

SEPTEMBER 26, 2023

Market Renewal Program Implementation

Market Rules and Market Manuals: Market and System Operations
Q&A Session for Dispatchable Loads, Price Responsive Loads, and
Hourly Demand Response Resources

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Disclaimer

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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
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Meeting Purpose

To provide stakeholders looking to participate in Ontario's energy markets as dispatchable loads (DL), price responsive loads (PRL), and hourly demand response (HDR) resources with 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

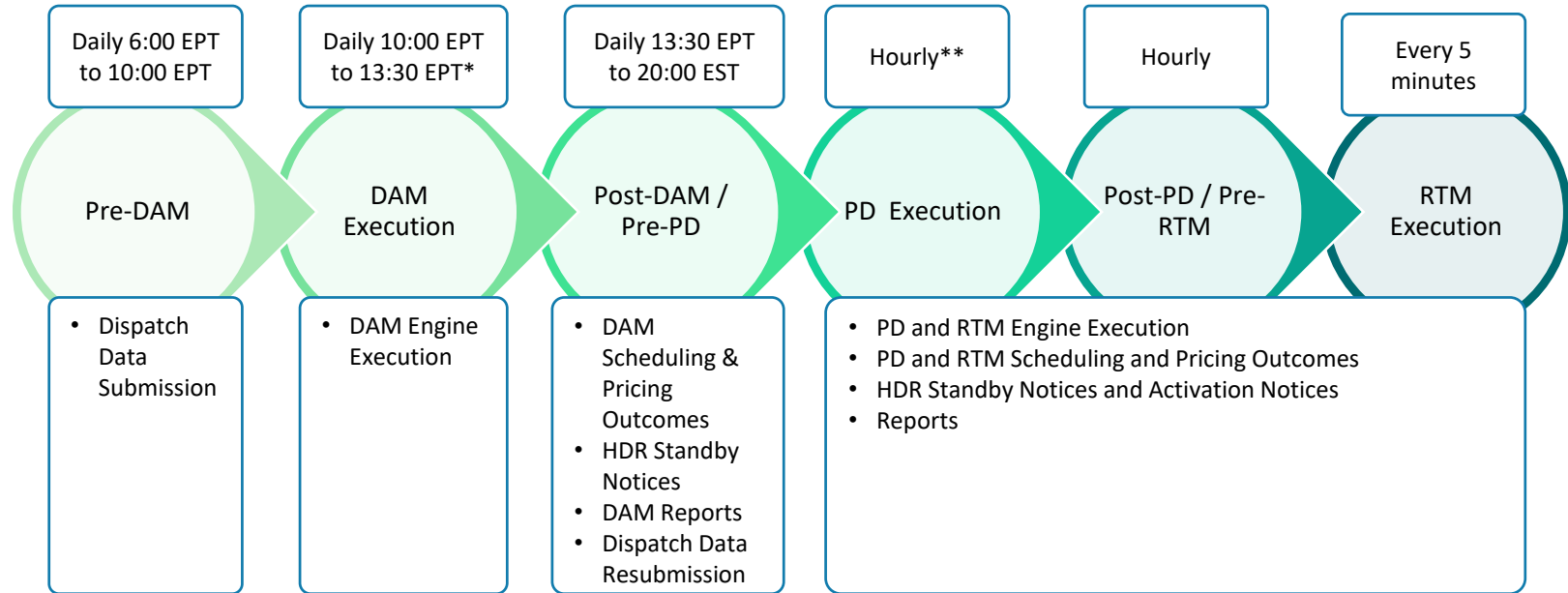
July 14: Draft MSO batch of market rule and market manual amendments published for stakeholder review

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

Today: Q & A session that focuses on DL, PRL and HDR 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 DL, PRL and HDR



