

**SEPTEMBER 28, 2023**

# Market Renewal Program Implementation

Market Rules and Market Manuals: Market and System Operations

Q&A Session for Intertie Traders

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# Disclaimer

This document provides an overview of certain draft amendments to the market rules proposed in connection with the Market Renewal Program (MRP). The content of the proposed amendments is subject to further revision and the overview contained herein is provided for information purposes only. The information contained in this document shall not be relied upon as a basis for any commitment, expectation, interpretation and/or decision made by any market participant or other interested party. The market rules and market manuals, applicable laws, and other related documents will govern the future market. The IESO makes no representation or warranty, express or implied about the accuracy or completeness of the information contained herein.

# Webinar Participation

- Ways to interact in today's webinar:
  - Questions encouraged at any point during the presentation
  - Raise your hand (click the "Raise hand" button in the top right corner) to let the host know you'd like to verbally ask a question or make a comment. The host will let you know when to unmute
  - Enter a written question/comment in the chat. The host will read it out for you
- Microphones should be muted at all times, unless the host has called on you to unmute yourself

# Meeting Purpose

To provide stakeholders looking to participate in Ontario's energy markets as intertie traders an overview of their participation in the future day-ahead market (DAM), pre-dispatch (PD) and real-time market (RTM) in accordance with the Market and System Operations (MSO) and Calculation Engines batches of market rule and market manual amendments.

# Engagement Timeline

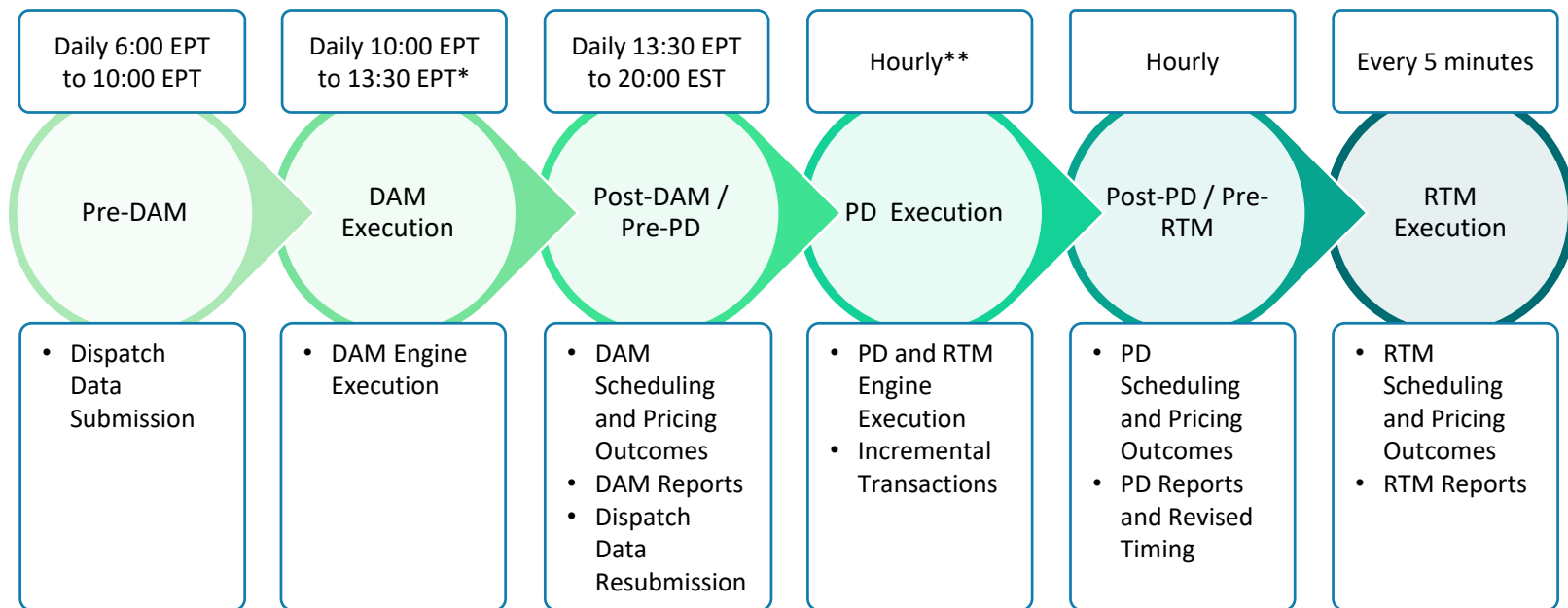
**July 14:** Draft MSO batch of market rule and market manual amendments published for stakeholder review

**July 27 and 28:** Webinars conducted to prepare market participants for their review of the MSO batch

**Today:** Q & A session that focuses on intertie traders navigating dispatch data submission and scheduling/pricing outcomes from day-ahead to real-time

**November 8:** Feedback on MSO batch of market rule and market manual amendments due to the IESO

# Q&A Session Scope for Intertie Traders



\* DAM execution can be extended until 15:30 EPT

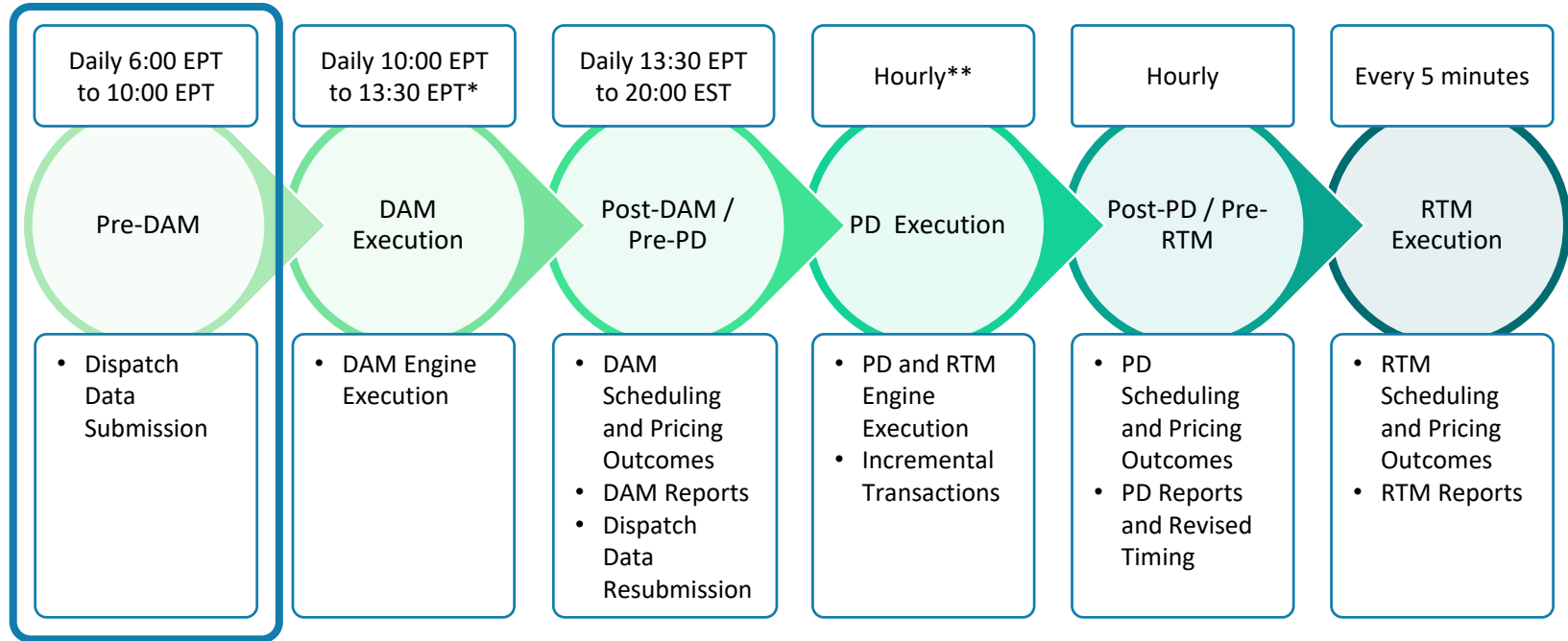
\*\* PD execution occurs hourly on rolling basis with first run starting 20:00 EST on the day prior to the dispatch day and the last run starting at 19:00 EST of the dispatch day

