DECEMBER 2, 2025

Technical Panel Education: Adjustments to Real-Time Make-Whole Payments

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Agenda

- Background
- Overview of Make-Whole Payments (MWP) and Economic Operating Point (EOP)
- Areas of Focus:
  - Item 1 – EOP and Forbidden Regions
  - Item 2 – Operating Reserve (OR) Ramping in Lost Opportunity Cost EOP Calculations
  - Item 3 – MWP not Offsetting Amongst Energy and Operating Reserve Products
- Summary of Changes
- Summary of Stakeholder Feedback
- Next Steps and Timelines

Background

- Ongoing monitoring and review of the renewed market has identified specific Real-Time Make-Whole Payment (MWP) circumstances under which unwarranted MWP payments are calculated.
- These are very specific and limited circumstances and only became apparent after the renewed market "go-live" and relate to the interaction between payments for Energy and Operating Reserve.
- The IESO will be making targeted corrections to the formulas in Market Rules, Market Manuals and related tools to ensure continued accuracy and consistency.

Make-Whole Payments

- Make-Whole Payments are essential to maintain reliability and to incentivize market participants to follow their schedules knowing they will not incur losses.
- They are designed to compensate a resource for the financial difference between its actual dispatch and what it would have been based on its offer curves and Locational Marginal Prices.
- Today, schedules and corresponding locational marginal prices (LMPs) are more aligned compared to legacy market.
- There is less need for additional compensation to ensure market participants recover their costs or do not lose out on revenue opportunities.
- Situations can still occur where schedules are not aligned to prices.

Make-Whole Payments in the Renewed Market

- Dispatch schedules may not align to prices because of:
    - Manual out-of-market actions taken for reliability; and
    - Scheduling pass/pricing pass differences
- Principles for calculating Real-Time Make-Whole Payments:

1. It must represent what is physically achievable for the resource; and
2. It must be calculated considering co-optimization of energy and operating reserve consistent to how the Real-Time market calculation engine does.

To calculate Make-Whole Payments, it is necessary to determine

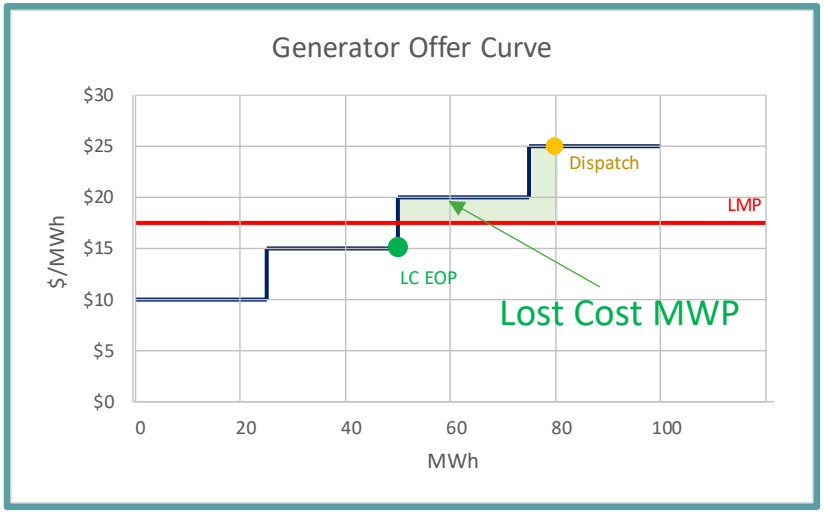
Economic Operating Points (EOPs)

What Are Economic Operating Points (EOPs)?

- The EOP for a product serves as the reference point for calculating payments related to Lost Costs and Lost Opportunity Costs.
- It reflects the output a resource could have achieved based on its physical capabilities and the locational marginal price (LMP), given actual market conditions.
- Key inputs for determining an EOP include offers and bids, resource specific characteristics, and LMPs.

