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Market Renewal Program – Market & System Operations (MSO)

Technical Panel MSO Batch – Overview Session

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Agenda

- MSO Batch - 'changes at a glance'
- High-level overview of changes being introduced via MSO Batch
- Next Steps

Purpose

- Provide Technical Panel an orientation on the key concepts and objectives of the Market & System Operations (MSO) batch to establish a groundwork for future conversations
- A subsequent discussion is planned for Q1 2024 to review areas of focus identified via stakeholder feedback or as requested by the Technical Panel

MSO Batch: 'Changes at a Glance'

Key Changes

Switch to Locational Marginal Pricing

DAM

PD

RTM

New Dispatch Data and Enhanced Optimization of Resources

Market Power Mitigation integrating into the engines

Facilitate New Resource Types

New Reports

Other - Economic Operating Point / Market Remediation

Calc. Engine Batch overlap

What the Change Means

Schedules and prices are aligned across all scheduling timeframes. DAM becomes primary scheduling, pricing and settlement process with real-time market used to balance DAM deviations

More efficient scheduling and commitment of resources

Market costs better reflect competitive outcomes

Increased competition & price convergence

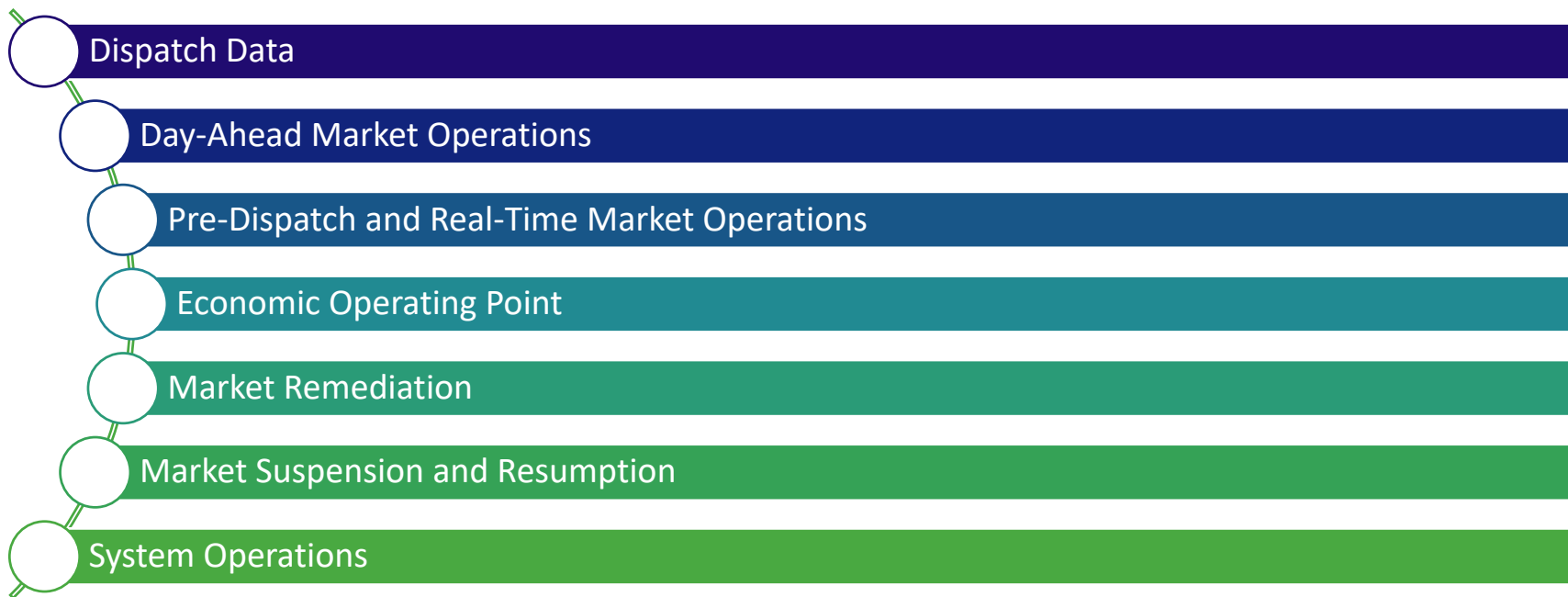
Improved transparency and decision making

Required modifications to the processes necessary to support the settlement of the new market



