Ancillary Services Measurement for PJM Generators Behind a Customer Meter

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Status Quo for “Net Excess” PJM Generator

- Meter “M” measures Load + DER.
- Real-time export readings from Meter “M” used for ancillary services measurement.

**Example:**
- 1 MWh excess (10 MWh Gen – 9 MWh load) is settled at wholesale at LMP.
Existing PJM Proposal for “Net Excess” PJM Generator

**Design Component 1c Option B**  --&--  **Design Component 2c Option A**

- Optional Regulation and Synch Reserve measurement at the Gen submeter.

Diagram:
- **Utility**
  - Up: Wholesale Energy
  - Down: Retail Energy
- **Customer**
  - Up: 1 MWh
- **Customer Loads**
  - Down: 9 MWh
- **DER**
  - Up: 10 MWh
- **SM**

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Other Proposal for “Net Excess” PJM Generator

- Option to allow negative values at the POI (including load and load reductions) to count towards Synch Reserve performance
- Note SR “baseline” is the same for both DR and Gen
  - Except 10-second telemetry required for Gen, vs. 1-minute readings used for DR
  - “Batch load” DR uses a different method altogether.

Design Component 1c Option A
Synch Reserve Status Quo (Design Components 1a & 1b)

Tier II allowed range (limited by 10-min ramp up capability)

Tier I estimate (limited by 10-min ramp up capability)

Net POI power
Synch Reserve Status Quo (Design Components 1a & 1b)

ECOMAX or SPINMAX

Allowable Synch range

PJM ENERGY BASEPOINT  θ  ECOMIN

Net POI power
SR Tier I & Tier II Option A (Design Components 1a & 1b)

- ECOMAX or SPINMAX
- Allowable Synch range
- Telemetered POI injection or withdrawal as Net POI value
Market participant offers in actual Tier II SR capability. Resource is responsible for offering no more than they are capable of providing (no PJM ramp limit calculation). Analogous to demand response.
Reg Status Quo (Design Component 2a)

RegHi (<= ECOMAX)

RegLo (>= ECOMIN)

Allowable Regulating range = RegHi – RegLo

Net POI power
Reg Status Quo (Design Component 2a)

RegHi <= ECOMAX

Allowable Regulating range limited to potential positive output

PJM ENERGY BASEPOINT \( \theta \)

RegLo >= ECOMIN

Lowest anticipated POI power
Reg Option A (Design Component 2a)

RegHi $\leq$ ECOMAX

Regulating range if allow RegLo $<$ ECOMIN

PJM ENERGY BASEPOINT $\theta$

ECOMIN

Lowest anticipated POI power

RegLo
## Possible Future Rules – Negative Values for SR Performance

### Example with 10 MW nameplate generator (notice load curtailment as well)

<table>
<thead>
<tr>
<th>Design component 1b</th>
<th>Design component 1c</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-event</strong></td>
<td>1c Opt. X: POI Performance</td>
</tr>
<tr>
<td><strong>Opt. A offer method</strong></td>
<td><strong>In-event</strong></td>
</tr>
<tr>
<td><strong>Gross load</strong></td>
<td>9 MW</td>
</tr>
<tr>
<td><strong>Gross gen</strong></td>
<td>6 MW</td>
</tr>
<tr>
<td><strong>Net at POI</strong></td>
<td>-3 MW (load)</td>
</tr>
<tr>
<td><strong>Gen headroom</strong></td>
<td>4 MW</td>
</tr>
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<td><strong>PJM ECOMAX</strong></td>
<td>1 MW</td>
</tr>
<tr>
<td><strong>PJM ECOMIN</strong></td>
<td>0 MW</td>
</tr>
<tr>
<td><strong>PJM Output</strong></td>
<td>0 MW</td>
</tr>
<tr>
<td><strong>On/off status</strong></td>
<td>on</td>
</tr>
<tr>
<td><strong>SR offer qty</strong></td>
<td>4 MW</td>
</tr>
<tr>
<td><strong>SR measurement</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Notes:
- **Gross load**: 9 MW, Can cut 1 MW load to 8 MW
- **Gross gen**: 6 MW, Can increase 4 MW gen to 10 MW
- **Net at POI**: -3 MW (load), Telemetry: -3 MW, +2 MW (gen)
- **Gen headroom**: 4 MW, 0 MW
- **PJM ECOMAX**: 1 MW, 2 MW
- **PJM ECOMIN**: 0 MW, 0 MW
- **PJM Output**: 0 MW, 2 MW
- **On/off status**: on, on
- **SR offer qty**: 4 MW, 5 MW
- **SR measurement**: 5 MW, 4 MW

### Example:
Example with 10 MW nameplate generator (notice load curtailment as well).
Possible Future Rules – Negative Values for SR Performance

**Example with 10 MW nameplate generator (notice load curtailment as well)**

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<td>+ 2 MW (gen)</td>
<td></td>
<td>+10 minus +6</td>
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<td><strong>Gen headroom</strong></td>
<td>4 MW</td>
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<td>0 MW</td>
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</table>

Gross load: 9 MW can cut 1 MW load
Gross gen: 6 MW can increase 4 MW gen

Net at POI: -3 MW load
Telemetry: -3 MW

Gen headroom: 4 MW
PJM ECOMAX: 1 MW
PJM ECOMIN: 0 MW
PJM Output: 0 MW
On/off status: on
SR offer qty: 4 MW
SR measurement: 6 MW
### Submetering

<table>
<thead>
<tr>
<th>Design Component</th>
<th>Status Quo</th>
<th>Option A</th>
<th>Option B</th>
<th>Option C</th>
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<tbody>
<tr>
<td>4.1 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>
<td>Third party submeter allowed as per Generation status quo for POI meters</td>
<td>EDC submeter allowed as per Generation status quo for POI meters</td>
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<tr>
<td>4.2 Submeter communications</td>
<td>PJMNet ICCP or Jetstream DNP3 depending on size. Via marketer or TO as Market Operations Center.</td>
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<tr>
<td>4.3 Submeter set-up Process</td>
<td>N/A</td>
<td>Similar to Regulation performance testing</td>
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Eligibility for "behind the customer meter DER" rules for A/S measurement

• Option A: Optional for any PJM generator co-located with non-station-power load and settled for energy on net output.
• Option B: Mandatory for any PJM generator co-located with non-station-power load and settled for energy on net output.