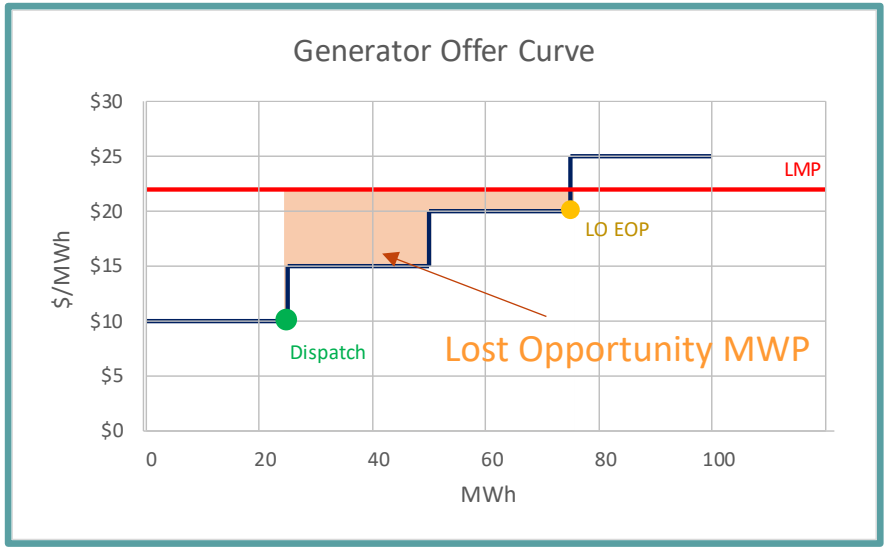
EOP calculations can be found in Market Rules Chapter 0.7 System Operations and Physical Markets, Appendix 7.8.

Lost Cost and Lost Opportunity Scenarios



Lost cost (LC) scenarios occur when the LMP implies the resource should have been scheduled lower.

Lost opportunity cost (LOC) scenarios occur when the LMP implies the resource should have been scheduled higher.



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Inappropriate Real-Time Make-Whole Payments

Overview

Item	Description
1	Lost Opportunity Cost (LOC) and Forbidden Regions
2	Operating Reserve (OR) Ramping in LOC EOP Calculations
3	Make-Whole Payment (MWP) Not Offsetting Amongst Energy and OR Products

Item 1

Lost Opportunity Cost (LOC) and Forbidden Regions

Item 1 Overview: LOC and Forbidden Regions

- Some hydro generators have Forbidden Regions in which they cannot maintain steady operation without equipment damage and can only ramp through.
- These Forbidden Regions are considered in dispatch schedules but not when determining the EOPs upon which MWPs are based. The result is that the EOPs can be physically unattainable.
- To ensure that MWP are based on physically achievable operations, there is a settlement process that subtracts out the portion of the MWP resulting from an **energy** schedule in a Forbidden Region or at the upper boundary.
- However, this settlement process does not exist for **OR** LOC MWP calculations when the energy schedule is in a Forbidden Region or at the upper boundary, resulting in unwarranted MWP.

Item 1: Rationale for Change

- A MWP must be based upon a physically achievable schedule.
  - The current LOC MWP settlement rules for forbidden region are only applied for energy.
  - LOC MWP settlement calculation can occur for OR EOP when the energy schedule is within, or at the upper boundary of a forbidden region and are unwarranted. An equivalent settlement rule is applied for energy EOP when the energy schedule is within or at the upper boundary of a forbidden region.

Item 1: Implementing the Changes

Item	Description	Market Rule Change?	Other Document Change?
1	LOC and Forbidden Regions	Chapter 0.9 Settlements and Billing; Section 3.5.6 Appendix 9.2	Charge Types and Equations CT 1905 - 1907

- Market Rule Amendment to **MR Ch.0.9 Section 3.5.6** (Real-Time MWP) to match the OR rule to the existing energy rule.
- Updating Charge Types and Equations.
- Tool changes in Settlement System to include LOC MWP variables for OR when the energy schedule is constrained by a Forbidden Region, but the energy EOP is not.

Item 2

Operating Reserve Ramping in Lost Opportunity Cost EOP Calculations

Item 2 Overview: OR Ramping in Lost Opportunity Cost EOP Calculations

- There is an inconsistency between OR ramp constraints in the DSO and EOP Calculation Engine.
- This inconsistency results in overstating LOC OR EOPs beyond what resources can be scheduled to.
- The result is unwarranted LOC MWPs.

Item 2: Rationale for Change

- A MWP must be based upon a physically achievable schedule.
  - The EOP Calculation Engine is missing constraints containing the interval-to-interval energy ramp impact on available OR ramp.
  - The result is that the OR EOPs can exceed the physical ramping characteristics of the resource.