# Assumptions

Stakeholders are already familiar with:

- the relevant MSO batch materials that pertain to the participation of intertie traders in the future DAM, PD and RTM
- the future authorization, registration and settlement market rules and manuals that pertain to intertie traders
- the timelines and general mechanics of the future DAM, PD and RTM engines
- the dispatch data applicable to intertie traders, what it represents and the purpose it serves (as described in the Offers, Bids and Data Inputs Detailed Design)

# Pre-DAM



\* DAM execution can be extended until 15:30 EPT

\*\* PD execution occurs hourly on rolling basis with first run starting 20:00 EST on the day prior to the dispatch day and the last run starting at 19:00 EST of the dispatch day



# Dispatch Data Submission Considerations

Intertie traders should be mindful of the following when submitting dispatch data:

- Dispatch data parameters and their applicability within each engine
- Revised submission rules for linked wheels
- Dispatch data validations
- Implications of ex-post market power mitigation (MPM)
- Pre-DAM reports

# Dispatch Data & Engine Applicability

| Dispatch Data Type | Dispatch Data Parameter                   | New or Existing | DAM | PD | RTM |
|--------------------|---|-----------------|-----|----|-----|
| Hourly             | Boundary entity resource and tie point ID | Existing        | ✓   | ✓  | ✗   |
| Hourly             | Import offer / export bid                 | Existing        | ✓   | ✓  | ✗   |
| Hourly             | Capacity transaction flag                 | New             | ✓   | ✓  | ✗   |
| Hourly             | Operating reserve offers                  | Existing        | ✓   | ✓  | ✗   |
| Hourly             | e-Tag ID                                  | Existing        | ✓   | ✓  | ✗   |

✓ = dispatch data is either required or optional

## Revised Submission Rules for Linked Wheels

- MPs may submit prices for the import and export legs within +MMCP/-MMCP (no longer required to submit the import and export legs at specific prices)
- MPs wanting an import and export to be treated as a linked transaction by the DAM and PD engines must:
  - Enter the same e-Tag ID for both the import and export leg;
  - Prefix the import e-Tag ID with WI; and
  - Prefix the export e-Tag ID with WX

## Revised Submission Rules for Linked Wheels (cont'd)

- While MPs may submit different prices and quantities for the import and export legs, the DAM and PD engines would schedule both legs to the lesser of the import or export quantity scheduled
- Example: Linked wheel intended from Michigan to Quebec

| Scenario                                 | Leg    | e-Tag ID Submitted           | Offer / Bid | Schedule | Outcome  |
|--|--------|------------------------------|-------------|----------|--|
| e-Tag ID and prefix requirements not met | Import | MECS_ONTMM1234_HQT           | 120         | 100      | <ul style="list-style-type: none"> <li>• Transactions not considered as a linked wheel by the DAM and PD engines</li> <li>• Import and export legs may be scheduled to different quantities</li> </ul> |
|  | Export | MECS_ONTMM12345_HQT          | 120         | 110      |  |
| e-Tag ID and prefix requirements met     | Import | <b>WI_MECS_ONTMM1234_HQT</b> | 120         | 100      | <ul style="list-style-type: none"> <li>• Transactions considered as a linked wheel by the DAM and PD engines</li> <li>• Import and export legs scheduled to the same quantity</li> </ul>               |
|  | Export | <b>WX_MECS_ONTMM1234_HQT</b> | 120         | 100      |  |

# Dispatch Data Validations

- Dispatch data submissions must adhere to several rules documented within the MSO batch to be accepted as valid. Examples include:

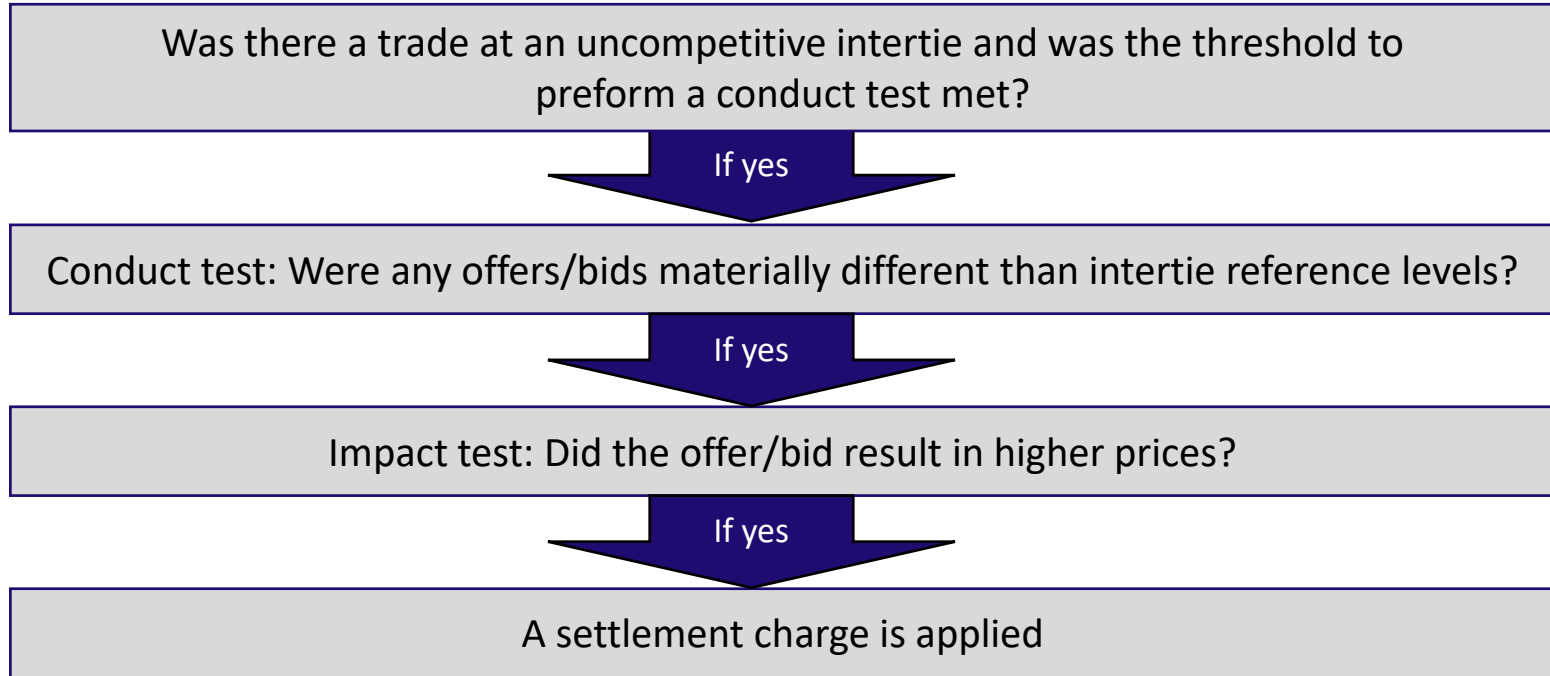
| Validation        | Description   | Example for Intertie Transactions   |
|-------------------|---|---|
| General           | Dispatch data format aligns with how the engines read the data              | Import offer laminations must be monotonically increasing while export bid laminations must be monotonically decreasing                     |
| Registration      | Dispatch data submissions adhere to registered values                       | Only MPs registered as a capacity market participant can flag their import/export transactions with the capacity transaction flag           |
| MPM               | Dispatch data submissions are within permissible reference level thresholds | N/A for intertie transactions   |
| Cross validations | Related dispatch data are not in conflict with one another                  | Any operating reserve quantities submitted in a given hour must be less than or equal to the energy quantities submitted for that same hour |