* DAM execution can be extended until 15:30 EPT

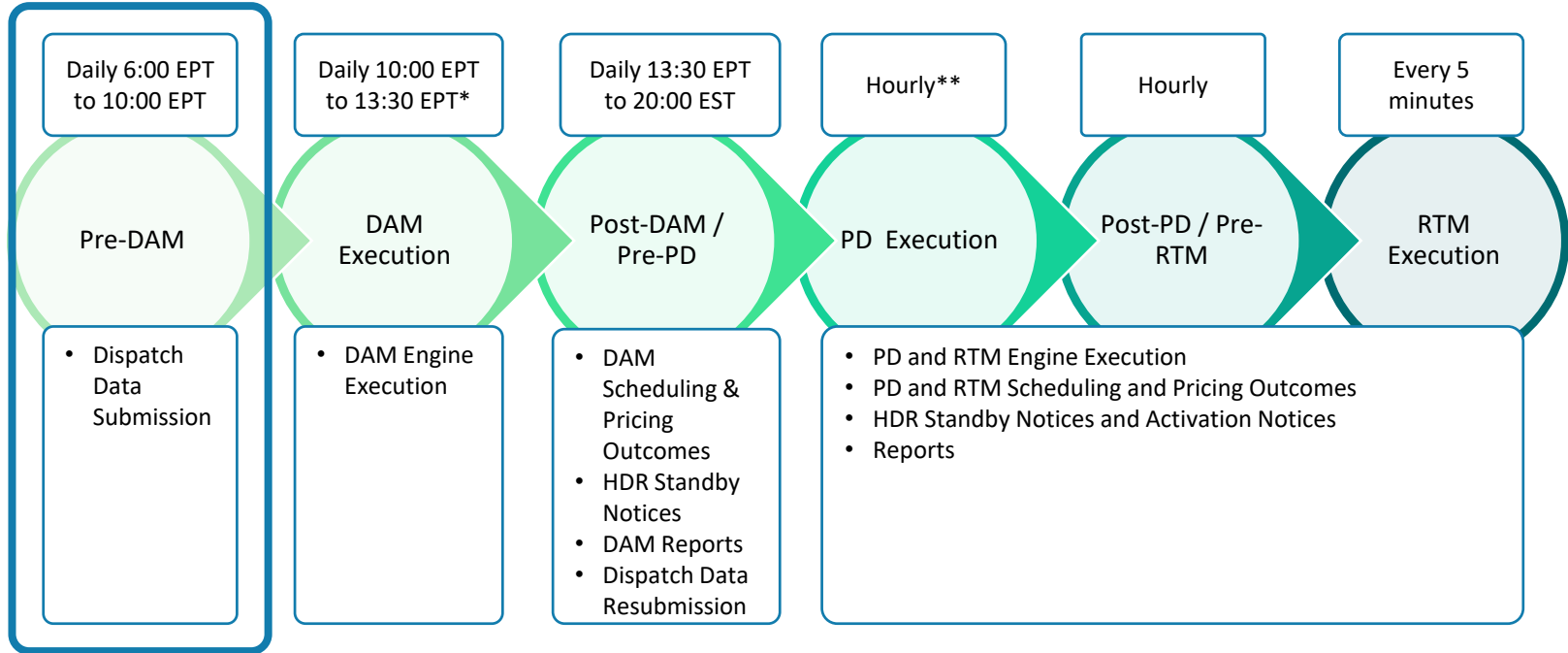
** PD execution occurs hourly on rolling basis with first run starting 20:00 EST on the day prior to the dispatch day and the last run starting at 19:00 EST of the dispatch day

Assumptions

Stakeholders are already familiar with:

- the relevant MSO batch materials that pertain to the participation of their resources in the future DAM and RTM
- the future authorization, registration and settlement market rules and manuals that pertain to their resources
- the timelines and general mechanics of the future DAM, PD and RTM engines
- the dispatch data applicable to their resources, 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

Market participants (MPs) should be mindful of the following when submitting dispatch data for their resources:

- Dispatch data parameters and their applicability within each engine
- Availability Declaration Envelope (ADE)
- Dispatch data validations
- Additional rules for dispatchable loads
- Implications of ex-ante market power mitigation (MPM)
- Pre-DAM reports

Dispatch Data Parameters and Engine Applicability

Dispatch Data Submission	New or Existing	Load Resource Type								
		DL			PRL			HDR*		
		DA	PD	RT	DA	PD	RT	DA	PD	RT
Energy bids	Existing	x	x	x	x			x	x	x
Operating reserve offers	Existing	x	x	x						
Hourly energy ramp rate	Existing			x						x
Daily energy ramp rate	New	x	x					x	x	
Operating reserve ramp rate	Existing	x	x	x						
Reserve loading point	Existing	x	x	x						

X = dispatch data is either required or optional

*HDR dispatch data is only applicable to PD and RT engines if a standby notice is issued

Availability Declaration Envelope (ADE)

For DL and HDR resources:

