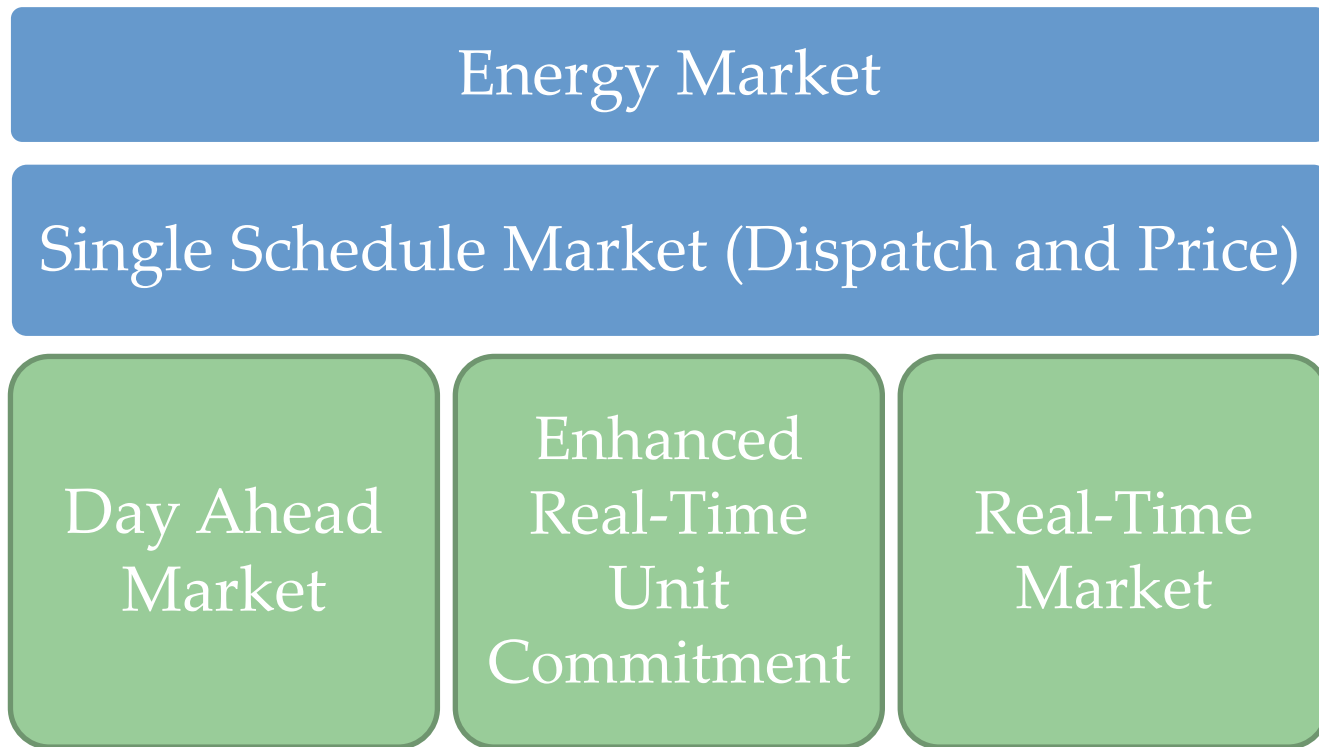


# Market Renewal Program: Energy Workstream

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# The Big Picture

- Energy workstream will improve the dispatch, commitment and pricing of resources in the energy market