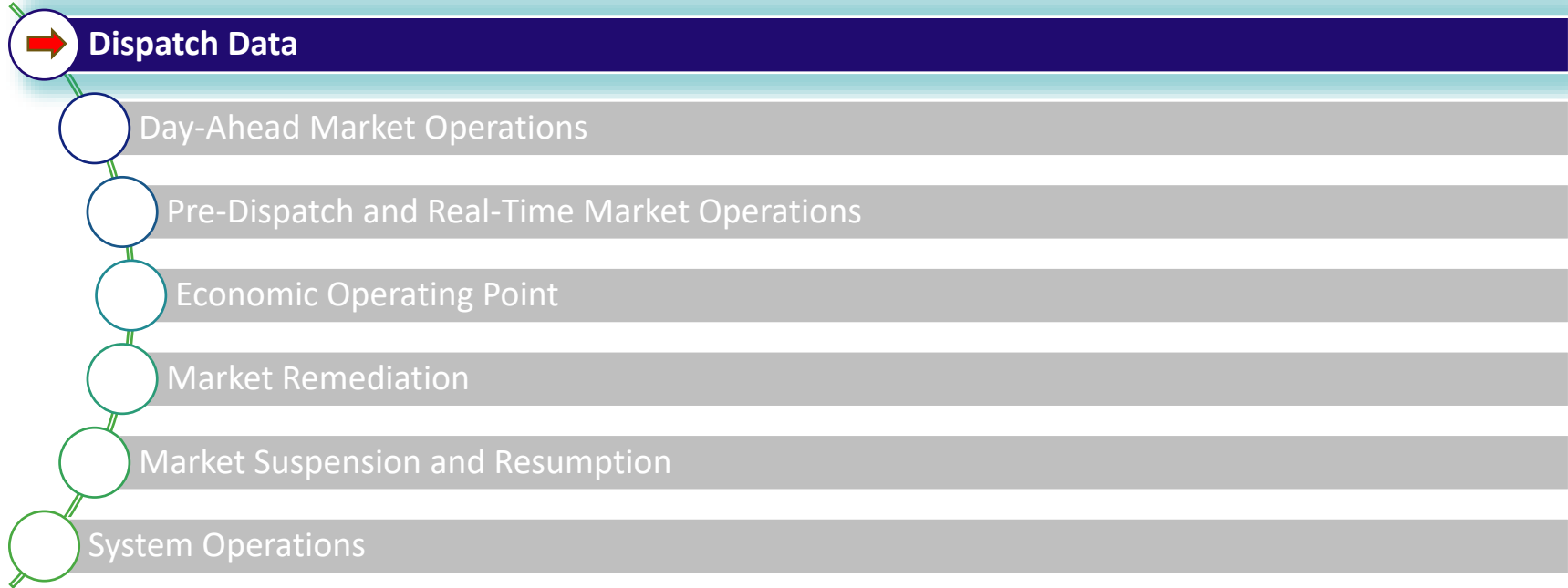
MSO Batch: Overview of Key Changes

MSO Batch Topic Overview



For ease of reference, the balance of this presentation will mirror the structure used in the July 27/28 stakeholder engagement webinars; TP members may refer to that [deck](#) as desired for more detail on any specific topic

MSO Batch: Dispatch Data



Dispatch Data Parameters

New dispatch data parameters introduced for various resource types to support more efficient scheduling in DAM and PD timeframes