- ADE continues to apply
- MPs must submit energy bids into the DAM for every hour they intend to participate in the RTM
- The allowance to expand the DAM established ADE in the RTM is being increased **from** the lesser of **2%** of the ADE or 10 MW **to** the lesser of **15%** of the ADE or 10 MW

For PRLs:

- While ADE does not apply, MPs must submit energy bids into the DAM for every hour they intend to consume energy in the RTM

Dispatch Data Validations

- Dispatch data submissions must adhere to a number of rules documented within the MSO batch in order to be accepted as valid. Examples include:

Validation	Description	Example
General	Dispatch data format aligns with how the engines read the data	Offer laminations must be monotonically increasing while bid laminations must be monotonically decreasing
Registration	Dispatch data submissions fall within registered quantities	Energy bid quantity must be less than or equal the maximum registered load capability
MPM	Dispatch data submissions are within permissible reference level thresholds	Operating reserve ramp rate must be greater than or equal to half of its registered reference level
Cross validations	Related dispatch data are not in conflict with one another	The sum of the energy bids from a PRL and an associated physical HDR must be less than or equal to the maximum registered load capability for the PRL

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

Example: Bid Validation for PRL with Physical HDR

Scenario: MP wants to bid 80 MW into the DAM for a given hour but also wishes to satisfy a demand response capacity obligation in the same hour

- To achieve this, the MP must submit two separate bids – one for the PRL resource and another for their associated physical HDR resource
- For both bids to be accepted, their sum must not exceed the maximum load capability registered for the PRL during registration

Validation Scenario	Registered Capability	Capacity Obligation	Total Bid Desired	PRL Bid	Physical HDR Bid	Validation
Accepted	80 MW	30 MW	80 MW	50 MW	30 MW	$30 + 50 \leq 80$
Rejected				80 MW	30 MW	$30 + 80 > 80$

Additional Rules for Dispatchable Loads

MPs will continue to have the ability to designate:

- all or a portion of their energy bid for any hour of the DAM as non-dispatchable at the maximum market clearing price; or
- the entire portion of their energy bid as non-dispatchable for any hour of the DAM by not submitting a bid (i.e., the 'no-bid' option)

In addition:

- MPs are restricted from converting the non-dispatchable portion of their energy bid that was submitted in DAM to dispatchable in the RTM; however
- the dispatchable portion of their energy bid can be converted to non-dispatchable

Implications of Ex-Ante MPM

- Ex-ante MPM only applies to DL for operating reserve offers in the DAM and PD engines
 - Mitigation decisions from PD are carried forward into RTM
- MPs may submit operating reserve offer prices above their registered reference levels with an understanding that such offer prices are subject to ex-ante mitigation by the DAM engine (ex-ante MPM overview discussed next)