- If one or more validations fail, error will be issued, and resubmission required

# Implications of Ex-Post MPM for Intertie Traders

- Ex-ante MPM within the engines does NOT apply for intertie transactions, however ex-post MPM assessments for economic withholding may apply for intertie transactions submitted on designated uncompetitive interties
- MPs may submit energy and operating reserve offer prices with an understanding that such offer prices are subject to ex-post mitigation in accordance with MPM market manual 14.1 (ex-post MPM overview discussed next)

# Overview of Ex-Post MPM for Intertie Transactions

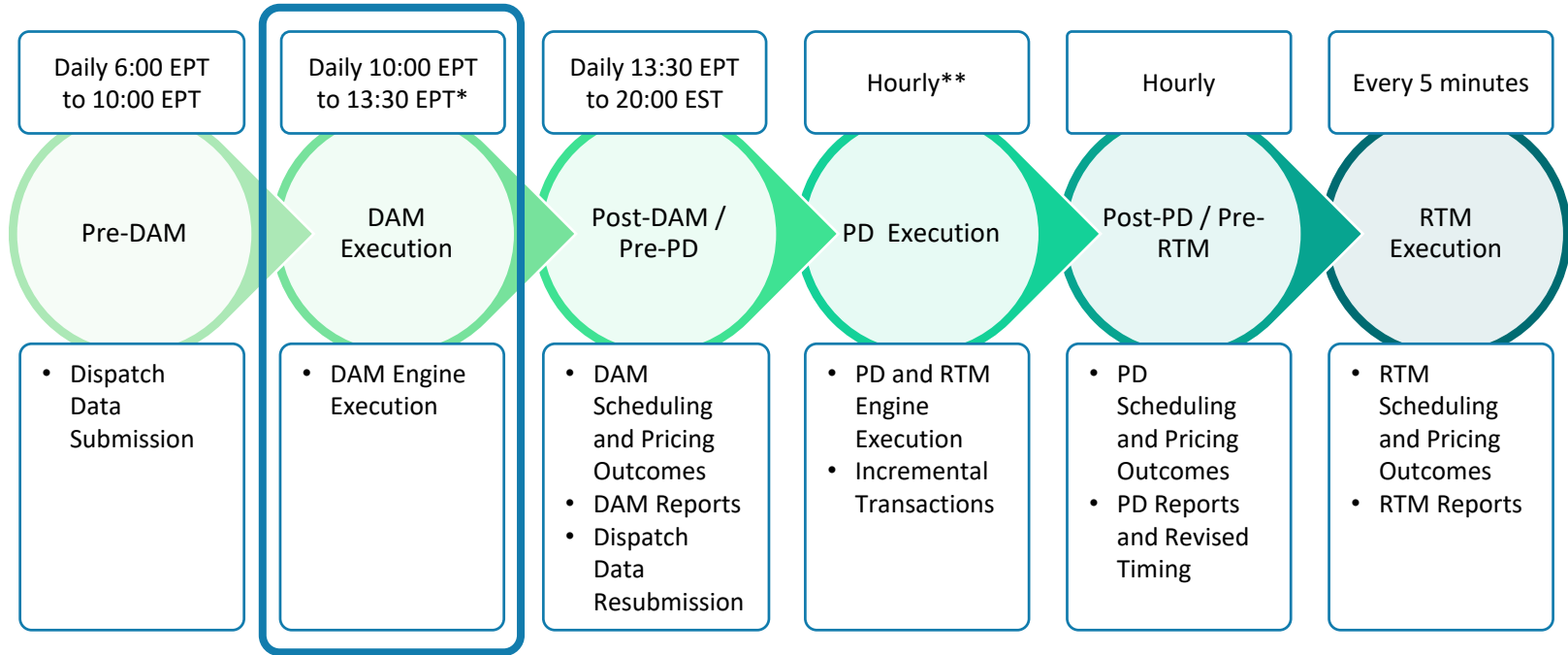


# Pre-DAM Reports

| Report Name   | New or Existing | Public or Private | Description  |
|---|-----------------|-------------------|--|
| Adequacy Report                                       | Existing        | Public            | Provides overall system conditions including any expected surplus/shortfalls, published at various times throughout the day-ahead and pre-dispatch timeframes  |
| Day-Ahead Area Reserve Constraints Report (Pre-DAM)   | Existing        | Public            | Hourly maximum and minimum constraints for the area operating reserve regions expected to be used by the DAM engine, published daily at approximately 9:00 EPT |
| Day-Ahead Intertie Scheduling Limits Report (Pre-DAM) | New             | Public            | Expected intertie scheduling limits to be used by the DAM engine, published daily at approximately 09:00 EPT   |



# DAM Execution



\* DAM execution can be extended until 15:30 EPT

\*\* PD execution occurs hourly on rolling basis with first run starting 20:00 EST on the day prior to the dispatch day and the last run starting at 19:00 EST of the dispatch day

# DAM Engine Execution Overview

## Pass 1: Market Commitment and Market Power Mitigation

- Determines an initial set of schedules and prices to meet average demand
- Includes evaluation of import and export transactions
- No ex-ante MPM for intertie transactions