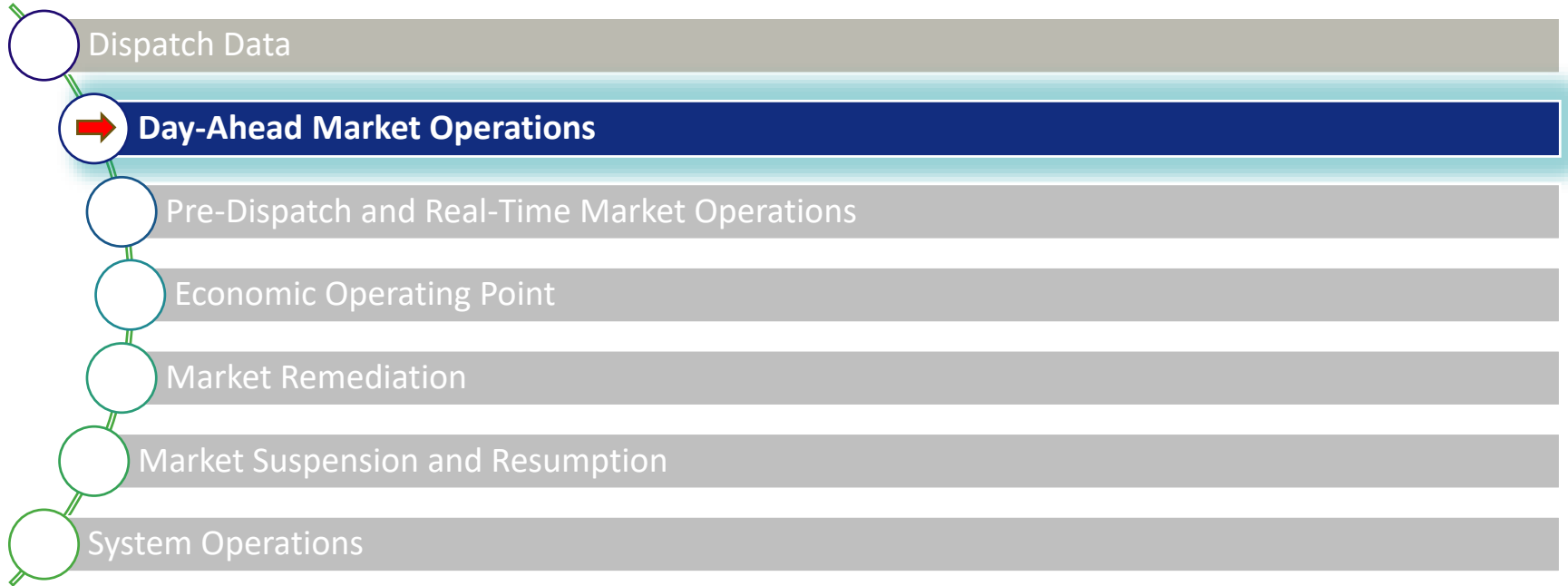
- Majority of dispatch data parameters from current market will be retained in the new market (e.g., P/Q pairs, minimum loading point (MLP), minimum generation block run time (MGBRT), etc.)
- Several new hourly and daily parameters are being introduced to more efficiently schedule hydro resources in a way that better reflects their physical characteristics (e.g., linking multiple forebays on a single river system)
- New dispatch data parameters will also facilitate more efficient commitment of non-quick start (NQS) resources by allowing the day-ahead market and pre-dispatch processes to better reflect their start-up parameters and thermal state
- Associated new dispatch data validations are also being introduced

Dispatch Data Submission Windows

Modifies or creates new submission windows to govern the timing of dispatch data submissions and revisions

- 1. DAM submission:** similar to today's DACP, unrestricted initial submission of dispatch data for the day-ahead market
- 2. DAM execution:** no revisions allowed until DAM is complete, unless a rerun of the DAM is needed and the IESO solicits the resubmission of dispatch data
- 3. (& 4.) DAM to RTM transition:** different rules apply for modifying hourly and daily dispatch data; of note GOG-eligible resources are restricted from submitting certain dispatch data revisions prior to the RTM dispatch hour recognizing that some commitment decisions will have been finalized in the DAM
- 5. RTM mandatory window:** same as today, no revisions 2 hours prior to RTM

MSO Batch: Day-Ahead Market (DAM) Operations



Introduction of a Day-Ahead Market

DAM replaces existing Day-Ahead Commitment Process and becomes the primary scheduling, pricing and settlement mechanism; real-time market used to balance DAM deviations

- DAM will establish financially binding schedules & locational marginal prices (LMP) for energy and operating reserve
- Market participants will be settled based on DAM schedules and prices, and subject to RTM balancing that accounts for deviations from their DAM schedules and differences between DAM prices and RTM prices
- The Generator Offer Guarantee (GOG), based on submitted start-up and speed no load costs, will replace the current Generator Cost Guarantee (GCG), which is based on pre-approved costs

Introduction of a Day-Ahead Market (cont'd)

