

APRIL 9, 2024

Market Renewal Project Market & System Operations (MSO) Batch, Final Alignment Batch

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Purpose

- Provide Technical Panel (TP) members with additional supporting information in advance of the Vote to Post for the Market & System Operations (MSO) and Calculation Engines batches:
 - further amendments to the market rules and manuals
 - results from Third Party Dispatch Scheduling & Optimization (DSO) review
- Finalize approach that will be taken for supporting Technical Panel's review of the Final Alignment (FA) batch



Market and System Operations (MSO) and Calculation Engines

MSO - Additional Amendments

- On March 13, 2024, the IESO posted responses to stakeholder comments on the MSO batch, with revised market rules and market manuals
- Since the February 13th TP meeting, the IESO further considered two stakeholder comments and incorporated amendments to the market rules/market manuals in the March 13th posting regarding:
 1. Required timelines to change load participation types from a non-dispatchable load back to a dispatchable load or price responsive load
 2. Submission deadlines for regulation offers on the day prior to dispatch day

1. Timelines to Change Load Participation Types

- AMPCO expressed concern about loads having to wait 12 months before they can change load participation types from a non-dispatchable load, back to a dispatchable load or a price responsive load (MR Ch.7 s.2.2.20)
- AMPCO is of the view that the above noted timeline could impair a load's participation in the capacity auction
- In light of AMPCO's expressed concern, the IESO has reduced the constraint from 12 months to 180 days and has amended s.2.2.20 of the market rules. Corresponding changes will be made in MM1.5 via the Final Alignment batch. The IESO will monitor the impact of this change post-go live and may re-evaluate the length of this constraint

2. Submission Deadlines for Regulation Offers

- Evolgen expressed concerns regarding the proposed change to the regulation offer submission deadline by one hour as compared to today's market, from 9:00 EPT to 8:00 EPT, on the day prior to dispatch
- Evolgen indicated that advancing the submission deadline to 8:00 EPT would significantly shorten the time staff have to assess conditions and optimize offers
- The IESO has revised the timing of the requirement to offer regulation capacity back to 9:00 EPT as requested, provided that offers for regulation are submitted in a standardized template acceptable to the IESO – the IESO will work with ancillary service providers to determine an acceptable template – MM4.1 & MM4.2 have been revised accordingly

Calculation Engines – Additional Amendments

- Since the March 13th publication of the calculation appendices, the IESO made the following refinements to the draft DAM calculation engine (App 7.5) and Pre-dispatch calculation engine (App 7.5A) market rule appendices:
 - Sections 11 and 14 – conduct tests and price impact tests for energy and operating reserve - inclusion of an absolute value operator in the equations to address outcomes caused by negative prices
 - Correction of a typo in section 11.5.1.1.5 to replace *P10NDG* with the correct variable *P10NDL*



MRP DSO Pre-Implementation Review: *Overview and Summary of Findings*

MRP DSO Review: Overview and Scope

- Through a competitive procurement, the IESO selected PricewaterhouseCoopers LLP (“PwC”) to independently assess that the implementation of the new calculation engines is compliant with the amended market rules
- The review, conducted between September 2023 and February 2024, addressed the following components:

Day-Ahead Market (DAM) Calculation Engine	Pre-Dispatch (PD) Calculation Engine	Real-Time (RT) Calculation Engine
Consistent with Chapter 7 - Appendix 7.5 (MR-00458-R00) Process used to assess day ahead commitments, day-ahead schedules and locational marginal prices	Consistent with Chapter 7 - Appendix 7.5A (MR-00459-R00) Process used to assess commitments, schedules and prices for the pre-dispatch look-ahead period	Consistent with Chapter 7 - Appendix 7.6 (MR-00460-R00) Process used to assess schedules and prices for the real-time market and real-time look-ahead period

MRP DSO Review: Scope

- The following items were out-of-scope of the DSO Review:
 - Validation of the completeness and accuracy of market participant input data in the calculation engines
 - Validation of the completeness and accuracy of IESO input data in the calculation engines
 - Estimation of non-dispatchable load (NDL), dynamically created system losses, dynamically created market power mitigation (MPM) parameters and the Network Security Assessment (NSA) as they are dependent on the network design model that represents the IESO grid

