

EXPANDING PARTICIPATION IN OPERATING RESERVE

Public Information Session

November 10, 2017

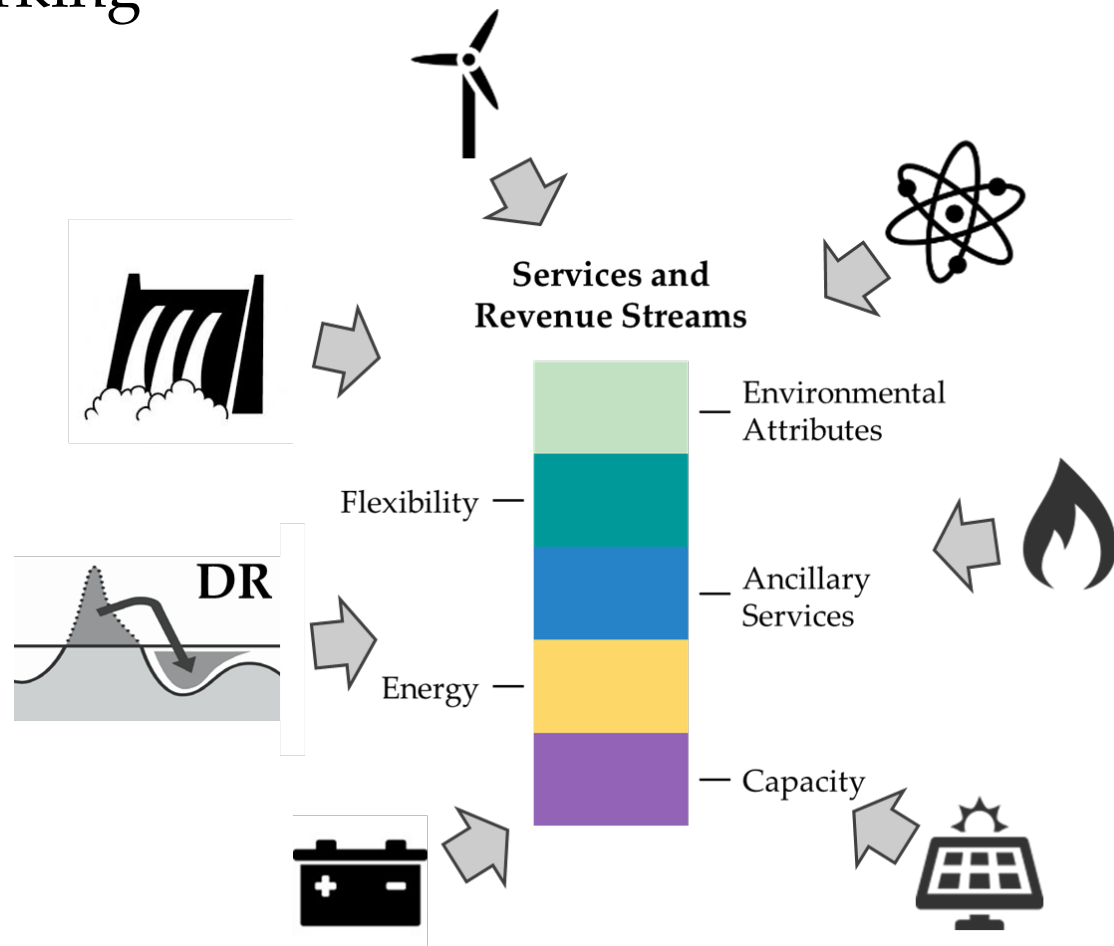
Purpose of Today's Information Session

- 1) Introduce the Expanding Participation in Operating Reserve initiative
- 2) Provide stakeholders with background information on Operating Reserve (OR) and related performance requirements
- 3) Request stakeholder input that will help inform feasibility and/or effectiveness of incorporating additional types of resources
- 4) Find out what additional information may help inform stakeholder responses.