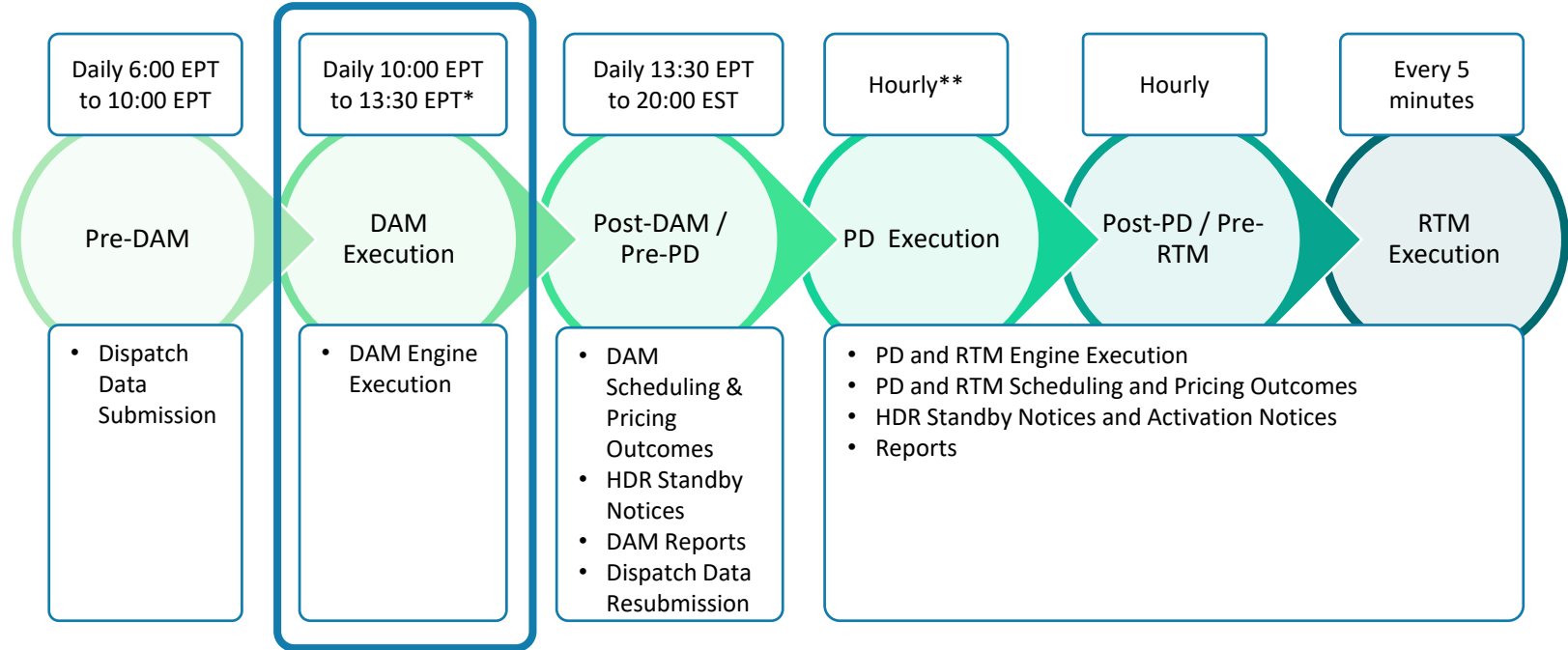
Overview of Ex-Ante Mitigation

- 1** Existence of market power condition restricting competition
Ensures mitigation is only performed if required
- 2** **Conduct Test:** Check if submitted offer prices are within the acceptable tolerance
If 'pass': no mitigation is needed
If 'fail': submitted offers are replaced with reference levels
- 3** **Price Impact Test:** Ensure the difference between LMP calculated with submitted offer and the one calculated using reference levels is within acceptable tolerance
If 'pass': no mitigation is needed
If 'fail': the resulting LMPs and schedules are based on reference levels

Pre-DAM Reports

Report	New or Existing	Public or Private	Description
Day-Ahead Area Reserve Constraints Report	Existing	Public	Expected hourly maximum and minimum constraints for the area operating reserve regions to be used by the DAM engine, published daily at approximately 9:00 EPT
Day-Ahead Financial Reference Level Values Report	New	Private	Reference level values applicable for each resource to be used by the DAM engine, issued by approximately 6:00 EPT Updated at approximately 09:30 EPT, reflecting changes to reference level values provided by the MP

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, including evaluation of bids from DL, PRL and HDR
- Operating reserve offers for DLs subject to ex-ante MPM, if required