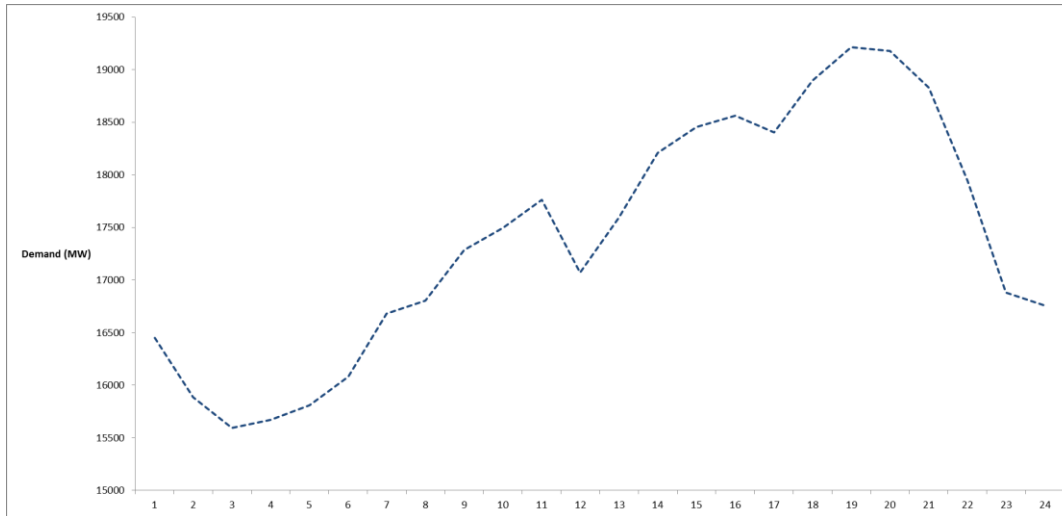


Day-Ahead → Intra-Day → Real-Time

# What is a Day Ahead Market?

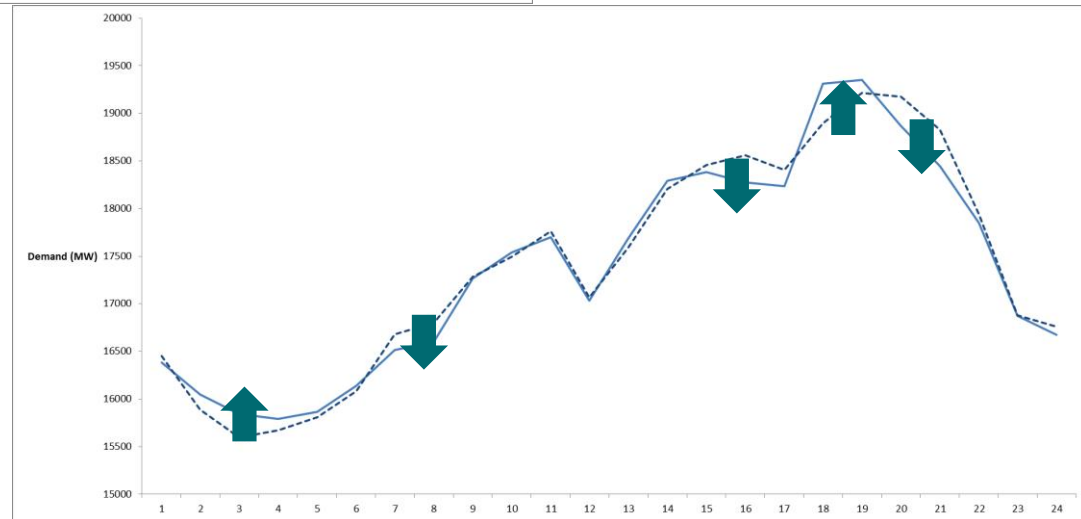
- Day-Ahead Market (DAM) lets market participants commit to buy or sell electricity one day before the operating day
- In jurisdictions with a DAM, the Real-Time Market balances the differences between day-ahead commitments and the actual real-time demand for and production of electricity.

# Balancing Real-Time conditions



Day-Ahead

Real-Time



# Day Ahead Market Settlement Mechanics

Day Ahead

$$Q_{DA} \times \$_{DA}$$

+

Real-Time (Balancing)

$$(Q_{RT} - Q_{DA}) \times \$_{RT}$$

Deviations from day-ahead obligations must be bought or sold back at real-time prices.

# Market Renewal Enhancements to Day-Ahead

1

- Majority of market is settled using day-ahead prices and schedules. Real-time only used for balancing quantities.

2

- Financial exposure to day-ahead prices and schedule will incent exports and supply to participate efficiently

