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IESO York Region Non-Wires Alternatives Demonstration Project

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Disclaimer

This document provides an overview of the currently proposed rules for the IESO York Region Non-Wires Alternatives (NWAs) Demonstration Project (the "Demonstration") for the 2022 Commitment Period and is subject to on-going revision. The posting of this document is made exclusively for the convenience of stakeholders, prospective participants, and other interested parties.

The information contained in this document and related documents shall not be relied upon by any stakeholder, prospective participant, or other interested party as a basis for any commitment, expectation, interpretation and/or design decision.

Dates and values presented here are for the purpose of seeking stakeholder feedback – the Pre-Auction Report will set out what is ultimately used for the Demonstration.

Purpose of Today's Meeting

Provide an overview of the Demonstration including year 1 highlights and summarize the Rules and Contracts for year 2 for Stakeholder feedback.

- Introduction to Demonstration
  - Overview, Objectives, Activities, Structure & Background
- Year 2 of the Demonstration
  - Process & Timeline Overview
  - Eligibility Requirements
  - Registration
  - Local Capacity Auction
  - Local Energy Auction & Local Reserve Auction
  - Demonstration Settlement

DER Roadmap

- The IESO is developing a Distributed Energy Resources (DER) Roadmap to provide clarity on IESO objectives, initiatives, and timing for DER integration
  - A draft DER Roadmap expected in fall 2021 and the final DER Roadmap expected by end of 2021, which will be updated periodically thereafter to reflect progress
- DER Roadmap focus areas are: Non-Wires Alternatives, Wholesale Market Integration and Transmission-Distribution (T-D) Coordination
- The Demonstration is one of the near-term DER Roadmap activities that will lay the groundwork for DER integration over the coming years
  - DER Scenarios & Modeling Study is being initiated as part of the Demonstration, investigating T-D coordination protocols in detail

Introduction to Demonstration

Demonstration Introduction

- Aimed at developing a better understanding of how to competitively secure and operate DERs to meet local, regional and province-wide electricity needs
- When communities grow and need more electricity, some combination of new transmission and distribution infrastructure and centralized generation has traditionally been the primary solution - DERs are providing communities more options to address their local electricity needs
- DERs can provide value by managing local peaks and providing other services to defer, reduce or avoid costs associated with traditional infrastructure

Demonstration Introduction (continued)

- The IESO and Alectra are committed to fostering innovation that supports reliability and affordability for ratepayers because investing in innovation today will position Ontario's electricity sector to effectively face the challenges of tomorrow

Demonstration Overview

- $10M project funded by IESO's Grid Innovation Fund and Natural Resources Canada (NRCan) with Alectra Utilities as the delivery partner
- Demonstrate how market approaches, including capacity, energy and reserve auctions, can be used to efficiently procure and operate DERs as NWAs
  - DERs are participating in a simulated market environment to safely test concepts, i.e. DERs are not being relied on for reliability needs in IESO-Administered Markets (IAMs) or to meet local needs
- Demonstrate a potential T-D coordination model for Ontario: the Independent Total Distribution System Operator (DSO) model
- In year 2, introducing Reserve (as a potential longer-term construct), to help manage local contingencies and make the mechanism more robust

Demonstration Objectives

- Explore the use of auctions to secure services from DERs to demonstrate their use as NWAs and wholesale-level resources
- Explore models of coordination between the IESO, as the transmission system operator, and Alectra, acting as DSO for the Demonstration
- Assess the interest and ability of different DERs to compete to provide local capacity and energy services, including local reserves
- Identify market and systems operations barriers to NWAs and exploring potential solutions to such barriers

Demonstration Objectives (continued)

- Assess the operational and reliability characteristics of particular DERs as compared to traditional solutions
- Assess the feasibility and impacts of distribution-level electricity pricing, while supporting reliability, resource adequacy and market efficiency
- Drive community engagement and development by enabling local solutions to meet local needs