## Pass 2: Reliability Scheduling and Commitment

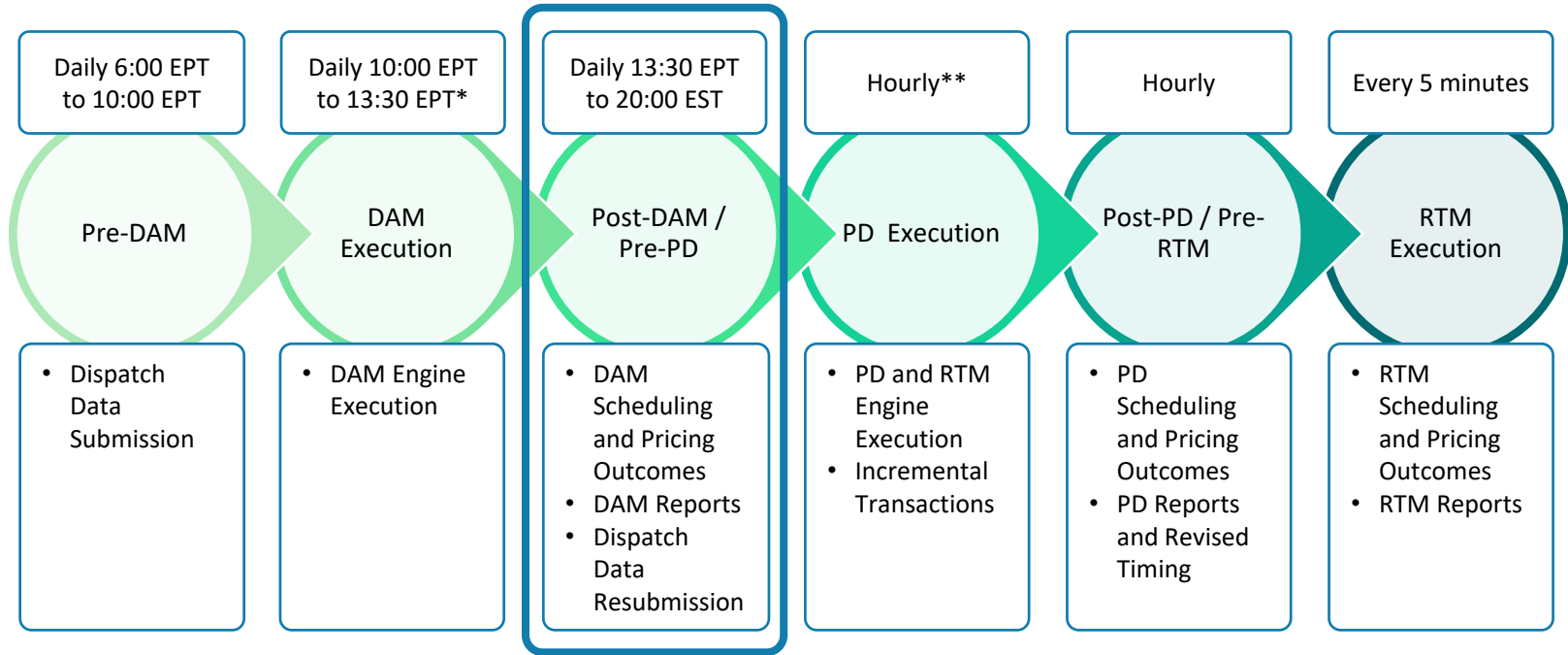
- Determines whether additional eligible non-quick start (NQS) resources need to be committed to meet peak demand
- Import schedules will not decrease and export schedules will not increase from Pass 1



## Pass 3: Day-Ahead Market Scheduling and Pricing

- Determines a final set of schedules and prices to meet average demand
- Import schedules will not decrease and export schedules will not increase from Pass 2

# Post-DAM / Pre-PD



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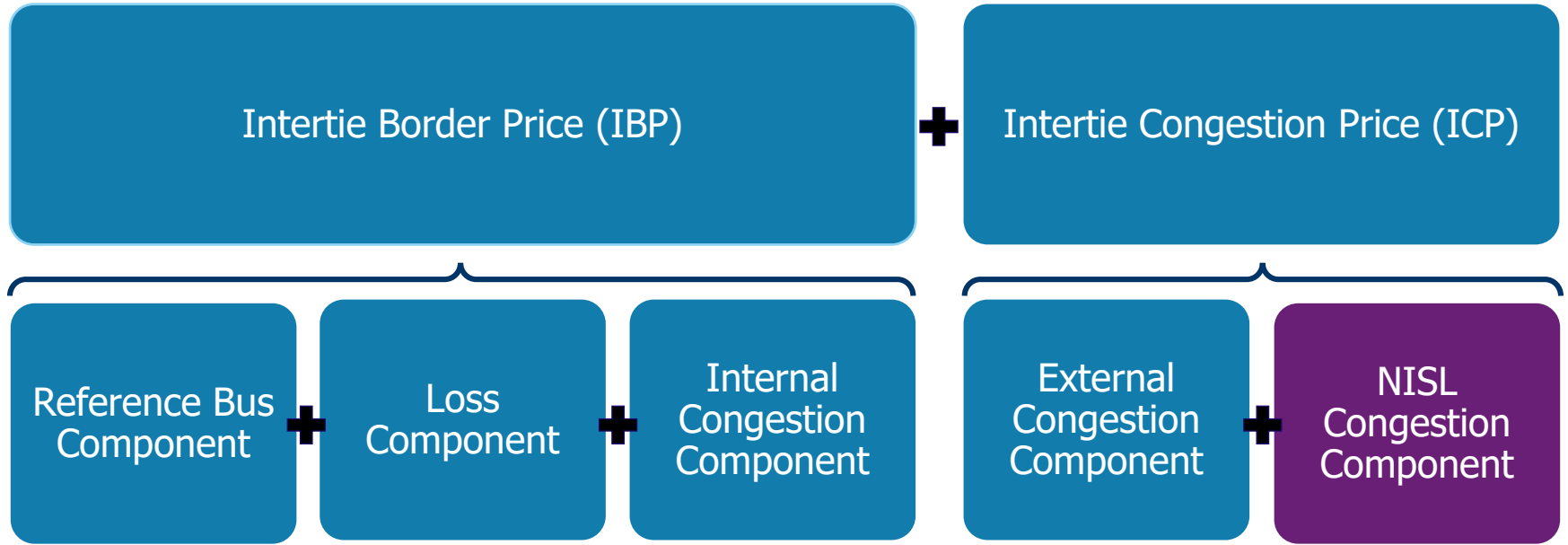
# DAM Scheduling and Pricing Outcomes

- DAM energy and operating reserve schedules for intertie transactions are produced hourly, similar to today's DACP
- Corresponding prices are produced hourly as locational marginal prices (LMPs) at each intertie location (i.e. the same location as the intertie schedule)
- Key input factors that may influence differences in scheduling and pricing outcomes relative to DACP include:
  - Evaluation of new dispatch data for various resources
  - Inclusion of Net Interchange Scheduling Limit (NISL) in intertie LMP
  - Constraint violation prices
- DAM intertie schedules and corresponding LMPs are used for settlement

# DAM Scheduling and Pricing Outcomes (cont'd)

| DAM Hourly Schedule | Outcomes                           | Intertie Transactions |
|---------------------|------------------------------------|-----------------------|
| Energy              | Schedule produced                  | ✓                     |
|                     | LMP produced                       | ✓                     |
|                     | Subject to offer mitigation        | Ex-post only          |
|                     | Schedule + LMP used for settlement | ✓                     |
| Operating reserve   | Schedule produced                  | ✓                     |
|                     | LMP produced                       | ✓                     |
|                     | Subject to offer mitigation        | Ex-post only          |
|                     | Schedule + LMP used for settlement | ✓                     |

# Intertie LMP Components



- For a recap of NISL under MRP, refer to the recorded presentation from Feb 22, 2022 posted on the MRP Implementation Engagement page

# Constraint Violation Prices

- Constraint violation prices are currently used in DACP to determine schedules
- For MRP, a new and separate set of constraint violation prices will be used to determine LMPs

| Constraint Violation Prices for DAM Scheduling  | Constraint Violation Prices for DAM Pricing  |
|---|--|
| <ul style="list-style-type: none"><li>• Informational only</li><li>• Constraint violation prices are used to prioritize which violations to resolve first where multiple constraints are violated, and insufficient MP resources are available to resolve</li></ul> | <ul style="list-style-type: none"><li>• Used for settlement</li><li>• Used to determine LMPs that reflect the value of resolving a constraint violation where insufficient MP resources are available to do so</li></ul> |