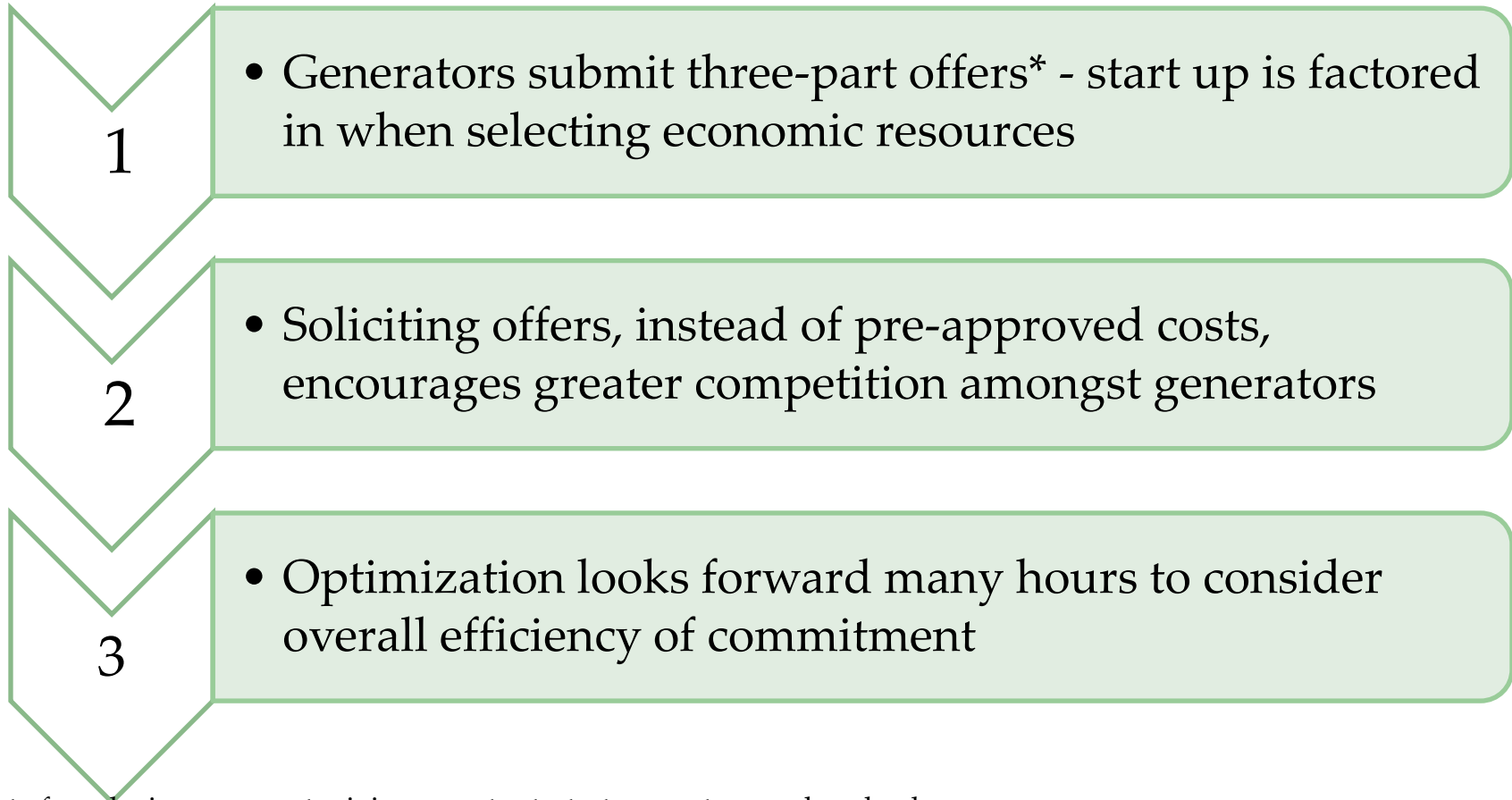
3

- Publishing day-ahead prices encourages growth from demand-side participation responding to system conditions

# Real-Time Unit-Commitment

- Even with a clear day-ahead picture, system conditions will inevitably change
  - Expected load, outages, variable generation, etc.
- In order to make sure system can handle these changes in real-time, the IESO re-evaluates available resources and may commit additional units if necessary
  - Number of real-time commitments should decrease with Market Renewal, as most resources will be scheduled in day-ahead

# Market Renewal Enhancements to Real-Time Unit Commitment



\* Cost of producing energy at minimum output, start-up costs, speed-no-load



# Ontario's Unique Two Schedule Pricing

Price for Dispatch ("Shadow Price")

Locational Prices taking transmission and operational constraints into account



Ensures reliable dispatch

For both Generators and Dispatchable Loads

Price for Settlement (HOEP)

Assumes no constraints and selects most economic units for price signal



Sends uniform price

For entire province

Congestion Settlement Credits (CMSC)

Makes up the difference between the two schedules

Can be paid to not run ('constrained off') or paid to run ('constrained on')



Distorts price signals and incents inefficient consumption/operation/trading and gaming

2 Special MSP Reports (2016, 2003); 8 Market Rule Changes; 4 MSP Gaming Investigations

# Nodal Prices vs. Current Prices (HOEP/MCP)

- Nodal (or locational) prices include the cost of congestion and losses at each location in the province

$$\textit{Nodal Price} = \textit{Reference Price} + \textit{Cost of Congestion} + \textit{Cost of Losses}$$

- Current prices (HOEP/MCP) do NOT include the cost of congestion or losses
  - Congestion (CMSC) and losses are captured in uplift

# Summary of Load Pricing Prelim. Decision

1

Zonal pricing for non-dispatchable wholesale loads, with an option for nodal. Dispatchable loads pay nodal prices.

2

10 zones, aligning with major system boundaries that could result in frequent or material congestion

3

Impacts of changes would be mitigated through disbursement of congestion and loss residuals