Demonstration Activities

2018

Proposal development, submission, award

NRCan-IESO agreement, IESO-Alectra agreement

Whitepaper and concept design development

Rules and Contract for Services development

Stakeholder engagement and participant marketing

Platform development

Now

2020 Local Capacity Auction

2021 Local Energy Auctions

Integration of enhancements/updates

2021 Local Capacity Auction

2022 Local Energy Auctions (including new Reserves service)

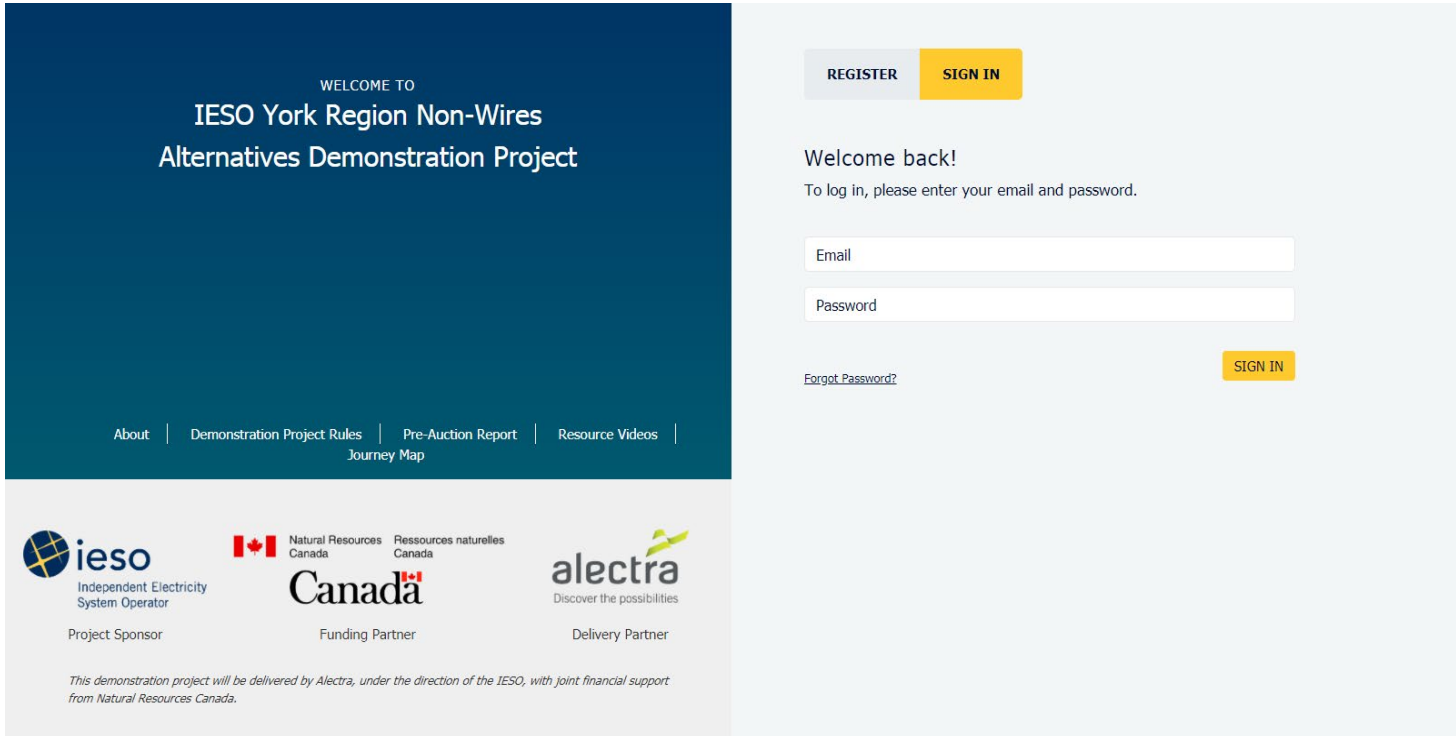
2022

Modelling study and lessons learned reporting

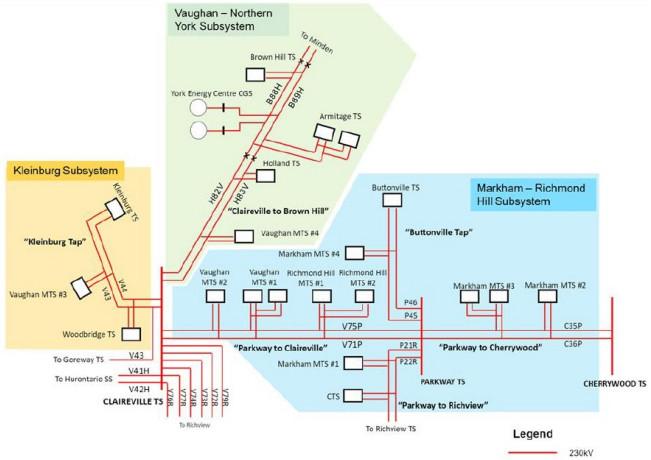
Structure & Background

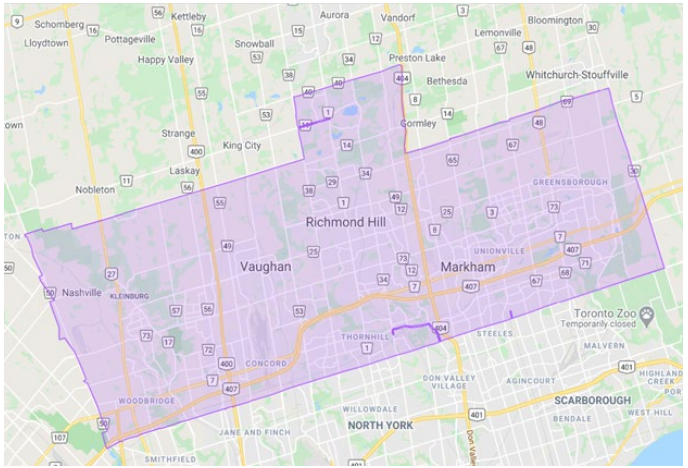
- Project is a proof-of-concept, will operate in a simulated test environment that is isolated from the real IESO market and system operations
  - Local need and wholesale market participation are simulated