- The methodology for determining both sets of constraint violation prices are documented in the market manual 4.2 and 4.3 appendices. While the actual values used for scheduling are documented, the actual values to be used for pricing will be determined before go-live

# DAM Reports

| Report Name   | New or Existing | Public or Private | Description  |
|---|-----------------|-------------------|--|
| Day-Ahead Area Reserve Constraints Report               | Existing        | Public            | Hourly maximum and minimum constraints for the area operating reserve regions used by the DAM engine, published at approximately 13:30 EPT |
| Day-ahead Intertie Scheduling Limits Report             | Existing        | Public            | Actual intertie scheduling limits used by the DAM engine, published after DAM completion   |
| DAM Hourly Intertie Energy Price Report                 | New             | Public            | Intertie LMPs for energy, including LMP components for all intertie locations, published after DAM completion                              |
| DAM Hourly Intertie Operating Reserve Price Report      | New             | Public            | Intertie LMPs for operating reserve, including LMP components for all intertie locations, published after DAM completion                   |
| Day-Ahead Scheduled Energy and Operating Reserve Report | Existing        | Private           | Hourly DAM energy and operating reserve intertie schedules, issued after DAM completion.   |
| Dispatch Data Report for DAM Scheduling Process         | New             | Private           | Daily confirmation of an MP's daily and hourly dispatch data submitted into the DAM, issued after DAM completion                           |



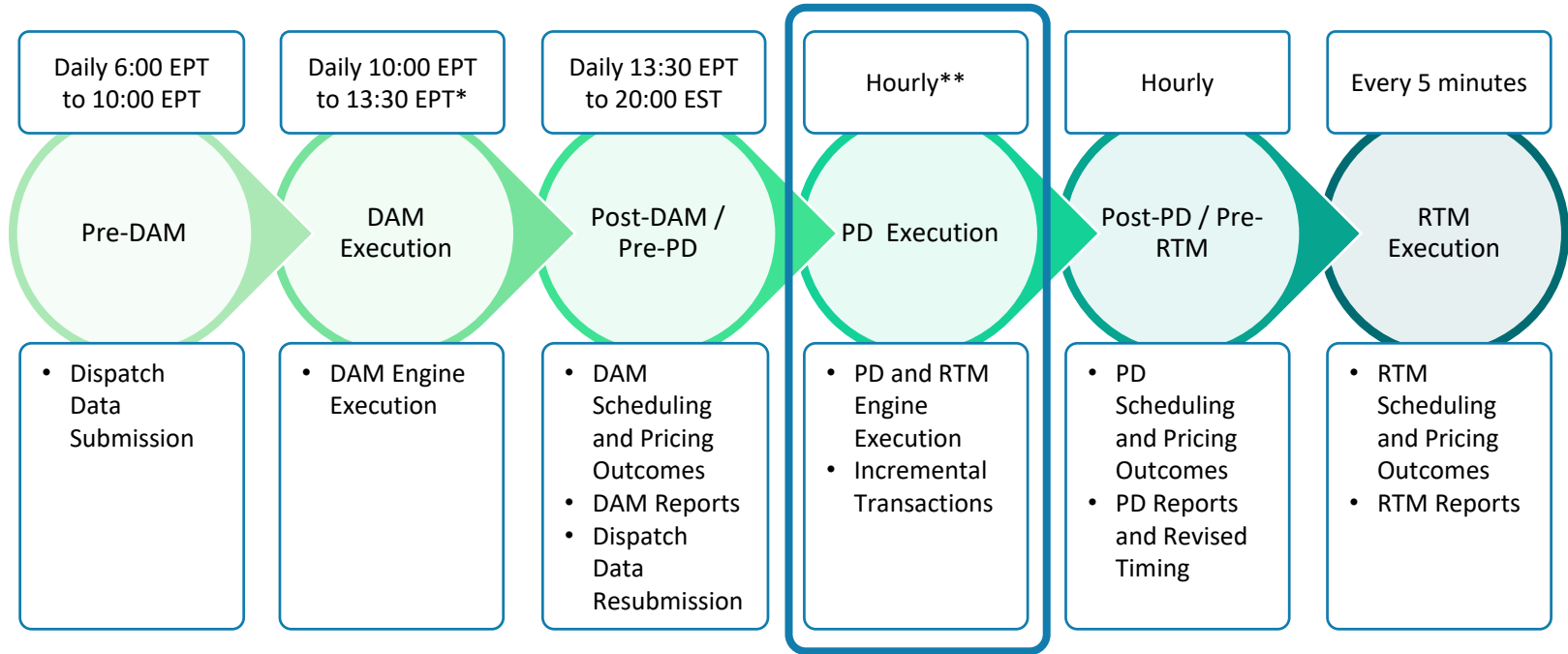
# Dispatch Data Resubmission

- All MPs are restricted from revising or submitting new dispatch data during DAM engine execution (i.e., the DAM restricted window)
- After DAM completion, intertie traders may revise and/or submit new dispatch data up to two hours prior to the dispatch hour, however:
  - New intertie transactions and quantity increases for DAM-scheduled transactions will not be evaluated by the PD engine until the PD run that occurs two hours prior to the dispatch hour

## Dispatch Data Resubmission (cont'd)

- Intertie traders continue to be restricted from revising and/or submitting new dispatch data during the same “mandatory window” they are familiar with in today’s market (i.e. starting two hours and ending 70 minutes before the dispatch hour):
  - No price changes
  - New offer/bid submissions or quantity changes for existing transactions require IESO approval
  - e-Tags IDs submitted up to 35 minutes before the dispatch hour are automatically approved, IESO approval required thereafter

# PD Execution



\* DAM execution can be extended until 15:30 EPT

\*\* PD execution occurs hourly on rolling basis with first run starting 20:00 EST on the day prior to the dispatch day and the last run starting at 19:00 EST of the dispatch day

# PD and RTM Engine Execution Overview

Runs of the PD Engine up to 2 hours prior to dispatch hour

- Determines hourly schedules and prices to meet composite demand
- For intertie transaction evaluation, only includes DAM-scheduled transactions + those incremental to DAM flagged as capacity transactions
- No ex-ante MPM for intertie transactions



Runs of the PD Engine for the 2 hours prior to the dispatch hour

- Continues to determine hourly schedules and prices to meet composite demand
- For intertie transaction evaluation, includes DAM-scheduled transactions + all transactions incremental to DAM
- No ex-ante MPM for intertie transactions



RTM Engine

- Determines a final set of schedules and prices to meet actual demand
- Intertie transactions scheduled by the last PD run passed to the RTM engine similar to today's market
- No ex-ante MPM decisions received from PD for intertie transactions