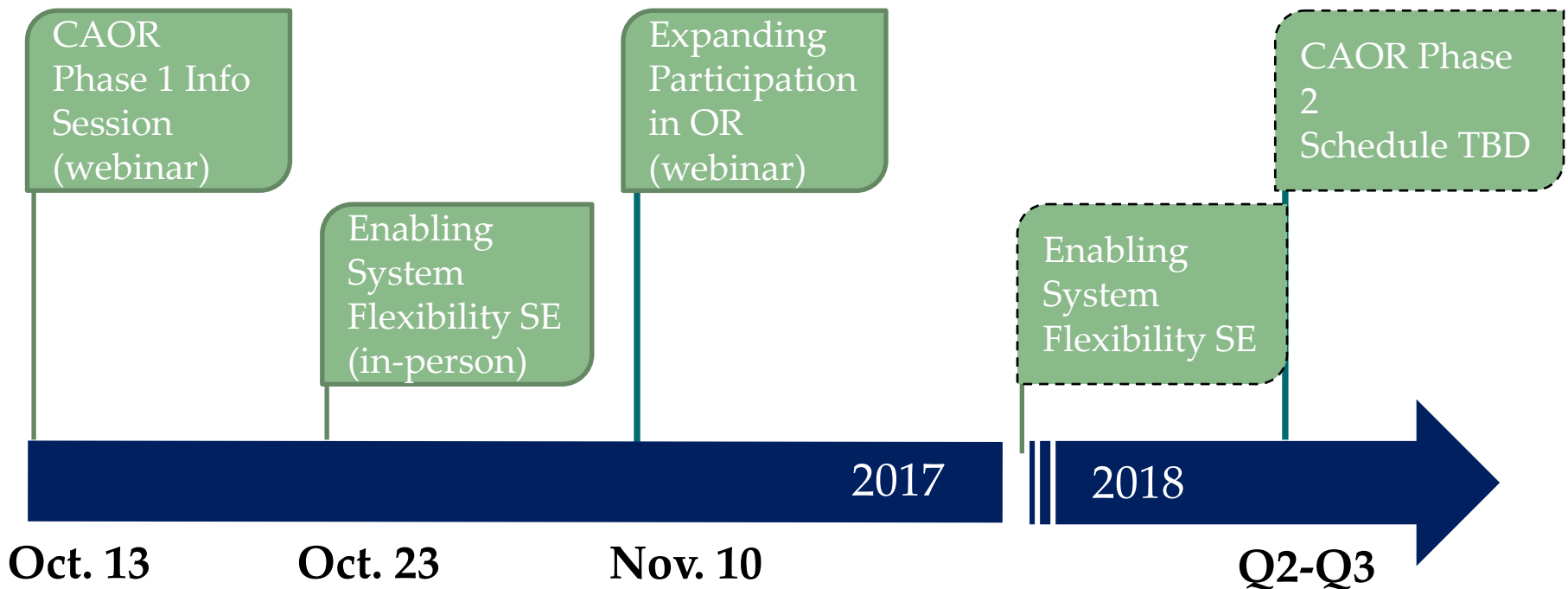
Context

IESO is committed to working with stakeholders to:

- Transition to a system with clearly defined products for needed services
- Expand opportunities to participate from a wide range of resource types
- Combination of clearly defined products with high participation will improve overall efficiency of the market



OR Initiatives at the IESO



Agenda

- 1) Expanding Participation in OR
- 2) Operating Reserve 101
- 3) Questions for Stakeholder Feedback
- 4) Next Steps

Introduction

Expanding Participation in OR

- The IESO is interested in facilitating a dialogue with stakeholders regarding the potential to expand participation in Operating Reserve to resources types that are not currently participating
- Expanding participation would:
 - increase competition in the OR market by integrating additional resource types
 - potentially benefit Ontario's electricity ratepayers through lower costs of OR uplift
 - reduce the risk of reaching scarcity conditions
 - potentially allow emerging technologies and new OR suppliers to provide a reliability service and access a new revenue stream

Operating Reserve 101

What is Operating Reserve?

- Operating Reserve (OR) is stand-by power or demand reduction that the IESO can call on with short notice to manage an unexpected mismatch between generation and consumption
- OR may be activated by the IESO's control room operators to respond to:
 - A sudden, unexpected increase in demand
 - A generation loss, or when several generators are unable to follow their dispatch instructions
 - The loss of a transmission element, which removes generation or results in a more restrictive operating limit that makes supply unavailable

Overview of the OR Markets

- The IESO administers three separate OR markets, in addition to the energy market
- There are three classes of OR, each defined by the time required to bring the energy into use and the physical behaviour of the facilities that provide it:
 - 10 minute spinning reserve (10S)
 - 10 minute non-spinning reserve (10N)
 - 30 minute reserve (30R)
- Prices and schedules are determined every five minutes for each reserve class and co-optimized with energy
 - Anticipatory prices and schedules are determined in DACP and pre-dispatch