  - Services secured, obligations, activations, settlement, etc. are real
- Demonstration involves two Local Capacity Auctions (LCAs) and two sets of associated Local Energy Auctions (LEAs)
  - Year 1: Q4 2020 LCA and May-Oct. 2021 LEAs
  - Year 2: Q4 2021 LCA and May-Oct. 2022 LEAs and Local Reserve Auctions (LRAs)
  - The Demonstration Project Rules in this presentation are regarding year 2
- Platform developed to register, secure, schedule, and activate DERs

Demonstration Platform – Live September 2020



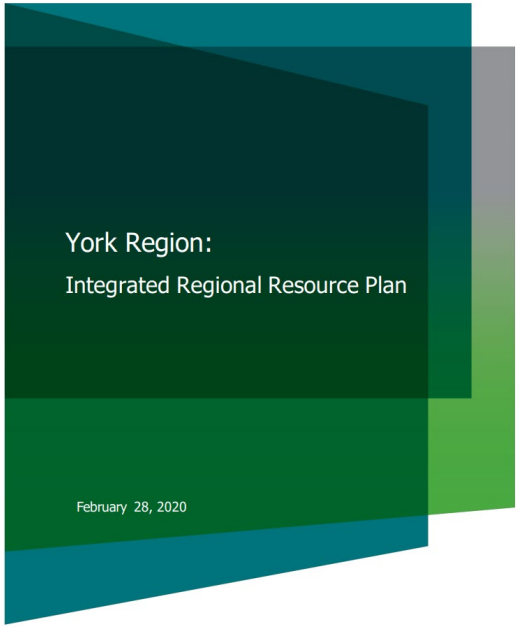
Demonstration Area





- Richmond Hill, Vaughan and Markham – peak demand of ~1350 MW
- Includes area serviced by: Markham #1 - #4 MTS, Buttonville TS, Richmond Hill #1-#2 MTS, Vaughan #1 - #4 MTS, and Woodbridge TS
- A map of the demonstration area can be found here

