Black Start, Critical Load, and Estimated Online Capacity
Supplemental Information – Follow-up

SRSTF Meeting
December 10, 2012
1. What about the 4 to 8 hour generation that’s removed from the critical load definition in the PJM/MMU proposal?
2. What is the total available est. online capacity at 8 hours?
3. What is the net difference between the 0 to 4 hour and the 4 to 8 hour in terms of est. online capacity?
4. What is the impact of delayed cranking of the 4 to 8 hour units?
5. Provide TO-specific details on critical load difference by going from 8 hr to 4 hr units.
RTO Black Start vs. Critical Load

PJM/MMU Proposal (MW)

<table>
<thead>
<tr>
<th>Description</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>BS (current BS + Est. 2,000 MW more)</td>
<td>7,980</td>
</tr>
<tr>
<td>CL (all units &lt;= 4 Hr)</td>
<td>4,898</td>
</tr>
<tr>
<td>Estimated Online CAP at 6 Hrs (4 Hr Gen started after 90 min. BS + 30 min. switching time)</td>
<td>47,808</td>
</tr>
<tr>
<td>Cranking Power for All Units 4 to 8 Hours Removed from CL Definition</td>
<td>1,169</td>
</tr>
<tr>
<td>Estimated Online CAP at 14.5 Hrs (worst case start-up of all units 4 to 8 hours)</td>
<td>5,303</td>
</tr>
</tbody>
</table>
PJM/MMU Proposal
(Unit Counts)

- **BS** (current BS + est. growth (53 units)): 213 units
- **CL** (all units <= 4 Hr): 645 units
- **All Units 4 to 8 Hours Removed from Current CL Definition**: 86 units

The chart illustrates the comparison between Black Start (BS) and Critical Load (CL) units, with specific counts for each category as per the PJM/MMU Proposal.
Impact of shifted focus on 0 to 4 hour generation to be cranked rather than 4 to 8 hour generation:

- Impacts appear minimal and dwarfed by the gains of the 0 to 4 hour generation focus.
  - More than sufficient est. online CAPat6Hrs to crank the critical load.
  - Significantly less estimated online capacity as compared to the 0 to 4 hour generation
  - Significantly less quantity of units cranked.
  - Coping power requirements would be served based on the GO’s needs.
Concern about the transitional states and associated lags that result from the focus away from the 4-8 hour generation to be cranked:

- Units transition from temperature states (hot->intermediate->cold) and each sequential state comes with a startup time impact.
- RTO Averages:
  - 19 hours to transition from hot to intermediate states.
    - 12 hours of buffer time (power at station within 6.5 hours)
  - 41 hours for these units to transition from intermediate to cold states.
PJM/MMU 0to4 Hr Units and 4to8 Hr Units (Unit Count)
Response to Question 5

PJM/MMU 0to4 Hr Units and 4to8 Hr Units (Cranking MW = CL)