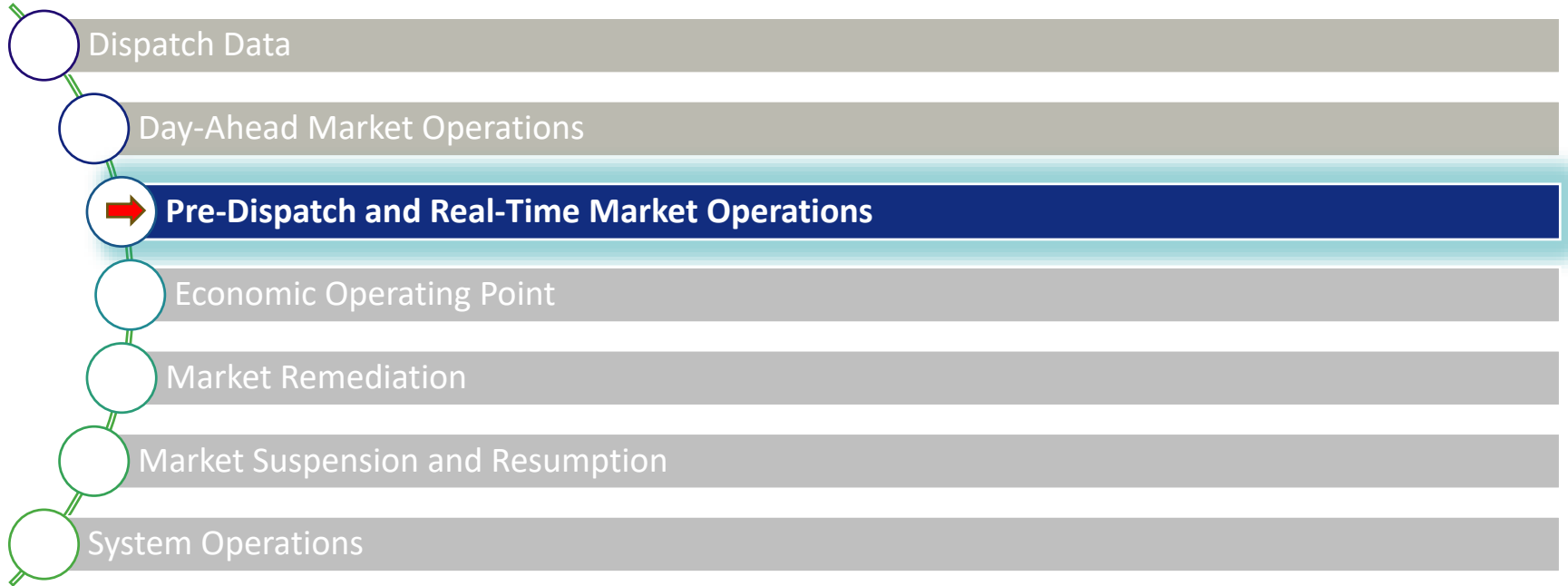
- To operate dispatchable resources in the RTM, market participants must continue to establish an Availability Declaration Envelope (ADE) by submitting offers or bids into the DAM
 - The existing allowance to expand the ADE in the RTM is being relaxed to provide additional real-time flexibility (increased from the lesser of 2% of the ADE or 10 MW to the lesser of 15% of the ADE or 10 MW)
- The current two-run DACP and associated hydro resource resubmission window in-between the two runs no longer applies; in the future all resource types will be evaluated in DAM during a single-pass (utilizing new dispatch parameters)

New Participant Types

New participant types introduced by MRP (virtual traders & price-responsive loads) integrated into the market to promote more efficient DAM outcomes

- **Virtual traders** may submit dispatch data for virtual transactions – that is, transactions without physical injection or withdrawal, submitted to the DAM to achieve scheduling and pricing outcomes to better reflect expected real-time conditions
- **Price-responsive loads** provide an optional mechanism for some of today's non-dispatchable loads to be more active in the market with exposure to locational prices, afforded with the ability to reflect their expected load consumption in the DAM while maintaining non-dispatchable status in real-time

MSO Batch: Pre-Dispatch (PD) and Real-Time Market (RTM) Operations



Enhanced Optimization and Unit Commitment

The pre-dispatch (PD) process will use an enhanced multi-hour optimization engine to more efficiently schedule resources within operating constraints

- The PD engine will use existing dispatch data and the new dispatch data introduced for hydro and NQS resource types to more effectively optimize hourly schedules
- The PD engine will be capable of determining new NQS resource commitments in addition to those determined in the DAM, and extend or advance existing DAM or PD commitments
- The IESO will continue to have the ability to manually commit a NQS resource for the purpose of safeguarding reliability at any time

Enhanced Optimization and Unit Commitment (cont'd)

- The IESO may cancel a day-ahead or pre-dispatch commitment at any time to safeguard reliability; the Market Rules may provide compensation for cancelled commitments
- Market participants will continue to have the ability, with notice to the IESO, to withdraw from a commitment that would endanger the safety of any person, cause equipment damage, or violate applicable law (“SEAL”)
- Where the market participant wishes to withdraw for reasons other than SEAL, they must request the IESO’s approval to withdraw from the commitment

Automation of Notices

Automated start-up and de-commitment notices will be introduced to streamline the dispatch of non-quick start resources

- Today, GCG-eligible resources must indicate via calls to the IESO Control Room their intent to start up/shutdown informed by referencing the relevant reports
- In the new market, GOG-eligible resources will receive automated start-up or shutdown notices automatically as an output from the new market tools
- The IESO will continue to have the ability to issue manual start-up or de-commitment notices at any time for reliability reasons