York Region Integrated Resource Plan (IRRP)



- Addresses electricity needs for the York Region out to 2037 based on a 20-year forecast
- York Region is one of the fastest-growing regions in Ontario and population growth and urban intensification are expected to continue
- Existing stations reach limits in mid- to late-2020s
- Maintains the long-term flexibility to use new cost-effective solutions, such as NWAs

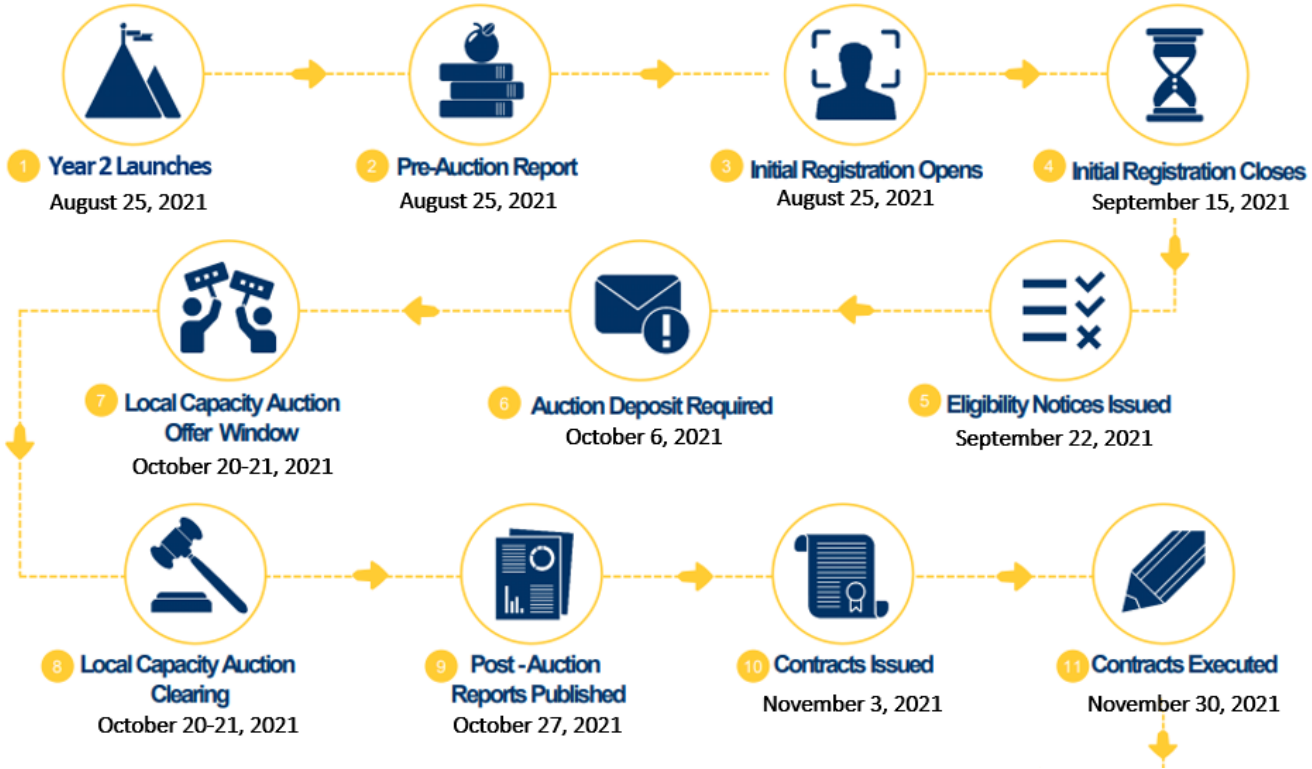
2020 Local Capacity Auction Results

Successful Participants	Local Capacity Obligation (kW)
EnergyHub Canada	1,200
NRG Curtailment Solutions	400
Longos Brothers Fruit Markets	1,000
Edgecom Energy	3,000
GC Project	1,000
Markham District Energy	2,900
Tycho Poly	500
Total	10,000

