
Quick Takes: Day-Ahead Market (DAM)

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1. Introduction

The Day-Ahead Market, also known as the DAM, is one of the key features of the IESO's future energy market. The purpose of this quick take is to provide readers with an understanding of the transition from the Day-Ahead Commitment Process (DACP) to the DAM, and how the DAM will improve Ontario's market design.

1.1 Learning Objectives

- What is the DAM?
- Key Features and Benefits of the DAM
- Key Design Features of the DAM
- How does the DAM compare to the existing DACP?
- DAM Process Timeline

2. What is the DAM?

A Day-Ahead Market for electricity is a market where market participants submit bids and offers a day in advance of operations in order to secure schedules and prices for the following day. A DAM is a standard component of many electricity markets in North America and around the world. In these markets, most of the supply is scheduled in the DAM and the Real-Time Market (RTM) is used to balance any deviations that occur between day-ahead and real-time.

3. Key Features and Benefits of the DAM

The DAM provides the following features and benefits to Ontario's electricity market:

- Greater financial certainty to market participants which allows them to better manage their risks
- Greater operational certainty to the IESO which helps to maintain a reliable supply of electricity
- Increased competition among market participants, ensuring lowest-cost resources are secured first
- A more efficient use of resources by committing only the resources needed to maintain reliability
- A better alignment of schedules and prices, enabled by the single schedule market design

4. Key Design Features of the DAM

There are six key design elements of the DAM. They are:

1. Financially-binding schedules and locational marginal prices (LMPs)

A DAM for energy and operating reserve (OR) has been designed to encourage greater and more efficient market participation by providing market participants with an opportunity to lock in a day-ahead price for their day-ahead schedules. Day-ahead settlement introduces a two-settlement system that allows market participants to obtain financially-binding day-ahead schedules while also being able to adjust their real-time production or consumption in response to real-time price signals.

$$Q_{DA} \times LMP_{DA} + (Q_{RT} - Q_{DA}) \times LMP_{RT}$$

Figure 1 | Two-settlement equation for DAM participants

The first settlement or the day-ahead settlement is the settlement amounts of energy and operating reserve that can be calculated on the basis of settlement data from the DAM calculation engine. It is calculated by using the day-ahead market scheduled quantity (Q_{DA}) and multiplying it by the day-ahead market locational marginal price (LMP_{DA}).

The second settlement or the real-time balancing settlement is the settlement amount that is calculated on the basis of settlement data from the DAM calculation engine reconciled with the real-time market results. It is calculated by the real-time market actual quantity of energy injected or withdrawn (Q_{RT}) less the day-ahead market scheduled quantity (Q_{DA}) multiplied by the real-time market locational marginal price (LMP_{RT}).

2. DAM Calculation Engine

The current day-ahead commitment process (DACP) and the day-ahead calculation engine (DACE) will be replaced by a financially-binding DAM that uses a new DAM calculation engine. This is a significant change as the DACP does not produce financially-binding prices. The DAM calculation engine will run on the pre-dispatch day, which is the day before the dispatch day. The engine will use new dispatch data, including daily and hourly dispatch data, submitted by market participants and produce schedules and locational marginal prices for every hour of the dispatch day.

3. Market Power Mitigation (MPM)

Market Power Mitigation refers to the actions necessary to prevent market participants from exercising market power.

Before-the-fact or 'ex-ante' mitigation will be applied within the day-ahead market calculation engine to prevent attempts to exercise market power from significantly impacting day-ahead

prices and schedules. This assessment is conducted by the day-ahead market calculation engine using the conduct and impact methodology by assessing the following:

1. Did any resources have market power?
2. For those resources, did any of them submit dispatch data at prices significantly above the relevant reference level value?
3. Were market prices significantly higher using the too-high prices than would have been the case if reference level values were used in place of the too-high prices?

If the answer to all three questions is yes, then the relevant resources' dispatch data will be replaced with the relevant reference level values to determine prices and schedules in the day-ahead market calculation engine.

4. Introduction of virtual traders and price responsive loads (PRLs)

To improve participation and competition in the day-ahead market, market participants can choose to participate as virtual traders or price responsive loads. Virtual traders can submit virtual transactions into the DAM where they believe over-bidding or under-bidding may be occurring through physical transactions, attempting to obtain a more favourable two-settlement outcome.