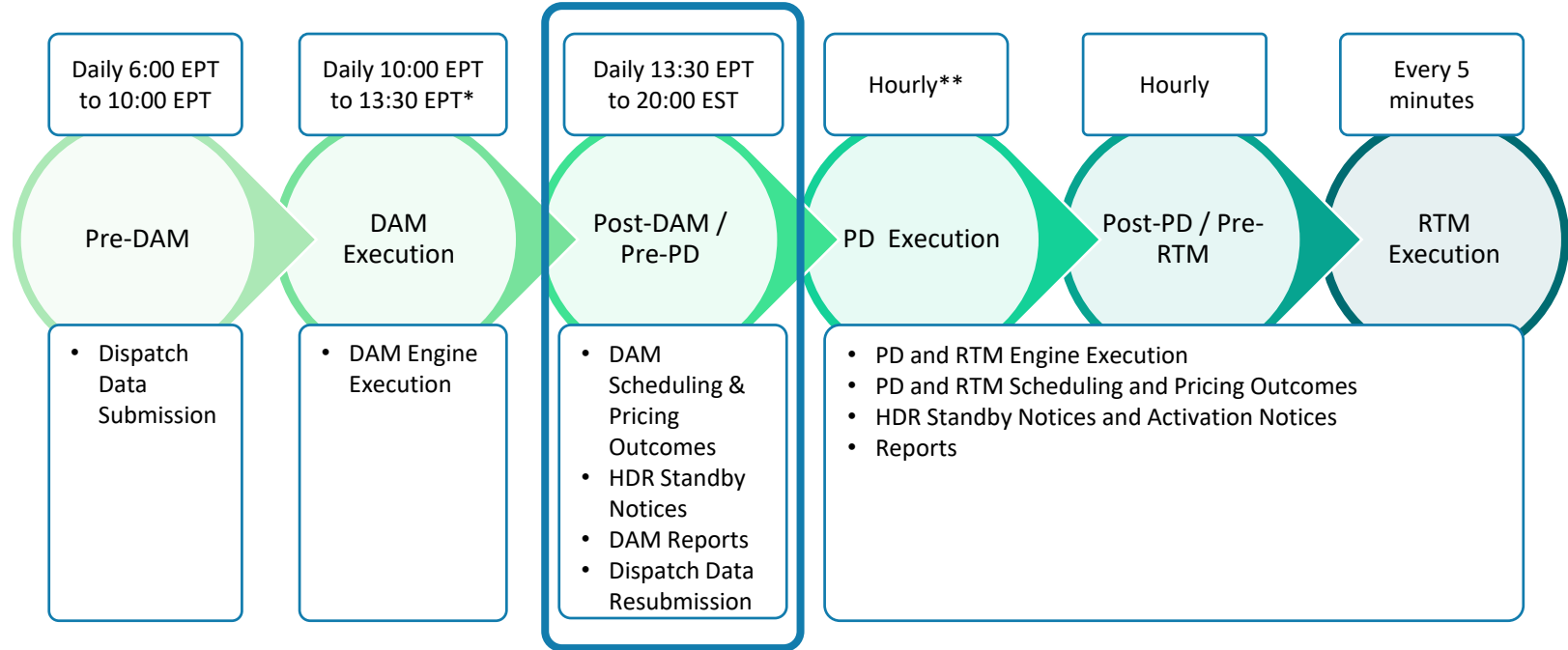
Pass 2: Reliability Scheduling and Commitment

- Determines whether additional eligible non-quick start (NQS) resources need to be committed to meet peak demand, inclusive of IESO forecast for PRL and 'no-bid' DL
- PRL bids are not evaluated
- Reference levels from Pass 1 used if mitigation applied

Pass 3: Day-Ahead Market Scheduling and Pricing

- Determines a final set of schedules and prices to meet average demand, including evaluation of bids from DL, PRL and HDR
- Reference levels from Pass 1 used if mitigation applied
- PRLs and their associated physical HDR receive separate schedules, one for PRL and the other for HDR

Post-DAM / Pre-PD



* 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 Scheduling and Pricing Outcomes

- DAM energy and operating reserve schedules are produced hourly similar to today's DACP. Key input factors that may influence differences in scheduling and pricing outcomes relative to DACP include:
 - Evaluation of new dispatch data for various resources, for example hydroelectric and GOG-eligible NQS (discussed at future Q & A sessions)
 - Application of ex-ante MPM
 - Constraint violation prices
- Corresponding prices are produced hourly as locational marginal prices (LMPs) at each resource location (i.e., the same location as the schedule)
- DAM schedules and corresponding LMPs are used for DL and PRL settlement

DAM Scheduling and Pricing Outcomes (cont'd)

DAM Hourly Schedule	Outcomes	DL	PRL		Stand Alone HDR
			Stand Alone PRL	w/Physical HDR	
Energy	Schedule produced	x	x	x	x
	LMP produced	x	x	x	x
	Subject to ex-ante offer mitigation				
	Schedule + LMP used for settlement	x	x (see next slide)	x (see next slide)	
Operating reserve	Schedule produced	x			
	LMP produced	x			
	Subject to ex-ante offer mitigation	x			
	Schedule + LMP used for settlement	x			

DAM Scheduling and Pricing Outcomes (cont'd)

- For PRL associated with a physical HDR, separate DAM schedules are determined, one for the PRL and one for the physical HDR
- Building off the 'accepted' dispatch data validation scenario illustrated earlier, assume the following DAM schedules are determined:

Total Bid Desired	PRL Bid	Physical HDR Bid	DAM Schedule	
			PRL	HDR
80 MW	50 MW	30 MW	50 MW	30 MW

- The final DAM schedule for the PRL used for settlement will be the sum of the individual PRL and physical HDR schedules, in this case 80 MW

DAM Scheduling and Pricing Outcomes (cont'd)

- 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">• Informational only• 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	<ul style="list-style-type: none">• Used for settlement• Used to determine LMPs that reflect the value of resolving a constraint violation where insufficient MP resources are available to do so