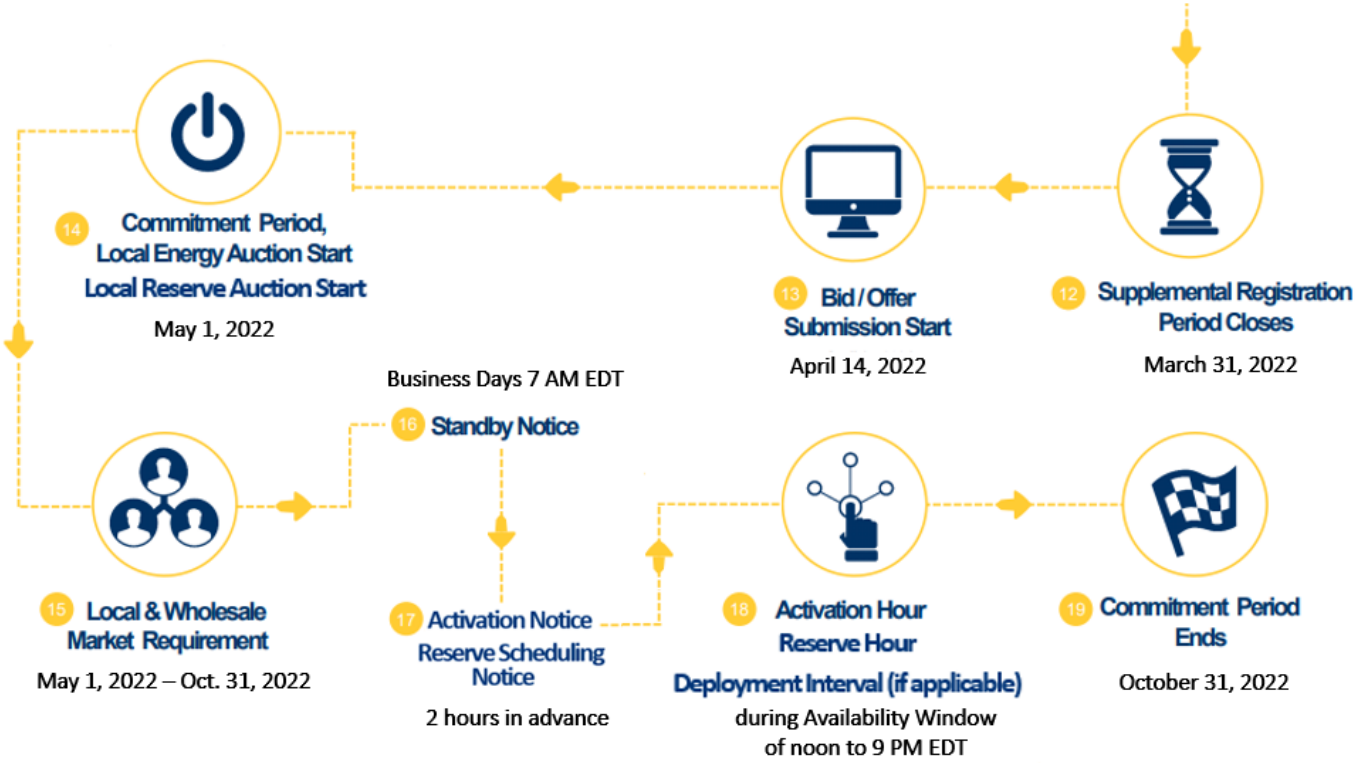
- 2020 Capacity Target: 10 MW (with 34 MW registered)
- Local Capacity Clearing Price: $0.64/kW-day (below the $1.60/kW-day maximum)
- A variety of DER participant types and DER technology types cleared