# Incremental Transactions

Runs of the PD Engine  
up to 2 hours prior to  
dispatch hour

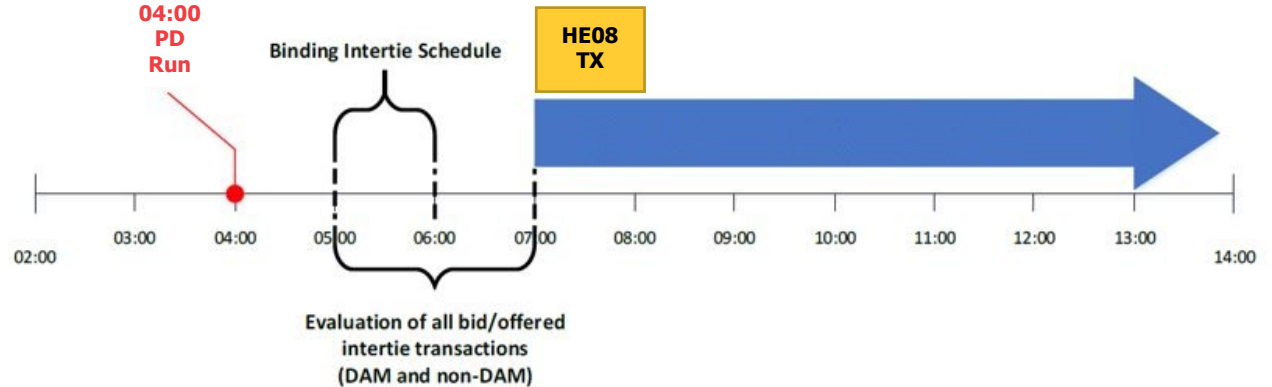
- Determines hourly schedules and prices to meet composite demand
- **For intertie transaction evaluation, only includes DAM-scheduled transactions + those incremental to DAM flagged as capacity transactions**
- No ex-ante MPM for intertie transactions

IESO may allow for incremental transactions to be evaluated beyond the 2 hour PD look-ahead period (LAP) for the following reasons:

- in response to DAM failure
- to manage overall reliability of the system
- to manage surplus conditions

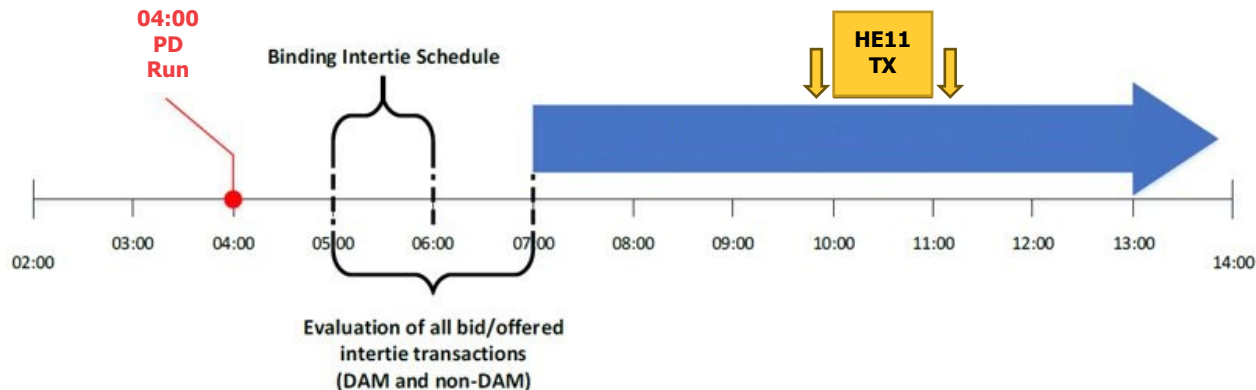
# Example: Incremental transaction beyond 2-hr PD LAP

- MP submits transaction (TX) for HE08 after the DAM has run
- The PD run at 04:00 will not see this new transaction as it was not scheduled in the DAM
- PD will assess the transaction in the next hour's PD run at 05:00



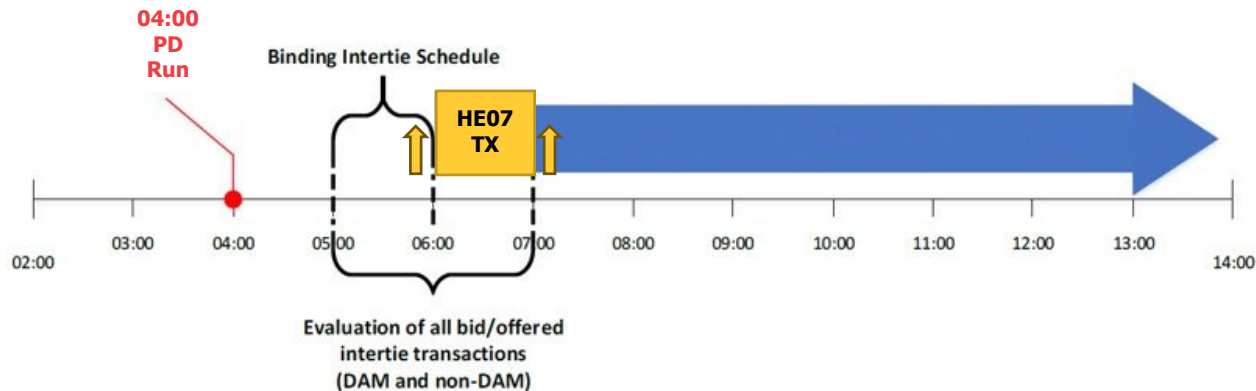
# Example: Reduced DAM transaction beyond 2-hr PD LAP

- MP reduces their transaction (TX) for HE11 after the DAM has run
- The PD run at 04:00 will still consider this decreased transaction beyond two hours as it was scheduled in the DAM



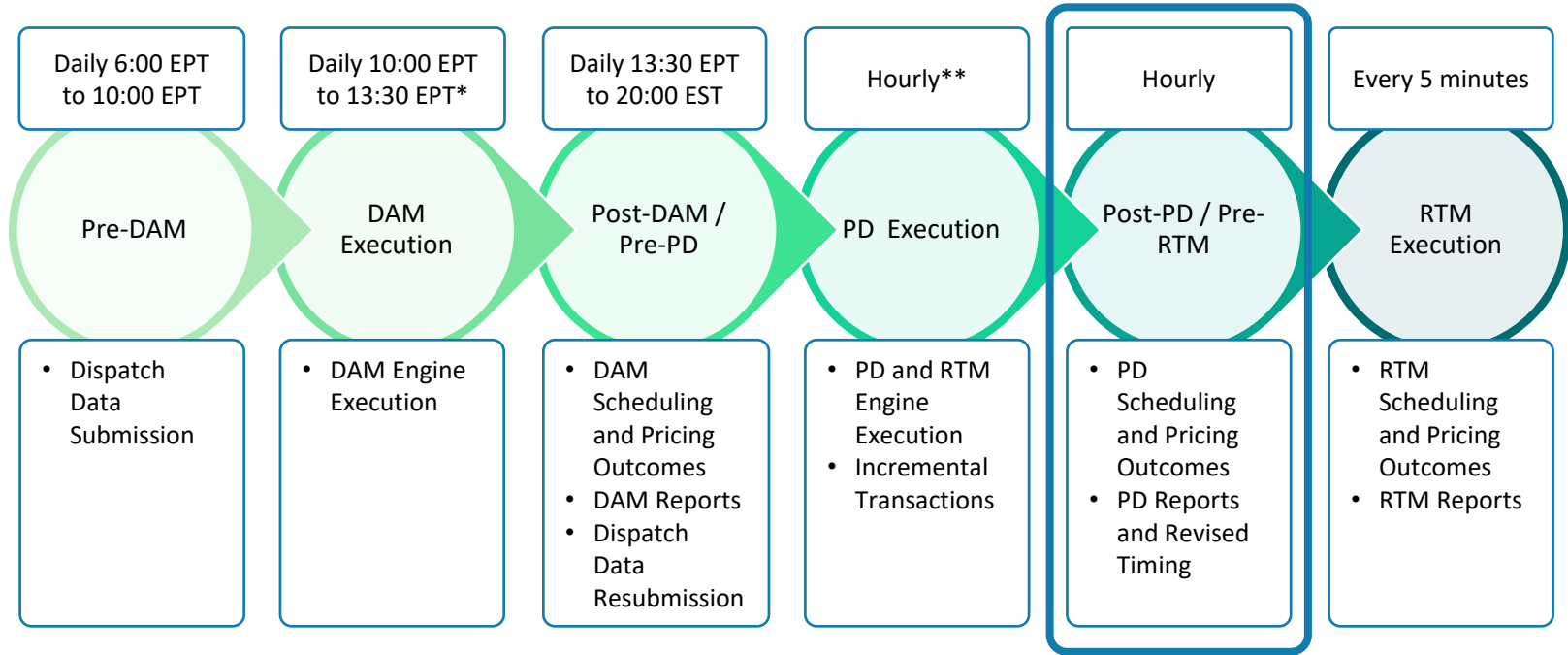
# Example: Increased DAM Transaction within 2-hr PD LAP