- 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 HDR Standby Notices

- DAM schedules will form the basis for standby notices for physical and virtual HDR resources including physical HDR resources associated with a PRL
- A demand response standby report will be issued to market participants after the successful completion of the DAM

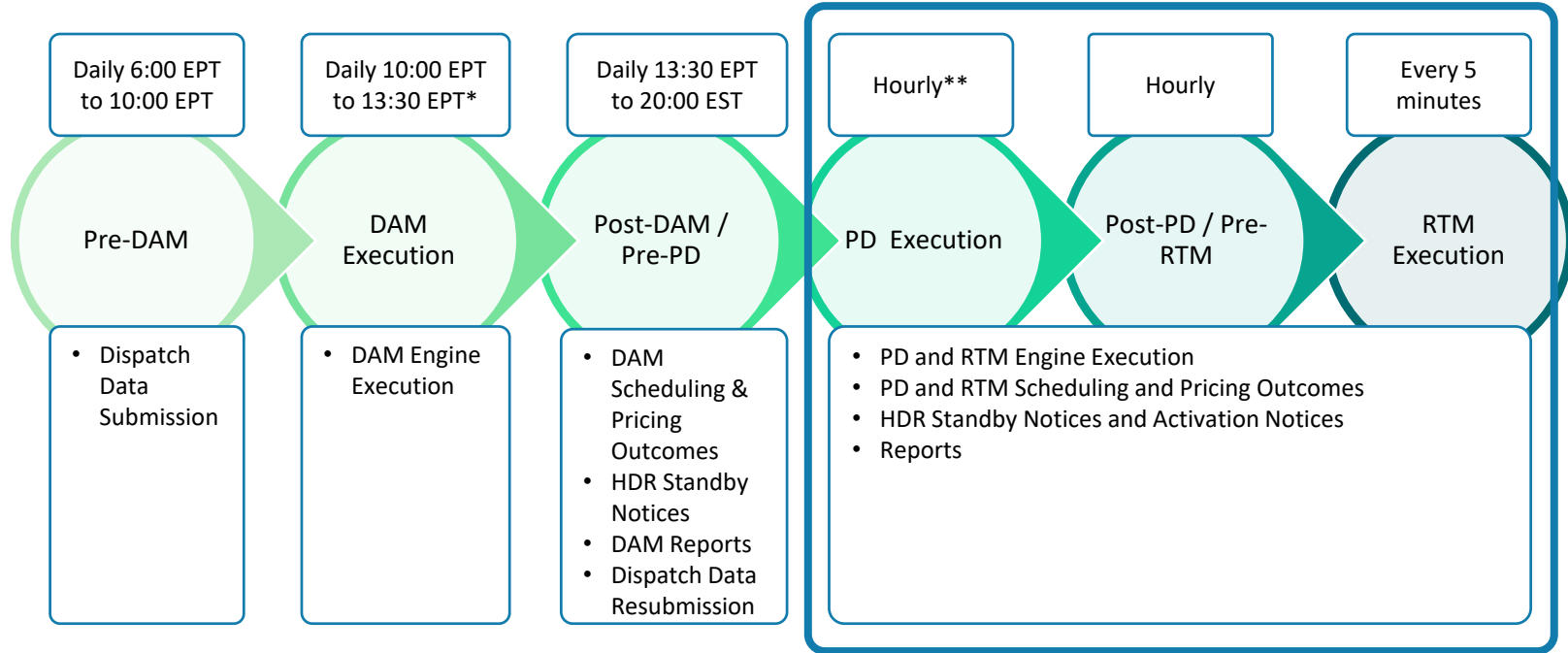
DAM Reports

Report	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
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
Day-Ahead Schedule Report	Existing	Private	Hourly DAM energy and operating reserve schedules, issued after DAM completion. Also indicates whether mitigation was applied and the relevant constrained area condition.
DAM Hourly Energy LMP Report	New	Public	LMPs for energy, including LMP components for all generator and load schedule locations, issued after DAM completion
DAM Hourly Operating Reserve LMP Report	New	Public	LMPs for operating reserve, including LMP components for all eligible generator and load schedule locations, issued after DAM completion
Demand Response Standby Report	Existing	Private	Daily notice that identifies whether a demand response resource is on standby for a given trade date, issued after DAM completion
Real-time Financial Reference Level Values Report	New	Private	Reference level values to be used by the PD and RTM engines, issued daily at 14:00 EPT

