

Revenue Opportunities in the IESO Administered Markets

Background Information for the NER-SC

January 22, 2017

Introduction

- Some members of the NER-SC have requested background information on the existing revenue opportunities for Ontario Market Participants
- This reference document:
 - Briefly outlines existing revenue streams
 - Identifies what is changing
 - Provides references for further information

Context

- The figures in this document provide a snapshot for electricity sector payments at a particular point in time
- Payments for existing services can change substantially over time
 - Changes in gas prices can significantly impact energy market revenues
 - Changing reserve requirements (e.g. to meet flexibility needs) can impact operating reserve revenues
- New revenue streams may also be introduced
 - The incremental capacity auction will provide a new tool for procuring capacity
 - The IESO and stakeholders will explore approaches to procuring flexibility and environmental services to meet system needs and policy objectives
- In phase 2 of its work (market efficiencies) the subcommittee will explore potential future market revenues under a range of scenarios

Existing Electricity Market Revenue Streams

1. Energy
2. Capacity
3. Operating Reserve (OR)
4. Regulation
5. Reactive Support and Voltage Control (RSVC)
6. Black Start
7. Demand Response Auction (DR)

Energy

What is it?

- Ontario balances the supply and demand of energy on a 5 minute basis through a real-time energy market; the energy market is supplemented by the day-ahead commitment process and the real-time generation cost guarantee program which help to ensure there is adequate supply to meet demand.

Who Participates?

- Subject to applicable regulatory, administrative and environmental measures, all technology types (including domestic supply, loads, and imports/exports) can participate in the energy market.

How much revenue?

- Over the past four years, total energy market revenue was between \$2-5bn, with an weighted average annual price of energy between \$16/MWh-\$34/MWh. In 2016, total energy market revenue was \$2.4bn.

Energy

What is changing?

- Through Market Renewal, Ontario is introducing a single schedule market, day-ahead market , and enhanced real-time unit commitment.

Additional resources

- To learn more, please go the links:
 - Real-time energy market: <http://www.ieso.ca/en/sector-participants/market-operations/markets-and-related-programs/real-time-energy-market>
 - Day-ahead commitment process: <http://www.ieso.ca/en/sector-participants/market-operations/markets-and-related-programs/day-ahead-commitment-process>
 - Real time generation cost guarantee: <http://www.ieso.ca/-/media/files/ieso/document-library/training/qt-real-time-generation-cost-guarantee.pdf?la=en>
 - Single schedule market: <http://www.ieso.ca/en/sector-participants/market-renewal/market-renewal-single-schedule-market>
 - Day-ahead market: <http://www.ieso.ca/en/sector-participants/market-renewal/market-renewal-day-ahead-market>
 - Enhanced real time unit commitment: <http://www.ieso.ca/en/sector-participants/market-renewal/market-renewal-enhanced-real-time-unit-commitment>

Capacity

What is it?

- Ontario does not currently have a regular process for the procurement of capacity as a stand-alone product.* Capacity in Ontario has traditionally been procured on an intermittent basis through contracts and regulation, and has been bundled with other services such as energy and environmental benefits.

Who Participates?

- Multiple forms of market participants provide capacity through contracts and regulation.

How much revenue?

- Because capacity payments have been bundled together with payments for other services, it is not possible to determine revenues from capacity on a stand-alone basis. Looking forward, Market Renewal will introduce an Incremental Capacity Auction that will value capacity in a clear and transparent manner. Payments for capacity account for a portion of Global Adjustment.

* Demand Response Capacity is procured through the DR auction

Capacity

What is changing?

- Market Renewal will introduce an Incremental Capacity Auction; a new transparent and stable mechanism for procuring capacity to meet Ontario's reliability needs.

Additional resources

- To learn more, please go the links:
 - Incremental Capacity Auction: <http://www.ieso.ca/en/sector-participants/market-renewal/market-renewal-incremental-capacity-auction>
 - Global Adjustment: <http://www.ieso.ca/en/power-data/price-overview/global-adjustment>
 - Global Adjustment components: <http://www.ieso.ca/sector-participants/settlements/global-adjustment-components-and-costs>

Operating Reserve

What is it?

- Operating Reserve (OR) is stand-by power or demand reduction that can be called on with short notice to deal with an unexpected misalignment between generation and consumption. OR is provided through 3 markets: 10-minute synchronized, 10-minute non-synchronized, and 30-minute reserve. Prices and schedules are determined every five minutes for each reserve class and are co-optimized with the energy market.

Who Participates?

- Subject to performance requirements, dispatchable loads and generators can provide all three classes of operating reserve while imports and exports may provide 10-minute non-synchronized and 30-minute OR.

How much revenue?

- Historically, annual OR revenues range between \$50-75m. In 2016, annual OR revenue was \$54m, based on average prices of \$6.40/MWh for 10-minute sync, \$5.41/MWh for 10-minute non-sync and \$1.86/MWh for 30-minute reserve.

Operating Reserve

What is changing?

- Through the enabling system flexibility stakeholder engagement, the IESO is adding flexibility to our grid by procuring additional 30 minute OR when needed; the IESO is also exploring ways to expand participation in OR

Additional resources

- To learn more, please go the links:
 - Operating Reserve markets: <http://www.ieso.ca/sector-participants/market-operations/markets-and-related-programs/operating-reserve-markets>
 - Enabling system flexibility: <http://www.ieso.ca/en/sector-participants/market-renewal/enabling-system-flexibility>
 - Expanding participation in Operating Reserve: <http://www.ieso.ca/-/media/files/ieso/document-library/public-info-session/2017/epor-20171110-presentation.pdf?la=en>

Regulation

What is it?