- MP increase their transaction (TX) for HE07 after the DAM has run
- The PD run at 04:00 will consider this increased transaction as it is within the two-hour PD look-ahead period





# Post-PD / Pre-RTM



\* DAM execution can be extended until 15:30 EPT

\*\* PD execution occurs hourly on rolling basis with first run starting 20:00 EST on the day prior to the dispatch day and the last run starting at 19:00 EST of the dispatch day

# PD Scheduling and Pricing Outcomes

- PD energy and operating reserve schedules for intertie transactions are produced hourly similar to today's PD.
- Corresponding prices are produced hourly as LMPs at each intertie location
- As discussed for DAM, key input factors that may influence differences in scheduling and pricing relative to today's PD include:
  - Evaluation of new dispatch data for various resources
  - Inclusion of NISL in intertie LMPs
  - Constraint violation prices
- PD intertie schedules and LMPs are NOT used for settlement, however the ICP produced by PD in the hour prior to the dispatch hour is passed to the RTM engine for RTM intertie LMP calculation

# PD Scheduling and Pricing Outcomes (cont'd)

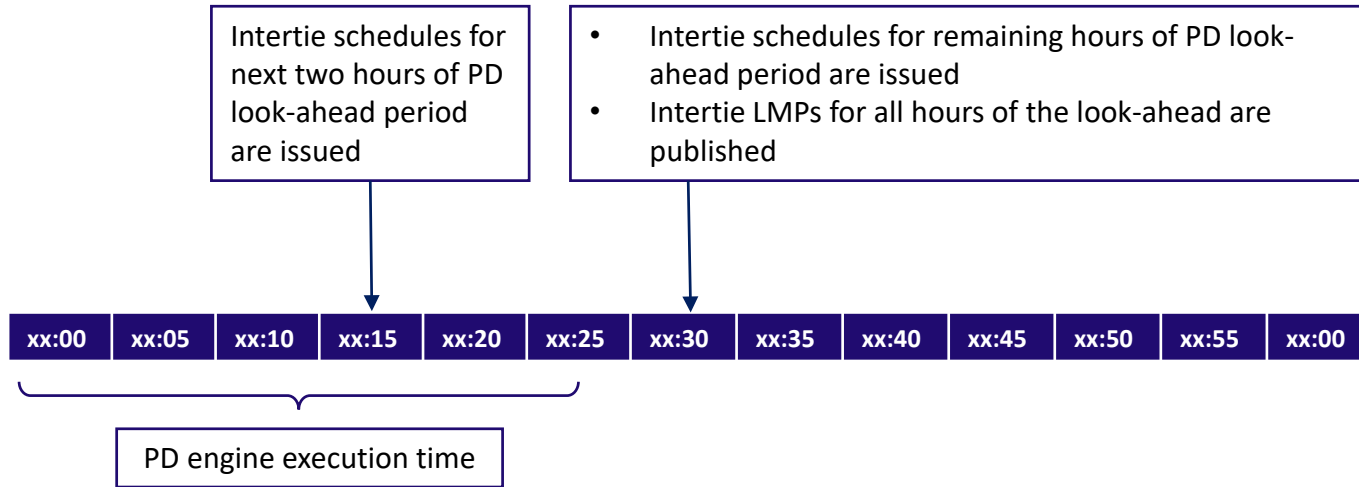
| PD Hourly Schedule | Outcomes                           | Intertie Transactions      |                   |
|--------------------|------------------------------------|----------------------------|-------------------|
|                    |                                    | Up to 2 Hours Prior to RTM | Hour Prior to RTM |
| Energy             | Schedule produced                  | ✓                          | ✓                 |
|                    | LMP produced                       | ✓                          | ✓                 |
|                    | Subject to offer mitigation        | ✗                          | Ex-post only      |
|                    | Schedule + LMP used for settlement | ✗                          | ICP only          |
| Operating reserve  | Schedule produced                  | ✓                          | ✓                 |
|                    | LMP produced                       | ✓                          | ✓                 |
|                    | Subject to offer mitigation        | ✗                          | Ex-post only      |
|                    | Schedule + LMP used for settlement | ✗                          | ICP only          |