PD Intertie Scheduling Process

MRP will be introducing new intertie scheduling procedures that will limit transactions incremental to the day-ahead schedule

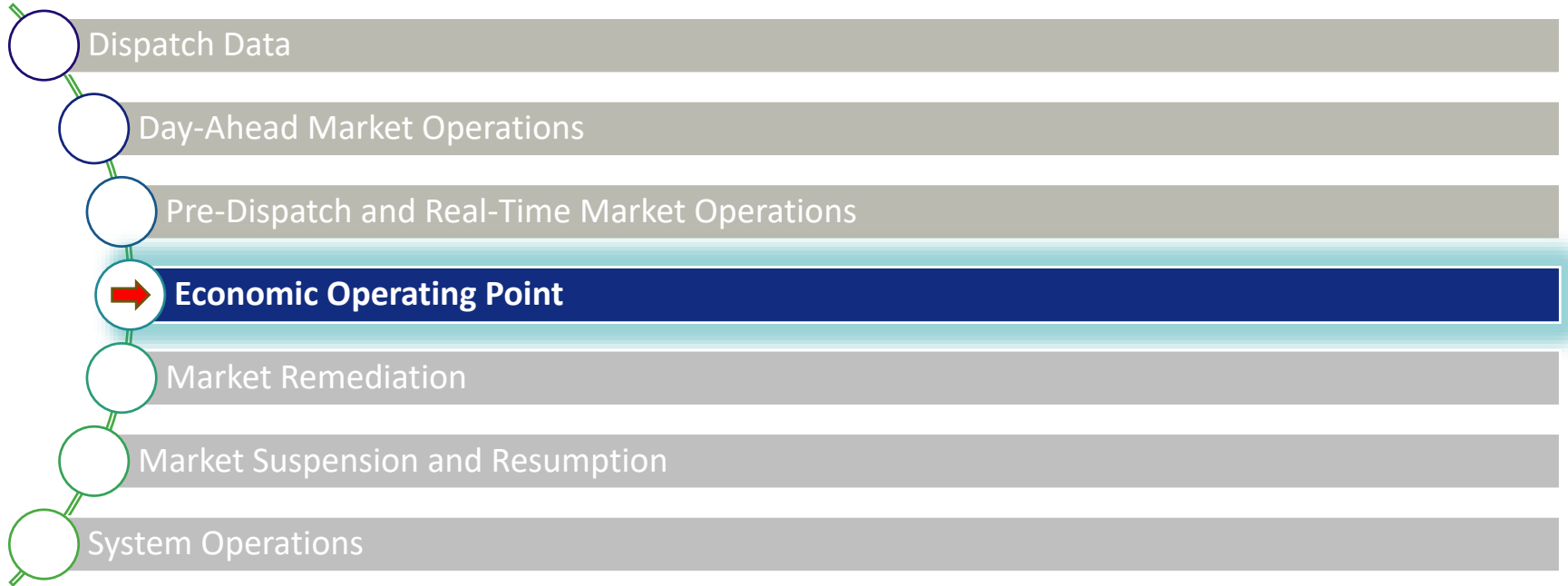
- PD calculation engine will only evaluate DAM-scheduled transactions when determining hourly interchange schedules beyond the first two hours of the PD scheduling horizon
- Incremental imports and exports above the DAM-scheduled quantities are only evaluated for the first two hours of the PD look-ahead period
- The IESO will have the ability to remove the two-hour limitation for reliability

Pseudo-Units (PSU) Across All Timeframes

To better reflect combined cycle facility scheduling across all timeframes, the PSU model that is only used in today's DACP, will in the future be used in all timeframes (DAM, PD, & RTM)

- PD and RTM schedules are issued for both the PSU and translated to physical resource equivalents; physical resource translation is necessary to facilitate resource based real-time communications and settlement
- DAM and PD commitments, and corresponding start-up notifications, will be issued for the physical resources for the same reasons noted above
- Constraints (e.g., MLP) for PSUs will be transferred from PD to the RTM