Wholesale consumers, including those registered with physical HDR resources, have the option of registering their load to participate in the DAM as price responsive load (PRL) resources. PRLs can participate directly in the DAM by submitting energy bids that reflect their intended consumption in real-time, but they will operate as non-dispatchable in real-time. This enables wholesale consumers to represent their own consumption in the DAM and realize the benefits of two-settlement at their LMP. It also encourages more day-ahead load participation which improves visibility of expected real-time demand.

5. Alignment with gas market timelines

The natural gas market currently operates on a day-ahead basis with the gas nomination deadline of 14:00 Eastern Prevailing Time (EPT). To create greater alignment between the gas market and the future electricity market, the DAM will be executed on an EPT clock instead of an Eastern Standard Time (EST) clock like today's DACP. The DAM will run between 10:00 and 13:30 EPT. With a DAM end time of 13:30 EPT, gas resources can base their fuel supply decisions on already determined day-ahead schedules and have the opportunity to secure gas transport in a timely manner and at lowest cost ahead of the 14:00 EPT nomination deadline.

6. Enhanced modelling of hydroelectric resources

Currently, hydroelectric resources that have interdependencies with other resources on the same river system are allowed to revise their offers after initial DACP results are released. This opportunity is offered to ensure that hydroelectric resources can deliver on the schedules they receive. However, under a DAM and a two-settlement system, this approach will no longer be feasible. To enable fair competition and help ensure that hydroelectric resources receive feasible day-ahead schedules, hydroelectric resources will be able to reflect additional hydroelectric operating characteristics in the day-ahead scheduling process. These operating characteristics will be supplied to DAM as daily dispatch data. The DAM will include enhanced cascade modelling for hydroelectric resources as well as several new inputs to better reflect their flexibility and additional physical constraints. This will benefit the IESO and market participants by providing more accurate, feasible and efficient scheduling of all resources and a clearer view of the next day's operations.

5. How does the DAM compare to DACP?

The chart below outlines the key differences between the existing Day-Ahead Commitment Process (DACP) and the new DAM.

Day-Ahead Commitment (DACP)	Day-Ahead Market (DAM)
Participants submit day-ahead bids and offers primarily to declare availability in real-time	Participants submit day-ahead bids and offers to compete with others for a day-ahead price and schedule
Day-ahead bids and offers may be less efficient because they are not competing for a price	Day-ahead bids and offers are more efficient because they are competing for a price
Exports can participate but are not incentivized to do so	Exports have incentive to participate in the DAM
Resources are scheduled to meet Ontario demand that is exclusive of exports, providing a rough approximation of the next day's operation	Resources are scheduled to meet total market demand that is inclusive of exports, providing a better view of the next day's operation

6. DAM Process Timeline

Figure 2 outlines the timing of key activities that occur during the DAM process.

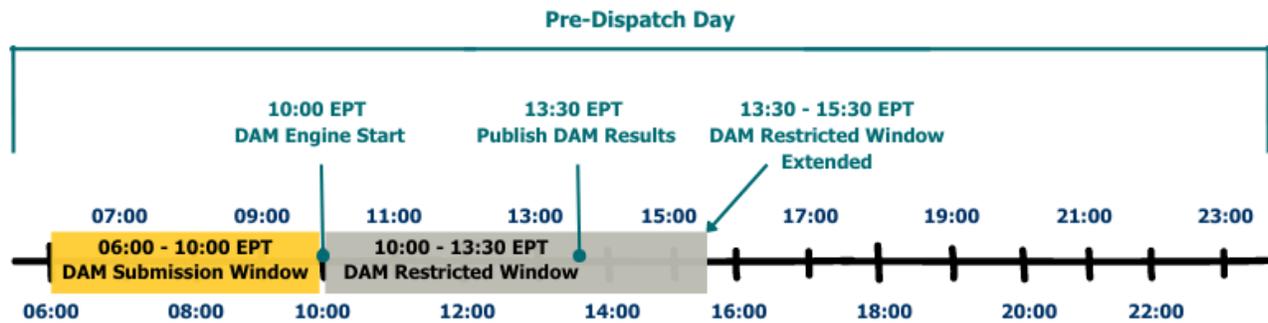


Figure 2 | DAM Process Timeline

The DAM will operate in Eastern Prevailing Time (EPT). On each pre-dispatch day, market participants submit dispatch data for dispatchable loads, dispatchable and self-scheduling generation facilities, PRLs, virtual traders, energy storage resources, and importers and exporters. They submit dispatch data that reflects the expected capabilities of these resources between 06:00 EPT and 10:00 EPT, which is also known as the **DAM submission window**. The DAM submission window will close at 10:00 EPT and the DAM calculation engine will start running at 10:00 EPT.

