

Market Renewal FACT SHEET

Multi-interval Optimization

#11

The single schedule market (SSM) is one initiative in the Market Renewal's Energy work stream. Multi-interval optimization (MIO) is used in a SSM to improve system operation by considering energy balancing requirements over a longer timeframe.

What is Multi-interval Optimization?

MIO is used to determine the economic dispatch of generation over a specified number of future time intervals in a SSM. The alternative is making dispatch decisions only on a five-minute forward interval. MIO improves system operation by considering energy balancing needs over a longer time frame. This is especially important in systems with high penetration of intermittent renewable generation, as is the case in Ontario. Currently the IESO's real-time constrained schedule employs MIO and this will continue in SSM.

There are two primary changes that must be considered in regards to MIO when shifting to a single schedule market.

- MIO could also be used for pricing, requiring greater scrutiny of optimization assumptions.¹
- The ability of a resource to set LMP may be limited by their physical capability to change generation².

Why is it important?

Compared to single interval optimization, MIO provides the system with additional time to ensure that there is sufficient short-term flexibility to handle expected changes in system energy requirements. Using MIO in pricing supports the goal of aligning prices with dispatch

¹ An example of a problem parameter that will need increased scrutiny is a discount that is applied to future time periods vs. the present time period. This is used to ensure that the optimization generally chooses to minimize costs in the current time period unless there is a large system cost benefit to deviating from it.

² For example, if a resource has a limited ramp rate that prevents it from being able to fully change its generation in the MIO, then there may need to be limits on that resource's ability to be the marginal resource that sets LMP.

instructions that consider system and resource operating constraints. The settlement prices will be consistent with the actual cost of dispatch that minimizes system cost over a longer period.

Using MIO in a single schedule market introduces new considerations. For example, a key parameter to the dispatch model is the time interval on which the problem is solved. A longer time period can reduce overall system cost. However, there is a limit to how long this period should be. The longer the interval, the harder the problem is to solve. Furthermore, longer time intervals cause higher chances of load and renewable generation forecast error, which may result in a disconnect between the optimized dispatch and the actual future system operating requirements. Another potential drawback of longer intervals is that resources are dispatched out of market due to forecast error which may cause a need for make-whole payments³ as the MIO does not make up lost revenue in the future intervals.

³ See Market Renewal Fact Sheet on Make Whole Payments (#18)