MSO Batch: Economic Operating Point



Economic Operating Point

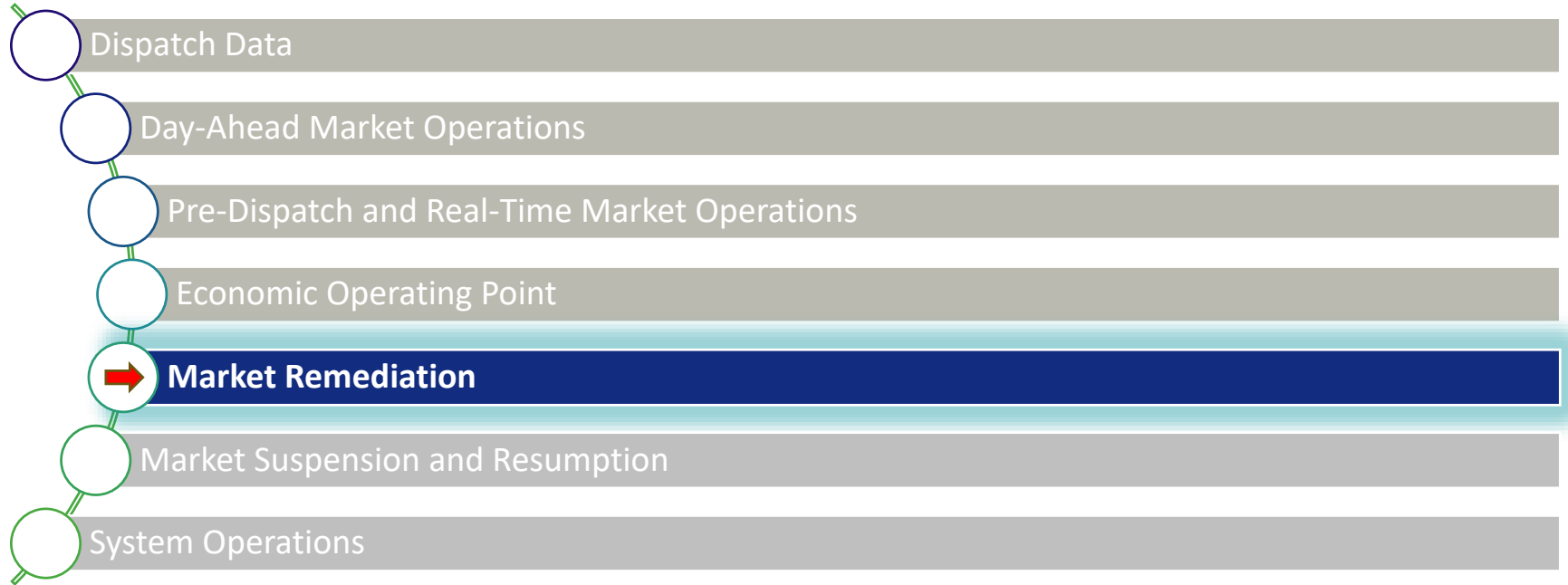
New mechanism that facilitates make-whole payments for out-of-merit dispatch scenarios in the new market

- In the current market, Congestion Management Settlement Credit (CMSC) payments for certain lost opportunity and lost cost scenarios are determined using two-schedule “constrained” vs. “unconstrained” system outputs
- Despite the shift to a future single-schedule market where schedules and prices are aligned, there can still be limited circumstances where these costs are not fully covered by the single-schedule price

Economic Operating Point (cont'd)

- Economic Operating Point (EOP) serves as the reference point from which future make-whole payments for lost cost and lost opportunity scenarios are established – the 'should have been' schedule implied by a resource's LMP
- For such scenarios, the EOP framework provides for make-whole payments that are still required to ensure a market participant remains incentivized to follow their dispatch schedule

MSO Batch: Market Remediation



Market Remediation - Day-Ahead Market

Current market remediation provisions will be extended and modified to reflect the Day-Ahead Market