From 10:00 EPT to 13:30 EPT, with limited exceptions, market participants cannot make any revisions to their dispatch data submissions for the next dispatch day. This is known as the **DAM restricted window**. This allows sufficient time for the calculation of schedules and prices to be completed. IESO approval is required for any new submissions or revisions to dispatch data for the next dispatch day within the restricted window. Such requests are only approved in the rare case of an IESO tool failure that prevents the IESO from receiving dispatch data submissions. If such a tool failure occurs, an advisory notice will be posted on the [IESO advisory notice webpage](#).

By approximately 13:30 EPT, hourly schedules, commitments and locational marginal prices are produced for the 24 hours of the next dispatch day as an output of the DAM, and results are published in the form of reports. For a full-list of Day-Ahead Market Reports, please refer to the draft [Market Manual 4.2, Section 7.1](#).

As demonstrated in Figure 2, there is a possibility that the **DAM restricted window may be extended to 15:30 EPT** if there is a delay in publishing the resource schedules and day-ahead market prices. If results are not available to be published by 15:30 EPT, a DAM failure will be declared and no DAM results will be published for the relevant dispatch day.

7. The DAM Calculation Engine

The DAM Calculation Engine runs once per day and consists of three passes executed sequentially. The three passes are described in the draft [Market Manual 4.2, Appendix A](#).

The DAM calculation engine is to achieve the following objectives for the next day:

- Produce financially binding day-ahead energy and OR schedules for all resources
- Generate commitment decisions for eligible non-quick start (NQS) resources
- Provide locational marginal prices (LMPs) that will be used to settle the day-ahead market
- Prevent the potential exercise of market power by performing the ex-ante market power mitigation process.

7.1 Availability Declaration Envelope (ADE)

In order for dispatchable generation resources, dispatchable loads, hourly demand response resources, and dispatchable electricity storage resources to operate in the real-time market, they must establish an Availability Declaration Envelope (ADE) by submitting energy offers or bids in the Day-Ahead Market for every hour they wish to participate in the Real-Time Market. If a dispatchable generation resource, dispatchable load, hourly demand response resource, or dispatchable electricity storage resource does not establish an ADE, the resource is unable to operate in the real-time market.

The allowance to expand the Day-Ahead established ADE in the Real-Time Market will increase **from** the lesser of 2% of the ADE or 10 MW **to** the lesser of the 15% of the ADE or 10 MW. Energy bid or offer quantities that exceed the availability declaration envelope quantity for a given hour by the materiality threshold specified in the draft [Market Manual 4.1 Section 7.5.1](#) (15% of existing ADE or 10 MW, whichever is less) are not allowed to increase their bid or offer quantity unless approved by the IESO. Please refer to the draft [Chapter 7, Section 3.1.14 of the Market Rules](#) on when the IESO will approve an increase to the ADE.

For PRLs, self-scheduling generation, intermittent generators, and non-dispatchable storage resources, the ADE does not apply but market participants must submit for each hour in the day-ahead market the amount of energy they intend to inject or consume in the Real-Time Market.



Further Reading

Market Rules under the [MRP Webpage](#):

- Chapter 7, Section 3.1.14 – Establishing an Availability Declaration Envelope
- Chapter 7, Section 3.2 – Dispatch Data Submissions in the Day-Ahead Market
- Chapter 7, Section 4 – The Day-Ahead Market
- Chapter 7, Section 21.4 – Day-Ahead – Energy Offers and Energy Bids
- Chapter 7, Section 21.5 – Energy Offers and Energy Bids
- Appendix 7.1A – The Day-Ahead Market Calculation Engine

Market Manuals under the [MRP Webpage](#):

- Market Manual 4.1: Submitting Dispatch Data in the Physical Market
- Market Manual 4.2: Operation of the Day-Ahead Market (this Market Manual replaces the existing Market Manual 9.3)

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