Dispatch Data Resubmission

- All MPs are restricted from revising their submitted dispatch data during DAM engine execution (i.e., the DAM restricted window)
- After DAM completion, dispatch data may be revised ahead of the first PD run and subsequent PD runs, up until the same two-hour mandatory window that MPs are familiar with in today's market

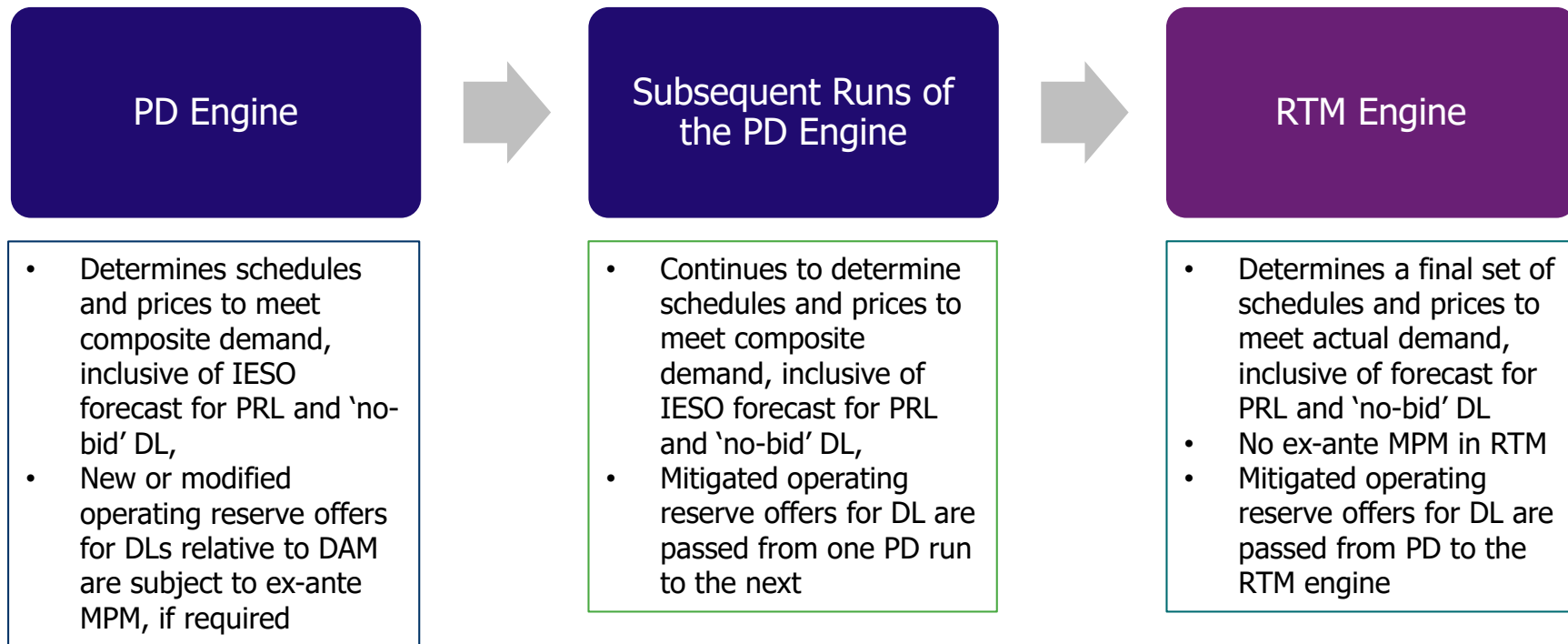
PD to RTM Engine Execution



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** 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



PD and RTM Engine Execution (cont'd)

- If operating reserve offers for a DL are mitigated by the PD engine, reference level values are used in lieu of offer values for all subsequent PD runs
- MPs may request updates to their reference level values between PD runs if their fuel costs change as per MPM market manual 14.2. Updated reference level value will be used by subsequent PD runs
- Reminder: the RTM engine uses the reference level values passed from the last hourly PD engine run

PD Scheduling and Pricing Outcomes

- PD energy and operating reserve schedules are produced hourly similar to today. Key input factors that may influence differences in scheduling and pricing outcomes relative to today's PD include:
 - Evaluation of new dispatch data for hydroelectric and GOG-eligible NQS resources (discussed at future Q & A sessions for NQS and hydro)
 - Application of ex-ante MPM
 - Constraint violation prices
- Corresponding prices are produced hourly as LMPs at each resource location
- PD schedules and corresponding LMPs are NOT used for settlement