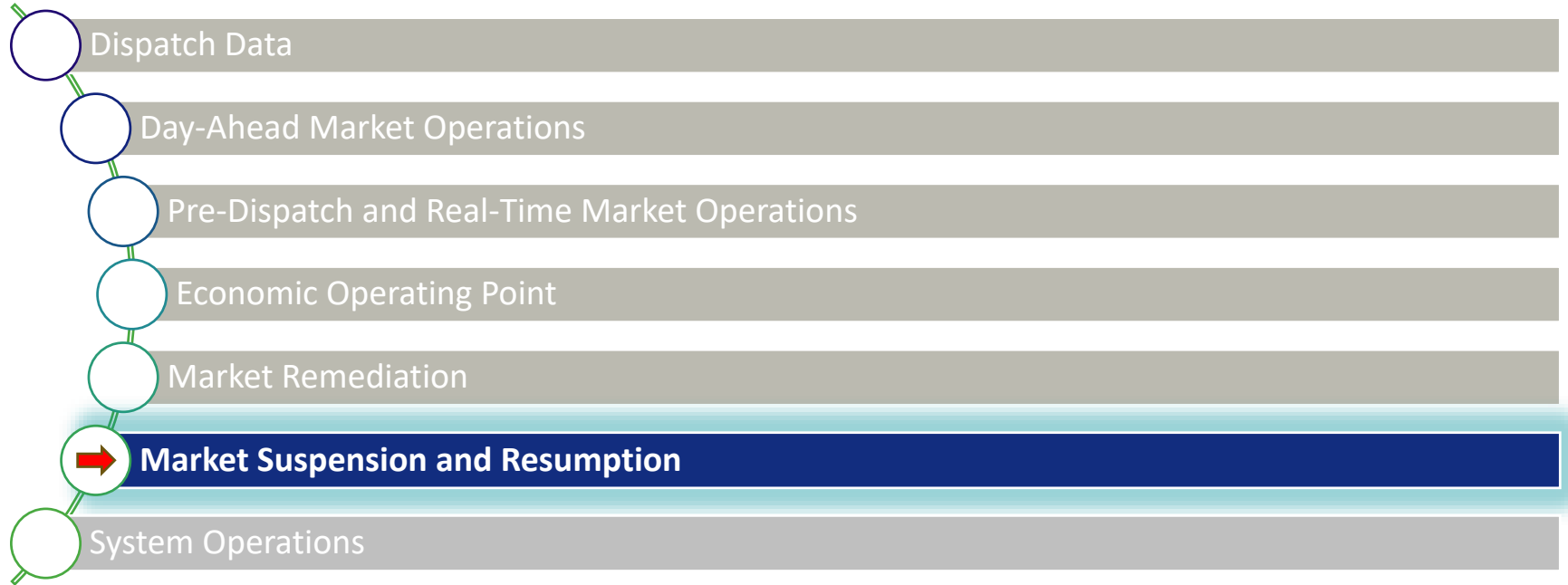
- Consistent with today's real-time market, should the IESO determine that published DAM prices for energy or operating reserve are materially incorrect, the IESO will administer and republish those prices
- A key difference from today's real-time market is that price administration will only occur for DAM when the error is isolated to the calculation of prices (recognizing that schedules can be updated via PD or RTM)
- Existing Dispatch Scheduling Error (DSE) process will also apply to the DAM under certain conditions

Market Remediation – Price Administration

Revised and new price administration methodologies are being introduced

- The shift to LMP allows for price administration to be conducted at a more granular level relative to today, the existence of DAM also allows for day-ahead results to be leveraged during price administration events
- In addition to current pricing methodologies, three new methods will be introduced based on the following approaches:
 - Recalculating LMPs using offline tools
 - Using DAM prices
 - Using a similar delivery point