Year 2 of the Demonstration

Process & Timeline Overview



Process & Timeline Overview (continued)



Eligibility Requirements - Participants

- To register as a Direct Participant, the Registrant must be an existing DSO customer (i.e. an Alectra customer) with a valid account number or Temporary Account Number
    - To register a Future DER, the Registrant must obtain a Temporary Account Number
- The Registrant must be a corporation (with or without share capital), co-operative, partnership, or limited partnership
- DER Capacity of the DERs submitted by a Registrant and its Affiliates cannot exceed 3,000 kW
- Direct Participants can participate with Direct DERs and Aggregators can participate with Contributor DERs registered as Aggregator DERs

DER Eligibility - Direct Participants

- Must have User Rights that are held by the Direct Participant
- Must be only one of the following types of "Permitted Resource":
  - a Demand Response Resource
  - a Thermal Resource
  - a Storage Resource
- Must have a DER Capacity of at least 100 kW and no more than 3,000 kW
- Must, no later than the last day of the Supplemental Registration Period:
  - be in commercial operation and have a valid Meter Number
  - be connected directly to the DSO's Distribution System
  - be capable of providing the DER Capacity for four (4) consecutive hours
  - have revenue-quality interval metering

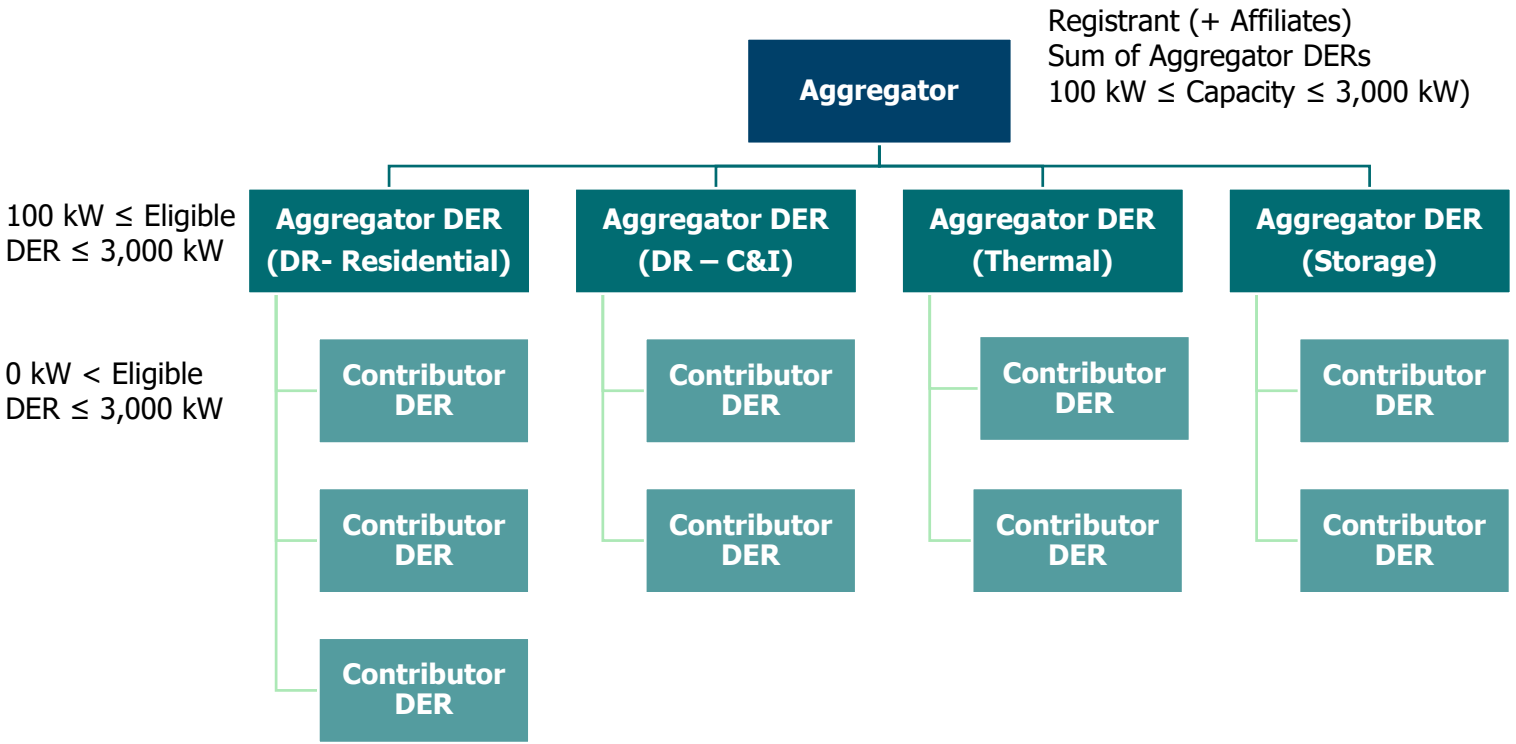
DER Eligibility - Aggregators

- Each Contributor DER, no later than the last day of the Supplemental Registration Period, must:
  - have User Rights that are held by the Aggregator
  - have a valid Meter Number
  - have revenue-quality interval metering
  - connect directly to the Distribution System at a single Connection Point, or multiple Connection Points provided the written consent of the DSO has been obtained
  - have a Connection Point within the Demonstration Area
  - be one of the Permitted Resource types

DER Eligibility - Aggregators (continued)

- Each Aggregator DER must:
  - be two or more Contributor DERs
  - be a single Aggregator Resource Category
  - be capable of providing the Eligible Capacity over at least four (4) consecutive hours
  - have an Eligible Capacity of at least 100 kW and no more than 3,000 kW
- Four categories for Aggregator DERs:
