

# PAI Settlement Issues

MIC

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IMM



Monitoring Analytics

# Agenda

- **Reserve and Regulation Assignments**
- **Excused MW**
- **Outage Data**
- **Retroactive replacement transactions**



# Performance Assessment Intervals

- On October 2, 2019, PJM declared the first Performance Assessment Interval (PAI) with settlement implications. The PAI was declared when PJM issued a Pre-Emergency Load Management Reduction Action in the AEP, BGE, Dominion and Pepco control zones.
- PJM's PAI triggers are subjective, based on operator emergency action declarations.
- This subjectivity was evident in the October 2 market results and in the PAI settlements.

# October 2 PAI

- **October 2**
  - **Average RT LMP between 1400 and 1800 was \$157/MWh.**
  - **Zero RTSCED cases approved with shortage.**
  - **Load over forecasted.**
- **In contrast, on October 1:**
  - **Average RT LMP between 1400 and 1800 was \$685/MWh.**
  - **Six consecutive RTSCED cases approved with shortage.**
  - **Load under forecasted.**
  - **Low ACE event.**
- **The real emergency conditions were experienced on October 1, not October 2.**

# Subjective PAI Trigger

- If PJM had used a clear, well defined and systematic metric for triggering PAIs, the PAI would have been declared on October 1.
- The IMM raised this issue during the CP filing. The IMM commented:
- ***“PJM should instead use a calculated metric based on the available reserves. If the available reserves in the system fall below a certain pre-defined limit, that should trigger a performance assessment hour.”***

# Subjective PAI Trigger

- PJM did not include a clear, well defined and systematic metric to trigger PAIs.
- FERC argued that *“PJM’s approach would accurately correspond with conditions and events during which the system is experiencing, or may reasonably expect to experience, a shortage of capacity. We find that this approach will appropriately trigger Performance Assessment Hours when performance is most critical to the PJM system.”*
- The three PAI events that have happened since CP was implemented have shown that this is clearly not the case.

# Subjective PAI Trigger

- **The PAI trigger rules are out of scope in this specific process, but the main issues highlighted by the problem statement (e.g. treatment of ancillary services assignment and scheduled MW calculation) are a consequence of declaring PAIs when the system is not in stress.**
- **Essential to understand triggers when evaluating the issues here.**

# Background

- **PJM response to FERC deficiency letter (April 10, 2015):**
  - ***“Under the Capacity Performance design, units are required to provide their share of the peak load and reserve requirement in every PAH. Units are not required to provide full ICAP or full UCAP. The balancing ratio,  $B$ , is defined to be the ratio of load plus reserves to total UCAP cleared in the capacity market.”***
- **The measure of “load plus reserves” used in the balancing ratio calculation is the sum of the actual performance of all generation and storage resources in the emergency area.**



# Background

- **The capacity performance design is based on a pay for performance model.**
  - **Performance is providing energy and reserves in the energy market when the system is stressed.**
  - **Assessed when PJM declares emergency actions.**
  - **The demand curve for capacity (VRR) includes both load and reserves, not just load.**
- **In the energy market, PJM dispatches the system to meet load and the real time reserve requirement:**
  - **Primary reserves (synchronized and non-synchronized)**
  - **Regulation**

# Actual Performance

- **The synchronized reserve requirement is nested within the primary reserve requirement.**
- **Synchronized reserve requirement can be met by supply from tier 1 and tier 2 reserves.**
- **RT SCED procures the most economic combination of tier 1 and flexible tier 2 reserves.**

# Actual Performance

- On Oct 2 during the PAI:

| PAI Duration (EPT) | PAI Area                  | MMU Calculated Tier 1 Cleared Reserves | MMU Calculated Tier 2 Cleared Reserves | MMU Calculated Total Synchronized Reserves | PJM Adjusted Synchronized Reserves |
|--------------------|---------------------------|--|--|--|------------------------------------|
| 1400 through 1545  | AEP, BGE, Pepco, Dominion | 411.7                                  | 17.8                                   | 429.5                                      | 4.0                                |
| 1545 through 1600  | AEP                       | 311.3                                  | 3.7                                    | 315.0                                      | 1.3                                |