# PD Reports

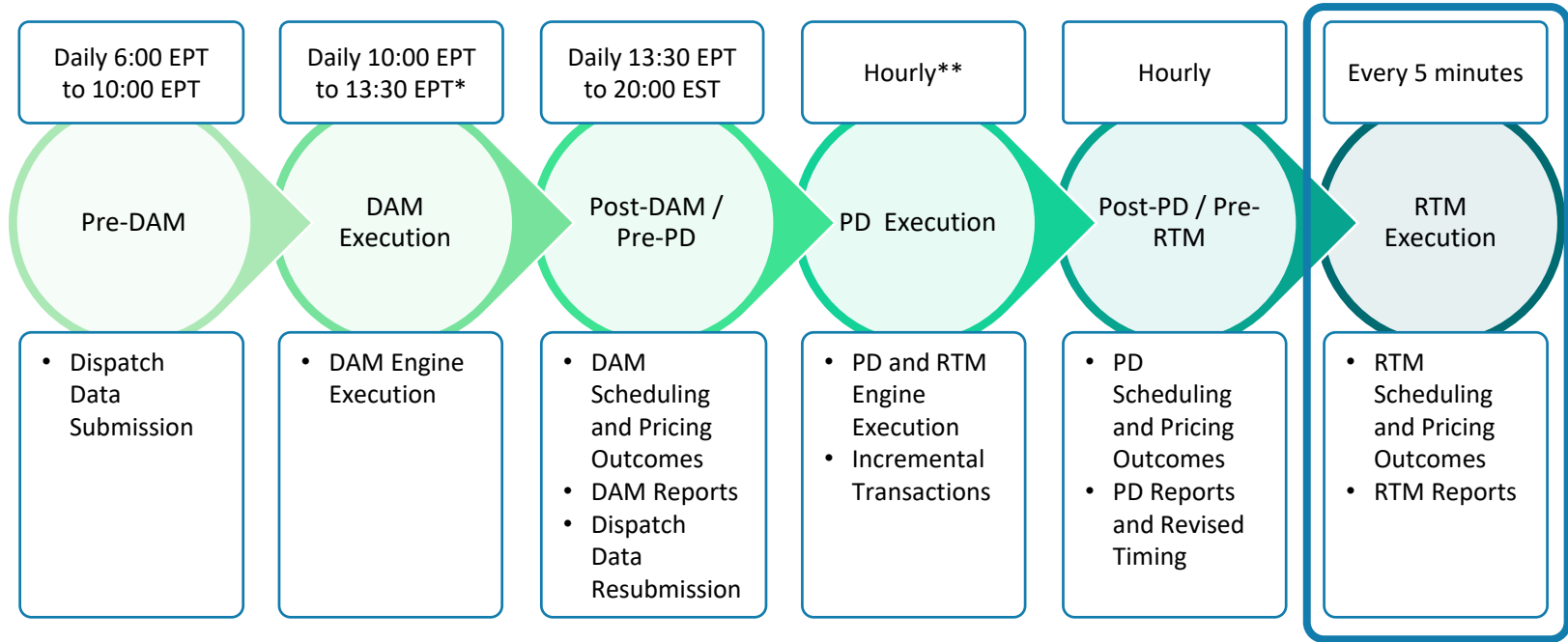
| Report Name   | New or Existing | Public or Private | Description  |
|---|-----------------|-------------------|--|
| Pre-dispatch Intertie Scheduling Limits Report                                | Existing        | Public            | Actual intertie scheduling limits used by the PD engine, published after PD completion around 30 minutes past the hour.  |
| Pre-Dispatch Hourly Intertie Energy Price Report                              | New             | Public            | Intertie LMPs for energy for all hours of the PD look-ahead period, including LMP components for all intertie locations, published after PD completion around 30 minutes past the hour.            |
| Pre-Dispatch Hourly Intertie Operating Reserve Price Report                   | New             | Public            | Intertie LMPs for operating reserve for all hours of the PD look-ahead period, including LMP components for all intertie locations, published after PD completion around 30 minutes past the hour. |
| Pre-Dispatch Schedules Report   | Existing        | Private           | Hourly energy and operating reserve intertie schedules for all hours of the PD look-ahead period, issued after PD completion around 30 minutes past the hour.                                      |
| Pre-dispatch Intertie Transactions Report and NQS Resource Extensions Reports | New             | Private           | For intertie traders, schedules for energy and operating reserve for the first two hours of the PD look-ahead period only, issued 15 minutes past the hour.  |

# PD Reports Timing Overview

- Two-stage timing of intertie schedule and price reports relative to today's PD reports given the longer execution time for the future PD engine



# RTM Execution



\* DAM execution can be extended until 15:30 EPT

\*\* PD execution occurs hourly on rolling basis with first run starting 20:00 EST on the day prior to the dispatch day and the last run starting at 19:00 EST of the dispatch day

# RTM Scheduling and Pricing Outcomes

- RTM energy and operating reserve schedules for intertie transactions are received from the previous hour PD run as fixed schedules, similar to today and subject to:
  - Checkout modifications with neighbouring jurisdictions
  - RTM hour changes for system reliability
- Corresponding prices are produced every 5 minutes as LMPs at each intertie location similar to today's RTM, using the ICP produced by the previous hour's PD run (for the future RTM, inclusive of any NISL congestion)
- As discussed for DAM and PD, key input factors that may influence differences in scheduling and pricing relative to today's RTM include new dispatch data constraints for various resource, NISL and constraint violation prices
- Actual RTM intertie schedules and corresponding LMPs are used for settlement

# RTM Scheduling and Pricing Outcomes (cont'd)

| RTM 5-min Schedule | Outcomes                                  | Intertie Transactions |
|--------------------|---|-----------------------|
| Energy             | Schedule produced <sup>1</sup>            | ✘                     |
|                    | LMP produced <sup>2</sup>                 | ✓                     |
|                    | Subject to offer mitigation               | ✘                     |
|                    | Actual schedule + LMP used for settlement | ✓                     |
| Operating reserve  | Schedule produced <sup>1</sup>            | ✘                     |
|                    | LMP produced <sup>2</sup>                 | ✓                     |
|                    | Subject to offer mitigation               | ✘                     |
|                    | Actual schedule + LMP used for settlement | ✓                     |

<sup>1</sup> RTM engine does not determine schedules however IESO adjustments to the previous hours' PD run may be made prior to or during the dispatch hour as they are in today's RTM

<sup>2</sup> LMP is produced using the ICP passed from the previous hours' PD run, subject to RTM import/export congestion (discussed next)



## RTM Scheduling and Pricing Outcomes (cont'd)

- RTM engine will determine settlement pricing on the interties depending on their congestion status in the last PD run

| Congestion from Last PD Run | LMP Used for Settlement  |
|-----------------------------|--|
| No congestion               | The RTM calculated IBP plus the previous hour's PD ICP (which would be zero with no external or NISL congestion)   |
| Export congested            | The RTM calculated IBP plus the previous hour's PD ICP (inclusive of any external and/or NISL congestion)  |
| Import congested            | The lesser of: <ul style="list-style-type: none"><li>• the PD LMP [IBP + ICP (inclusive of any external and/or NISL congestion)]; or</li><li>• the RTM IBP</li></ul> |

# PD and RTM Constraint Violation Prices

- The constraint violation prices discussed for DAM scheduling and pricing also apply to PD and RTM scheduling and pricing
- Key difference between PD and RTM is that the constraint violation prices used for PD pricing are informational only whereas for RTM pricing they are used for settlement

# RTM Reports

| Report Name  | New or Existing | Public or Private | Description   |
|--|-----------------|-------------------|---|
| Real-Time Intertie Scheduling Limits Report                | Existing        | Public            | Actual intertie scheduling limits for each five-minute interval used by the RTM engine, published after every interval  |
| Intertie Schedule and Flow Report                          | Existing        | Public            | Total quantities of energy included in interchange schedules and quantities of energy that have been conveyed to and from each intertie zones for each five-minute interval using hourly averages, published every hour |
| Real-Time 5-Minute Intertie Energy Price Report            | New             | Public            | Intertie LMPs for energy for each five-minute interval, including LMP components for all intertie locations, published after every interval   |
| Real-Time 5-Minute Intertie Operating Reserve Price Report | New             | Public            | Intertie LMPs for operating reserve for each five-minute interval, including LMP components for all intertie locations, published after every interval  |

# Summary of Today's Discussion

- Relevant dispatch data parameters and their applicability within each engine
- Revised rules for submission of linked wheels
- Overview of ex-post MPM applicability for intertie transactions
- Overview of DAM, PD and RTM engine functionality and relevant scheduling and pricing outcomes for intertie transactions, including treatment of DAM scheduled transactions and incremental transactions submitted in PD
- Applicable DAM, PD and RTM reports including revised timing for PD reports

## Next Steps

- Additional Q&A sessions for other resource types are scheduled for the coming days
- Should any further clarifications be necessary to support stakeholder's review of the MSO batch, please contact [engagement@ieso.ca](mailto:engagement@ieso.ca)
- **November 8:** Written stakeholder feedback due on the MSO batch market rules and market manuals can be submitted to [engagement@ieso.ca](mailto:engagement@ieso.ca)

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# Thank You

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