Item 2: Summary of Changes

Item	Description	Market Rule Change?	Other Document Change?
2	OR Ramping in LOC EOP Calculations	Chapter 0.7 System Operations and Physical Markets; Appendix 7.8	N/A

- Market Rule Amendment to add the equations including the interval-to-interval change in energy that are in **MR Ch.0.7 App. 7.6** for the DSO to **MR Ch.0.7 App. 7.8** for the LOC EOP OR calculations.
- Tool changes in the EOP calculation engine to reflect the Market Rule Amendment.

Item 3

Real-Time Make-Whole Payments Not Offsetting Amongst Energy and Operating Reserve Products

Item 3 Overview: RT-MWP Not Offsetting Amongst Energy and OR Products

- Make-Whole Payments are intended to keep a Market Participant whole for following dispatch instructions that are co-optimized across energy, 10S, 10N, and 30R products.
- The RT-MWP calculation must be congruent to how energy and OR schedules are co-optimized.

Item 3: Rationale for Change

- How Energy and Operating Reserve are co-optimized should be considered in the calculations of EOP and MWP.
- Lost Opportunity Cost MWP settlement is ignoring the profit realized for the same capacity in the market.
- At present, RT-MWP are not correctly netting across products, resulting in market participants being paid for the same MW twice.

Item 3: Summary of Changes

Issue	Description	Market Rule Change?	Other Document Change?
3	MWP Not Offsetting Amongst Energy and OR Products	Chapter 0.9 Settlements and Billing; Section 3.5	Market Manual 0.5.5 Settlements

- Market Rule Amendment to **MR Ch.0.9 Section 3.5** to clarify how the offsetting is to occur through updated eligibility criteria.
- Market Manual changes to **MM 0.5.5 Section 2.7**.
- Tool changes in Settlement System to reflect the Market Rule Amendment.

Overall Summary of Changes

Item	Description	Market Rule Change?	Other Document Change?
1	LOC and Forbidden Regions	Chapter 0.9 Section 3.5.6 Appendix 9.2	Charge Types and Equations CT 1905 - 1907
2	OR Ramping in LOC EOP Calculations	Chapter 0.7 Appendix 7.8	N/A
3	MWP Not Offsetting Amongst Energy and OR Products	Chapter 0.9 Section 3.5	Market Manual 0.5.5

Summary of Stakeholder Feedback

Summary of Stakeholder Feedback - Nov 21st

- The IESO held a public engagement session on Nov 21st to introduce the initiative and rationale for adjustments. Verbal feedback included the following:
  - Stakeholders requested examples for the scenarios presented;
  - A stakeholder asked whether the IESO would test the implementation with market participants prior to implementing the changes;
  - For item 1 related to forbidden regions and hydro-electric resources, a stakeholder indicated it would be helpful if details on specific instances of unwarranted payments could be shared confidentially with the market participant.

Stakeholders were given until Dec 1st to submit written comments on the Nov 21st presentation.

Next Steps and Timelines

Next Steps

- *November 21, 2025 – Public Engagement Session - complete*
- *December 1, 2025 – Deadline for written stakeholder feedback*
- December 2, 2025 - Technical Panel (TP) Education
- December 16, 2025 – Public Engagement Session and Response to Feedback; present red-lined draft market rule and market manual changes
- January 13, 2026 – TP vote to post
- February 10, 2026 – TP vote to recommend
- March 6, 2026 – IESO Board consideration of rule amendments

Thank You

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Appendix

Acronym List

Acronym	
LC	Lost Cost
LOC	Lost Opportunity Cost
EOP	Economic Operating Point
MWP	Make-Whole Payment
DSO	Dispatch Scheduling Optimizer
FR	Forbidden Region
OP	Operating Profit
OR	Operating Reserve (10S – 10 minute spin; 10N – 10 minute non-spin; 30R – 30 minute)

Acronym	
MR	Market Rules
MM	Market Manuals
ELC	Energy Lost Cost
OLC	Operating Reserve Lost Cost
ELOC	Energy Lost Opportunity Cost
OLOC	Operating Reserve Lost Opportunity Cost
ORR	Operating Reserve Ramp Rate