td>4.2</td>
<td>Submeter communications</td>
<td>PJMNet ICCP or Jetstream DNP3 depending on size. Via marketer or TO as Market Operations Center.</td>
<td>Status Quo</td>
</tr>
<tr>
<td>4.3</td>
<td>Submeter set-up Process</td>
<td>N/A</td>
<td>Similar to Regulation performance testing</td>
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