MRP DSO Review: Testing Approach

- All tests were conducted using test data provided by the IESO from single-day runs of each of the DAM, PD and RT engines
- Automated screening tests were developed to assess whether the schedules and associated costs produced by DAM, PD and RT were consistent with the market rules
- For cases where automated screening was limited due to unobserved phenomenon in the test data, scenario tests were performed in separate instances by manipulating inputs and observing effect on outputs for each discrete engine's test environment

MRP DSO Review: Summary of Findings

No Exceptions Observed:

- All the three engines respected the operational limits described in the market rules, passing all automated and scenario tests not impacted by the market power mitigation process
- All resource cost calculations for quick start resources were computed correctly
- Based on the results of scenario tests performed, the co-optimization of energy and operating reserves, cascading hydroelectric generation, tie-breaking mechanism, penalty factor violations, and inertia limit tests all passed

Exceptions Observed:

- Incorrect resource cost calculations due to inappropriate application of commitment costs in Day-Ahead Market (DAM) calculation engine for Pass 1 & Pass 3
- Incorrect Conduct Test results based on the described market rules which impacted 2 resources within the test data provided
- Incorrect Price Impact Test results based on the described market rules which impacted 5 resources within the test data provided

The following slides provide further details on each of these exceptions

MRP DSO Review: Exception 1

Issue:

- Resource start-up costs were not included in the cost calculation for the mitigated scheduling (i.e., Step 5) and pricing (i.e., Step 6) steps in Pass 1 of DAM
- Resource speed-no-load costs were incorrectly included in the cost calculation for the DAM scheduling (i.e., Step 8) and pricing (i.e., Step 9) steps in Pass 3 of DAM
- Caused by a vendor implementation issue during the encoding of specific equations

Remediation:

- DSO vendor was immediately able to provide a fix prior to the review completing.
- The IESO conducted extensive testing to ensure the accuracy of the fix. Additional limited scenario testing was also conducted by PwC to demonstrate the issue was fixed.

MRP DSO Review: Exception 2

Issue:

- Five resources within the test data provided to PwC, that were associated with a Narrow Constrained Area (NCA), failed price impact test screening conducted by PwC as part of MPM testing
- The scope of the issue was only applicable to those resources that belong to an NCA
- Caused by a vendor implementation issue during the encoding of specific equations

Remediation:

- DSO vendor was immediately able to provide a fix for the issue.
- The IESO conducted extensive testing to ensure the accuracy of the fix, but testing was not re-performed by PwC

MRP DSO Review: Exception 3

Issue:

- Two resources within the test data provided to PwC failed conduct test screening conducted by PwC as part of the MPM testing
- The scope of the issue was limited to resources with submitted energy offers, where the sum of the price breakpoints equaled to exactly zero
- Caused by a vendor implementation issue during the encoding of specific equations

Remediation:

- DSO vendor was immediately able to provide a fix for the issue.
- The IESO conducted extensive testing to ensure the accuracy of the fix, but testing was not re-performed by PwC



Final Alignment

Finalized Approach

- Based on TP feedback from the January 2024 meeting, the following approach will be adopted:
 - IESO to focus TP engagement on the **new content** introduced in the FA batch of market rule amendments; which will include transition/cutover details, updates for market power mitigation and settlements, and other conforming changes
 - As recommended, calendar placeholders for additional meetings will be issued in the event there is the need to discuss any issues or topics related to potential interdependencies between the MRP batches
- **Action item:** TP members to identify any topics that require additional review and discussion by the end of May

Placeholder Dates – Working Group sessions

Calendar holds will be circulated to TP Members for potential working group sessions on the following dates/times:

- July 16th – 1 to 4pm (afternoon of TP meeting)
- July 23rd – 9 to 12pm
- Aug 12th and Aug 15th (9 to 12pm both days)



Next Steps

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MSO & Calculation Engines:

- April 9, 2024: TP vote to post
- May 14, 2024: TP vote to provisionally recommend
- June 7, 2024: IESO Board consideration/provisional approval

Final Alignment:

- By June 7, 2024 – publication of the FA market rules and market manuals
- June 11, 2024 – TP Education
- July 16, 2024 – TP vote to post
- Sept 10, 2024 – TP vote to recommend

Thank You

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