OR Requirements

- North American regulatory standards determine the minimum amount of operating reserve capacity that Ontario is required to schedule, as well as minimum performance requirements
 - Northeast Power Coordinating Council (NPCC) Regional Reliability Reference Directory #5
 - North American Reliability Corporation (NERC) Standard BAL-002
- Minimum OR requirements for Ontario are:
 - **10 minute reserve** to cover **largest contingency**
 - Typically 900 MW
 - At least 25% of this must be synchronized to the grid (10S)
 - **30 minute reserve** to cover **½ of second largest contingency loss**
 - Typically 450 MW

Offering into the OR Market

- Dispatchable loads and dispatchable generators are eligible to offer into each of the three OR markets
 - Under certain circumstances, imports may provide non-synchronized reserve
- Offers include hourly prices, quantities and ramp rates
 - A price/quantity pair specifies the amount of reserve offered for a given hour
 - Submitted ramp rates specify how quickly the resource output can be moved up or down. Operating reserve offers have one ramp rate.
- To offer operating reserve, the market participant must have a bid or offer in the energy market for an amount greater than or equal to the quantity of their operating reserve offer
 - For example, a generator offering 10 MW in the 30 R market must offer at least 10 MW into the energy market for the same resource

Scheduling of Operating Reserve

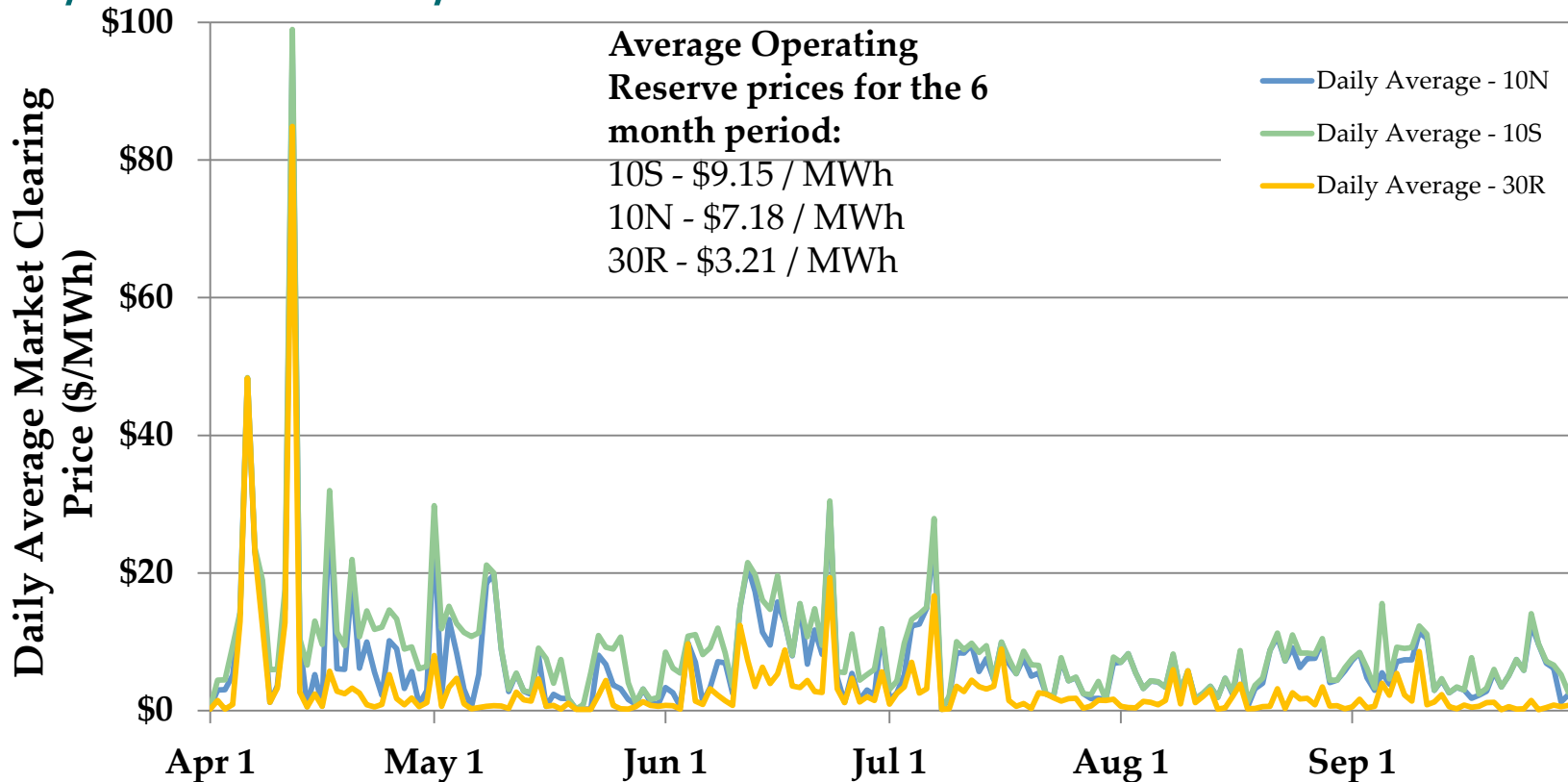
- The IESO's dispatch algorithm builds a stack every 5 minutes, from lowest to highest price, based on the submitted offers/bids for each of the three OR markets and the energy market
 - It can use offered reserve that is not required to satisfy one class to satisfy the requirements for a lower class
 - Therefore an offer in the 10S reserve market could result in scheduling for 10S, 10N, 30R, or any combination of the three
- Bids and offers in the energy market and offers in the OR market are evaluated at the same time, satisfying both the total electricity demand and the OR requirements at lowest total cost
 - This is referred to as joint optimization, or co-optimization
- This process establishes the resources that are scheduled as operating reserve, as well as the price they will be paid (\$/MWh)