- These reserves were not deployed, because there was no spinning event.**

## Actual Performance

- OATT Attachment DD Section 10A (c):  
*“Actual Performance = for each generation resource, the metered output of energy delivered to PJM by such resource plus the resource’s real-time reserve or regulation assignment, if any, during the Performance Assessment Interval”*
- There is no mention of adjustments to reserve assignments either in the tariff or in any of the CP compliance submissions.
- For performance assessment, reserves should be treated the same way they are treated in real time reserve market clearing.

# Actual Performance

- Neither the tariff nor CP compliance filings exclude tier 1 reserves from B (performance).
- PJM’s reasons for excluding tier 1 reserves are arbitrary and inconsistent with the definition of B.
- Excluding tier 1 reserves from actual performance reduced the numerator in the balancing ratio, and therefore did not accurately reflect the need for energy and reserves during the PAI.

| PAI Duration (EPT) | PAI Area                  | IMM<br>Calculated<br>Generator<br>Actual<br>Performance | IMM<br>Calculated<br>DR Bonus<br>Performance | Committed<br>Gen and<br>Storage<br>Capacity | IMM<br>Calculated<br>Balancing<br>Ratio | PJM<br>Calculated<br>Balancing<br>Ratio | Difference<br>between IMM<br>and PJM<br>Balancing<br>Ratio |
|--------------------|---------------------------|---|--|---|---|---|--|
| 1400 through 1545  | AEP, BGE, Pepco, Dominion | 45,113.6  | 567.7  | 61,197.6                                    | 74.6%                                   | 73.9%                                   | 0.7%   |
| 1545 through 1600  | AEP                       | 21,906.8  | 331.5  | 27,326.7                                    | 81.4%                                   | 80.2%                                   | 1.2%   |

# Tier 1 reserves

- **PJM states (MIC Special Session, October 1, 2020):**  
***“Tier 1 Reserves are not included in actual performance since the resource was not holding those reserve MWs for PJM. Tier 1 reserves is the available headroom on the unit while the unit is operating economically.”***
- **Statement is inconsistent with PJM using tier 1 reserves to meet the real time synchronized and primary reserve requirement.**
- **If reserves are defined to meet real time reserve requirement, they should be included in performance.**

# Reserves in Actual Performance

- **If performance is treated differently for real time energy market and for capacity performance assessment, the two settlement capacity design will not function efficiently, and will provide inconsistent incentives.**
- **The condition that reserves count for performance only if they are the result of uneconomic dispatch is unsupported, and inconsistent with the CP design.**
  - **PJM staff stated that the objective is to hold resources harmless for providing reserves.**
  - **That is a subjective criterion which is not specified in the tariff. This should not establish a precedent.**

# Reserve and Regulation Assignments

- **PJM should not adjust reserve and regulation assignments and it should not ignore tier 1 reserves:**
  - **Did not follow tariff and PJM's application of assignments in the reserve and regulation markets .**
- **PJM should not excuse or pay bonus to resources that did not provide actual reserves.**
- **Tariff should be modified.**
- **Correcting this will:**
  - **Make actual performance accurate.**
  - **Make balancing ratio accurate.**
  - **Make bonus payments and penalties from units providing ancillary services accurate.**



## Example: Regulation

- **Eco Max: 100 MW; Regulation Assignment: 10 MW.**
- **LMP Desired MW: 100 MW.**
- **RegA Bias: -0.5**
- **Reg basepoint: 85 MW.**
  - **100 MW – 10 MW (Reg Band) – 5 MW Reg signal down.**
- **PJM's Regulation Adjusted MW: 15 MW.**
- **Unit did not provide 15 MW of regulation.**
  - **PJM calculation results in incorrect calculation of B.**
- **Should use 10 MW of regulation**
- **Should excuse 5 MW dispatched down**