PD Scheduling and Pricing Outcomes (cont'd)

PD Hourly Schedule	Outcomes	DL	PRL		Stand Alone HDR
			Stand Alone PRL	w/Physical HDR	
Energy	Schedule produced	X		X	X
	LMP produced	X	X	X	X
	Subject to ex-ante offer mitigation				
	Schedule + LMP used for settlement				
Operating reserve	Schedule produced	X			
	LMP produced	X			
	Subject to ex-ante offer mitigation	X			
	Schedule + LMP used for settlement				

RTM Scheduling and Pricing Outcomes

- RTM energy and operating reserve schedules are produced every 5 minutes similar to today (for energy, in the form of dispatch instructions). Key input factors that may influence differences relative to today's RTM include:
 - Evaluation of new dispatch data constraints passed from PD (discussed at future Q & A sessions)
 - Ex-ante MPM decisions passed from PD
 - Constraint violation prices
- Corresponding LMPs are produced every 5 minutes at each resource location
- Actual consumption and corresponding LMPs are used for DL and PRL settlement

RTM Scheduling and Pricing Outcomes (cont'd)

RTM 5-min Schedule	Outcomes	DL	PRL		Stand Alone HDR
			Stand Alone PRL	w/Physical HDR	
Energy	Dispatch produced	X		X	X
	LMP produced	X	X	X	X
	Subject to ex-ante MPM from PD				
	Actual consumption + LMP used for settlement	X	X	X ¹	
Operating reserve	Schedule produced	X			
	LMP produced	X			
	Subject to ex-ante MPM from PD	X			
	Schedule + LMP used for settlement	X			

¹ PRL consumption, net of any physical HDR activation used for settlement

PD and RTM HDR Standby and Activation Notices

Standby notices and activation notices will follow the same process as the current market:

- Standby notices are issued through the existing demand response standby report. Standby status will be assessed and issued in pre-dispatch starting at 20:00 EST of the day before the dispatch day
- Activation notices are issued through the existing demand response activation report by the PD engine, no later than two hours prior to a DR activation

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

PD Reports

Report	New or Existing	Public or Private	Description
Pre-Dispatch Schedules Report	Existing	Private	Hourly energy and operating reserve schedules, issued approximately 30 minutes past each hour. Also indicates whether mitigation was applied and the relevant constrained area condition.
Pre-Dispatch Hourly Energy LMP Report	New	Public	LMPs for energy, including LMP components for all generator and load schedule locations, issued on an hourly basis
Pre-Dispatch Hourly Operating Reserve LMP Report	New	Public	LMPs for operating reserve, including LMP components for all eligible generator and load schedule locations, issued on an hourly basis
Demand Response Standby Report	Existing	Private	Notice that identifies whether a demand response resource is on standby for a given trade date, issued as required after each PD run
Demand Response Activation Report	Existing	Private	For each activation, identifies how much and for which hours a demand response is scheduled to provide demand response
Real-time Financial Reference Level Values Report	New	Private	Updated reference level values used by the PD and RTM engines based on MP changes to their reference levels, issued as required

RTM Reports

Report	New or Existing	Public or Private	Description
Dispatch Data Report for Real Time Scheduling Processes	New	Private	Confirmation of an MP's daily and hourly dispatch data submitted into the RTM, issued daily at 6:00 EST following the dispatch day
Real-time Schedules	Existing	Private	5-minute energy and operating reserve dispatch instructions, issued on an hourly basis for all intervals in the previous dispatch hour
Real-Time 5-min Energy LMP Report	New	Public	LMPs for energy, including LMP components for all generator and load schedule locations, issued every 5-minutes
Real-Time 5-min Operating Reserve LMP Report	New	Public	LMPs for operating reserve, including LMP components for all eligible generator and load schedule locations, issued every 5 minutes

Summary of Today's Discussion

- Relevant dispatch data parameters and their applicability within each engine
- Additional rules specific to PRL and DL dispatch data submission
- Overview of DAM, PD and RTM engine functionality and relevant scheduling and pricing outcomes
- Overview of ex-ante MPM applicability for DL
- Applicable DAM, PD and RTM 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
- **November 8:** Written stakeholder feedback due on the MSO batch market rules and market manuals can be submitted to engagement@ieso.ca

Thank You

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