

## **IMM proposal where different than PJM**

### **Regulation Product Type.**

1. PJM
  - i. Separate RegUp and RegDn Signal (split bidirectional signal). Under this design, regulation resources would be able to clear for either RegUp or RegDn, or both products (RegUp and RegDn), in the same commitment interval. Also, a separate RegUp and RegDn Market.
2. IMM
  - i. Bidirectional Signal and market.

### **Test Times.**

1. PJM
  - i. Reduce from 3 tests to 2 tests for new resources entering Regulation market, change language from uprate test to change in capability, remove differences between new and existing owners for signal change test (setting new test scores), disqualified resources only need 1 test.
2. IMM
  - i. Status Quo and PJM determined test times.
    - 1) Status quo:
      - a) "New unit tests -Meet or exceed 75% on 3 consecutive test (limited to one test per calendar day.) Up-rate tests- Meet or exceed 75% on 1 test (limited to one test per calendar day.) Signal change tests- Meet or exceed 75% on 1 test (limited to one test per calendar day.)"

### **Performance Score (Precision only).**

1. PJM
  - i. The lowest of the absolute error between the signal at  $t_0$  and the response at  $t_0$  and  $t_{10}$ .
  - ii. The denominator in the precision calculation will be an average of the regulation award and the absolute average hourly (commitment period) signal.
2. IMM
  - i. The precision score is based on a comparison every  $t_0$  and  $t_{10}$  ( $t = \text{second}$ ) and taking the minimum difference between signal and actual output of the resource. Response data of the unit is sent back to PJM for scoring.
  - ii. Performance scoring =  $1 - ((\text{unit specific SCED MW} + \% \text{ regulation fleet signal} \times \text{unit specific regulation assignment}) - \text{actual output of the specific unit}) / \text{regulation assignment}$ .

## Minimum Allowable Price Setting Performance Threshold

1. PJM
  - i. No lower limit.
2. IMM
  - i. A resource with less than or equal to 25% actual 5 minute performance score cannot set the price in any 5 minute period.
  - ii. Matches 25% threshold for getting paid for a 5 minute interval.

## Five minute and Ex Post Pricing and Settlement

1. PJM
  - i. 5 minute price based on historic mileage and performance scores and realized LOC.
  - ii. Unit specific settlement adjusted payments based on unit actual performance.
  - iii. Actual Mileage is used to adjust settlement credit after the hour.
2. IMM
  - i. 5 Minute price based on forecasted (historic) mileage and performance are informational only (for clearing and recommitments).
  - ii. 5 minute price posted and used for settlement based on the actual marginal unit in each segment based on the after the segment actual mileage and performance (and LOC) information is known.
    - 1) The information needed to correctly define marginal price/cost is not known until the end of each interval (ex post): Mileage and performance scores can be know at the end of each segment.
  - iii. 5 minute price paid match the effective price used to settle regulation MW provided in each segment.
    - 1) Can post an informational price based on ex ante (mix of historic and ex ante LMP based information—this is what PJM does now) and then actually price and settled on ex ante basis.

## Regulation Range vs Economic Range

1. PJM
  - i. No requirements.
2. IMM
  - i. Regulation range (Regulation Min and Regulation Max) should match economic dispatch range (limited by ramp rates and by economic min and economic max), unless explained by physical limitations (not fuel limit).

## LOC Calculations

1. PJM proposal:

"Use tracking calculation of desired MW at LMP ramp rate limited. This approach captures both the physical limitation of the resource and expected output tracked over time as dictated by lmp.

<https://www.pjm.com/-/media/committees-groups/task-forces/rmdstf/2023/20230222/20230222-item-06---regloc---enhanced-calculation-of-the-desired-mw-at-lmp-ramp-rate-limited.ashx>

1. Cumulative MW within and across hours for LOC in commitment, pricing and settlement. Consistent with the status quo, the shoulder-interval-after for the eligible resource is captured in the Settlement LOC adjustment..
2. IMM proposal:
  1. LOC based on desired MW output that reflects the physical limits of the unit's ability to ramp within the commitment period in response to changes in LMP. LMP based energy desired MW for LOC calculation within the commitment period based on cumulative movement over the commitment period based on physical ramp limit relative to regulation set point at the beginning of each commitment period. Portions of the energy offer where physical limitations prevent measurable energy ramping within the commitment period are not eligible to contribute LMP desired MW for LOC calculations.

## **VOM in Offers**

1. PJM
  1. VOM only in offers for regulation only units.
2. IMM
  1. No VOM in any cost offer.