## Example: Synchronized Reserve

- **Eco Max: 50 MW; Tier 2 Assignment: 10 MW**
- **LMP Desired: 50 MW; RT Generation: 46 MW.**
- **PJM Tier 2 Adjusted MW: 4 MW.**
- **Unit cleared and was assigned 10 MW, not 4 MW.**
- **PJM actually used 10 MW to meet the primary reserve requirement, not 4 MW.**
- **PJM should have used 10 MW as the actual performance .**
- **Tariff needs to be modified to prevent double counting of energy and reserves.**

## Example: Nonsynchronized Reserve

- **Eco Max: 50 MW; NSR Assignment: 50 MW**
- **LMP Desired: 10 MW.**
- **RT Generation: 0 MW (offline).**
- **PJM NSR Adjusted MW: 10 MW.**
- **Unit cleared and was assigned 50 MW, not 10 MW.**
- **PJM actually used 50 MW to meet the primary reserve requirement, not 10 MW.**
- **PJM should have used 50 MW as actual performance .**
- **Tariff needs to be modified to prevent double counting of energy and reserves.**

## Excused MW

- **PJM did not follow its tariff in defining excuses.**
- **The tariff states that resources shall not be considered in the performance shortfall calculation for two reasons:**
  - **Resources on approved planned or maintenance outages.**
  - **Resources not scheduled or scheduled down by PJM, unless...**

## Excused unless...

- **Resources are excused from PAI charges when they are not scheduled or scheduled down by PJM, unless PJM did not schedule or scheduled down such resources because:**
  - **Any operating parameter limitation.**
  - **A price-based offer above cost-based offer.**

## Excused MW

- **PJM did not determine if resources were not scheduled or scheduled down solely because of any operating parameter limitation.**
- **Generators submit multiple parameters, including, notification times, start times, min run times, etc. PJM did not determine if resource were not scheduled because of any operating parameter that affects unit commitment.**
- **Instead, PJM used RT LMP prices from RT SCED (a tool that does not commit resources) to determine if units were otherwise needed.**

## Outage Data Source

- **PJM used eDART outage information in the PAI settlement calculation.**
- **eDART is the tool used by generators to submit planned and maintenance for approval and forced outages in real time.**
- **eDART is not the official outage data repository application.**
- **eDART is not the outage application used by RPM to measure unit performance.**
- **eGADS is the official PJM outage application.**
- **PJM should use eGADS for PAI Settlements.**

# Retroactive Replacements

- **Under the RPM rules, a capacity market seller may request a retroactive replacement capacity transaction for capacity committed to RPM within three business days after a Performance Assessment Interval (PAI).**
- **This rule change was endorsed as part of revisions to “PJM Manual 18: PJM Capacity Market” related to Capacity Performance at the July 23, 2015, meeting of the PJM Markets and Reliability Committee.**



# Retroactive Replacements

- **The July 23, 2015, rule change did not address FRR plans.**
- **Manual 18 does not provide that FRR entities may retroactively adjust FRR commitments. The replacement capacity transaction type is not used for FRR Plans. Therefore the Manual 18 changes are not relevant to FRR entities.**
- **FRR plans are updated by adjusting resource commitment levels to make a comparable replacement.**
- **Any change to allow retroactive FRR plan adjustments would be a rule change and not a clarification.**
  - **Out of scope in this issue charge.**

# Retroactive Replacements

- **RAA Schedule 8.1.G references OATT Attachment DD sections that cover regularly timed replacement transactions.**
- **RAA Schedule 8.1.G does not reference PJM Manuals.**
- **The retroactive replacement rule is defined in Manual 18 only, not in the tariff.**

# Retroactive Replacements

- **The referenced OATT Att DD section (10A) refers to committed capacity but does not explicitly refer to replacements.**
- **Committed capacity as a function of replacement capacity is defined in Manual 18 and loosely defined in OATT Att DD Sections 7-10. Section 10A also does not reference PJM Manuals relating to replacements.**
- **Other penalty sections explicitly state how replacement capacity can be used.**

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