- Regulation acts on a short-term basis to match total system generation to total system load (including transmission losses) and helps correct variations in power system frequency. The service enables the system to adjust for factors such as discrepancies between tie line scheduled vs. actual flows and load and generation dispatch deviations.

Who Participates?

- IESO market rules determine a minimum of ± 100 MW of regulation service must be scheduled at all times, with a minimum overall ramp rate of 50 MW/minute. Regulation is scheduled in one hour increments and facilities must have the capability to receive a signal once every 2 seconds.
- Regulation services are procured as-required by RFP from a range of different technology types. Successful bidders are awarded multi-year contracts.
- The most recent regulation RFP was held in late 2017 where two new storage facilities were selected to expand regulation capacity by 50 MW.

How much revenue?

- In 2016, \$44m was paid out to seven generating stations and three energy storage facilities for regulation services. The weighted average price of successful participants in the 2017 RFP was less than \$200,000/MW/year.

Regulation

What is changing?

- To support future system flexibility, the IESO is seeking to expand the capacity of the regulation service market from 100 MW to between 150 MW to 200 MW for each hour, and developing sufficient market depth to schedule between 250 MW to 300 MW of regulation capacity on an as-needed basis by 2020.

Additional resources

- To learn more, please go the links:
 - Regulation services: <http://www.ieso.ca/en/sector-participants/market-operations/markets-and-related-programs/ancillary-services-market>
 - Regulation service RFP: <http://www.ieso.ca/en/sector-participants/market-operations/markets-and-related-programs/regulation-service-rfp>
 - Regulation 101 webinar: <http://www.ieso.ca/-/media/files/ieso/document-library/market-operations/incremental-regulation-capacity-rfp/regulation-101-webinar.pdf?la=en>

Reactive Support and Voltage Control

What is it?

- Reactive support and voltage control (RSVC) is a combined product service that allows the IESO to maintain acceptable reactive power and voltage levels on the grid. Reactive power flow is needed in an alternating-current transmission system to support the transfer of active power over the network.

Who Participates?

- All grid connected generators must provide reactive support services.
- Voltage control, which is typically provided by hydro facilities, is procured on an as-required basis through RFP or transmission planning initiative.

How much revenue?

- In 2016, 57 generating facilities were registered as eligible to receive RSVC payments. Historically, annual RSVC payments range between \$16-20m. In 2016, the annual payout for RSVC was \$18M.

Reactive Support and Voltage Control

What is changing?

- Market Renewal is not expected to materially impact the Reactive Support and Voltage Control service.

Additional resources

- To learn more, please go the links:
 - Reactive Support and Voltage Control Service: <http://www.ieso.ca/en/sector-participants/market-operations/markets-and-related-programs/ancillary-services-market>

Black Start

What is it?

- Black start facilities help system reliability by being able to restart their generation facility with no outside source of power. In the event of a system-wide blackout, they aid restoration efforts by re-energizing other portions of the power system.

Who Participates?

- Facilities must meet three conditions to offer Black Start: 1) energize or assist in energizing the specified transmission line within the applicable time period, 2) provide energy to the transmission line as required, 3) provide start-up power to the generation facility as specified by the IESO.
- IESO contracts for Black Start through RFP on an as-required basis.

How much revenue?

- In 2016, \$2m was paid out to 4 generation facilities to provide Black Start services.

Black Start

What is changing?

- Market renewal is not expected to materially impact the Black Start service.

Additional resources

- To learn more, please go the links:
 - Certified Black Start Facilities: <http://www.ieso.ca/en/sector-participants/market-operations/markets-and-related-programs/ancillary-services-market>

Demand Response Auction

What is it?

- Demand response allows consumers to change their demand and consumption patterns in response to market prices. Through the Demand Response Auction, participants provide demand response capacity in exchange for an availability payment.

Who Participates?

- Demand Response is procured by the IESO on an annual basis through competitive auction. Separate auctions are held for Summer and Winter commitment periods.
- To bid in the auction, participants must be authorised and complete the capacity qualification process.
- Typical participants include large loads (direct providers) and aggregators in the residential, commercial and industrial sectors

How much revenue?

- Historically, \$36-49m is paid out to providers in the Demand Response Auction*. In 2016, \$36m was paid out to 9 participants with a clearing price for the summer commitment period of \$331.33/MW-day, and for the winter commitment period of \$299.48/MW-day.

*Revenue data covers Demand Response Auction only (it does not include revenues from the Capacity-Based Demand Response program)

Demand Response

What is changing?

- Over time, the Demand Response Auction will be integrated into the Incremental Capacity Auction.

Additional resources

- To learn more, please go the links:
 - Demand Response Auction: <http://www.ieso.ca/en/sector-participants/market-operations/markets-and-related-programs/demand-response-auction>
 - Results from 2017 Demand Response Auction: <http://www.ieso.ca/en/corporate-ieso/media/news-releases/2017/12/ieso-announces-results-of-demand-response-auction>
 - Introduction to Demand Response Auction: <http://www.ieso.ca/-/media/files/ieso/document-library/training/introduction-to-the-demand-response-auction.pdf?la=en>
 - Incremental Capacity Auction: <http://www.ieso.ca/en/sector-participants/market-renewal/market-renewal-incremental-capacity-auction>

Summary of Revenue Streams in 2016

- Payments in each revenue stream can be considered in context when viewed together:

Market Revenues 2016 (\$m)