MSO Batch: Market Suspension and Resumption

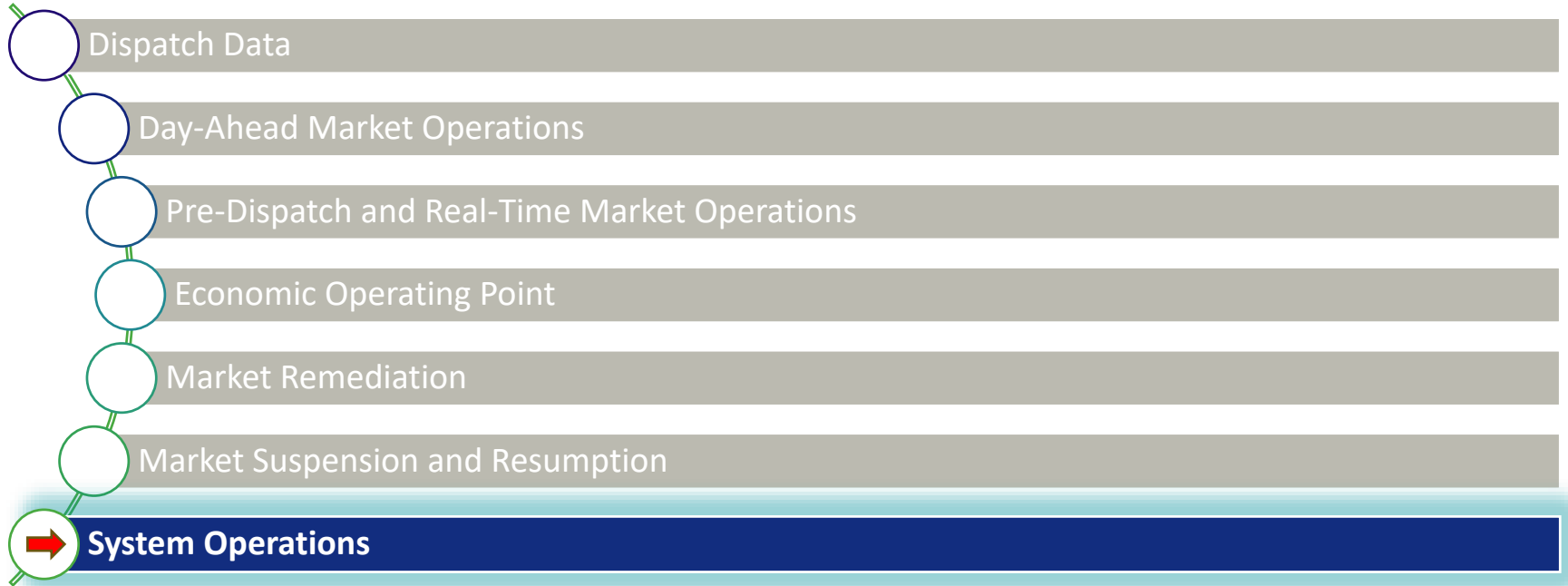


Market Suspension and Resumption

Market suspension and resumption processes will be updated to incorporate the new Day-Ahead Market

- If a real-time market suspension is expected to be in effect for future dispatch days, the DAM corresponding to those future dispatch days will also be suspended
- Market resumption advisory notices will include the dispatch day for which the DAM will resume
- Under a real-time market suspension, the IESO may rely on the most recent DAM schedule to facilitate dispatch in addition to today's practice of only relying on the most recent PD schedule

MSO Batch: System Operations



System Operations

Among other minor technical changes, outage management timelines will change to align with Day-Ahead Market submission timelines to promote alignment between day-ahead and real-time

- Outage requests for Segregated Mode of Operation (SMO) that require an outage to a critical transmission element must be submitted before DAM execution begins since critical elements impact security limits and therefore congestion
- Non-critical SMO outage requests are not expected to impact security limits and congestion and as such may be submitted in accordance with current SMO timelines

System Operations (cont'd)

- In addition to aligning SMO with DAM timelines, the existing 1-Day Advanced Approval process for lower impact outages has been shifted to align with the start of the DAM to better reflect expected real-time conditions in the DAM



Market and System Operations Batch

Next Steps: Reading the Batch and Providing Feedback

Engagement Timeline Recap

- **July 14:** MSO materials posted for stakeholder review
- **July 27 & 28:** Stakeholder sessions to introduce and discuss MSO materials
- **September 26 – October 3:** Targeted Q&A sessions by resource type:
 - September 26 - Energy Storage, Renewables, Nuclear Generators, Non-Dispatchable Generators
 - September 26 - HDRs, Dispatchable Loads, and PRLs
 - September 28 - Virtual Traders
 - September 28 – Intertie Traders
 - September 29 – Dispatchable Hydroelectric Generators
 - October 3 – GOG-Eligible Non-Quick Start Generators

Next Steps

- **November 8:** SE comments/feedback on market rules and market manuals due to the IESO
- **February 2024 TP:** Second Technical Panel session for MSO materials
- **March 13:** IESO responses to SE feedback posted
- **April 2024 TP:** Technical Panel vote to post MSO and Calculation Engine batch amendments
- **May 2024 TP:** Technical Panel vote to provisionally recommend MSO and Calculation Engine batch amendments



Appendix

Impacted Market Rules

Market Rules

Market rule provisions that describe the obligations and authorities regarding...

Chapter 5: Power System Reliability

Chapter 7: System Operations and Physical Markets

Ch.7, Appendix 7.1: Energy Offer, Schedule or Forecast Information

Ch.7, Appendix 7.2: Energy Bid Information

Ch.7, Appendix 7.3: Operating Reserve Offer Information

Ch.7, Appendix 7.4: Transmission Information Required for Scheduling and Dispatching

Ch.7, Appendix 7.7: Scheduling and Scheduling Approval

Ch.7, Appendix 7.8: Economic Operating Point

Chapter 11: Definitions

Impacted Market Manuals

Market Manuals

Market procedures and standards that describe the processes regarding...

- Market Manual 4.1 Submitting Dispatch Data in the Physical Markets
- Market Manual 4.2 Operation of the Day-Ahead Market
- Market Manual 4.3 Operation of the Real-Time Market
- Market Manual 4.5 Market Suspension and Resumption
- Market Manual 7.1 IESO-Controlled Grid Operating Procedures
- Market Manual 7.2 Near-Term Assessments and Reports
- Market Manual 7.3 Outage Management
- Market Manual 7.4 IESO-Controlled Grid Operating Policies

Thank You

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