Activation of OR and Performance Requirements

- When the IESO needs to activate operating reserve, the scheduled operating reserve resources are activated based on their energy bid/offer price, from lowest to highest
- When scheduled operating reserve suppliers are activated, the resource must provide the energy within the time period for the product activated:
 - If activated for 10-minute reserve, a facility has 10 minutes to provide the energy
 - If activated for 30-minute reserve, a facility has 30 minutes to provide the energy
- The participant must be able to sustain the supply of operating reserve energy for at least one hour

OR Market Summary for Previous 6 Months

Apr 2017 to Sep 2017



IESO publishes a Monthly Market Report that summarizes Operating Reserve Prices
<http://www.ieso.ca/power-data/market-summaries-archive>

Next Steps

Questions for Stakeholder Feedback

The following questions could be used to provide helpful input to the IESO. Please feel free to submit any additional comments or information you wish to provide as feedback on this discussion.

1. Which resource technologies should the IESO evaluate for potential participation in the OR market and why?
2. Are these technologies able to meet the performance requirements for OR? Please comment.
3. What appears to be preventing these technologies from participating in the OR market?
4. What additional information do you require in order to provide feedback?

Next Steps

- Through this public information session, and resulting stakeholder feedback, the IESO seeks to:
 - Identify which resource types should be further investigated to provide OR
 - Identify barriers that preclude each resource type from participating in the OR market
- Stakeholder interest and capabilities will be balanced against the associated costs, benefits and risks of introducing specific resource types into the OR market
- Please provide feedback to engagement@ieso.ca by December 15, 2017

References for Further Information

1) Guide to Operating Reserve

<http://www.ieso.ca/sector-participants/market-operations/markets-and-related-programs/operating-reserve-markets>

2) Energy Market Interface: Submitting, Revising and Cancelling Operating Reserve Offers

<http://www.ieso.ca/-/media/files/ieso/document-library/training/submitting-revising-and-cancelling-energy-offers.pdf?la=en>

3) Quick Take: Joint Optimization of Energy and Operating Reserve

<http://www.ieso.ca/-/media/files/ieso/document-library/training/qt-joint-optimization-of-energy-and-operating-reserve.pdf?la=en>

4) Market Rules: Chapter 5, Section 4.5; Chapter 7, Sections 2, 3 and 7; and Appendix 5.1, Section 1.2

<http://www.ieso.ca/sector-participants/market-operations/market-rules-and-manuals-library>

5) Market Summaries Archive

<http://www.ieso.ca/power-data/market-summaries-archive>