  - Demand Response Resources - Residential Customers
  - Demand Response Resources - Commercial and Industrial Customers
  - Thermal Resources
  - Storage Resources

Aggregator DER Breakdown Diagram



DER Ineligibility

- A DER that is participating in the IESO Capacity Auction during the Demonstration's Commitment Period
- A Direct DER that is a registered facility in the IESO-Administered Markets, which restriction shall apply during the Commitment Period only
- A DER that is the subject of an Existing Contract, unless otherwise consented to by Alectra
- A DER that is the subject of rate regulation by the Ontario Energy Board (OEB) pursuant to the Ontario Energy Board Act, 1998
- A DER that is the subject of a contract with a licensed electricity retailer, unless an Electricity Retailer Waiver is provided

Eligibility – Reserve-Capable DER

- Eligible Direct DERs and Aggregator DERs may provide Reserve and participate as a Reserve-Capable DER
- Reserve-Capable DER must be capable of providing Reserve in an amount within thirty (30) minutes of the issuance of a Deployment Notice
  - Three categories for Reserve-Capable DERs: (i) Demand Response Resources - Commercial and Industrial Customers, (ii) Thermal and (iii) Storage Resources
  - Demand Response Resource – Residential is not eligible as Reserve-Capable DER
- Reserve-Capable DERs that clear the Local Capacity Auction will be assigned a Local Reserve Obligation and must be available to provide Reserve service during the "Availability Window", defined as noon to 9PM EDT on Business Days throughout the Commitment Period

Two-Stage Registration

1. Initial Registration pertains to registering the Registrant
   - Information needed to demonstrate eligibility, e.g. type of DER, DER Capacity

- Registrants that complete the Initial Registration will be issued an Eligibility Notice to offer Eligible Capacity into the Local Capacity Auction
  - Eligible Registrants with DER that clear will be offered a Contract
  - Once a Contract is executed, the Eligible Registrant is considered a Participant

2. Supplemental Registration pertains to registering the DERs
   - Eligible Registrants will be required to complete the Supplemental Registration
   - All information required for each Direct DER and Contributor DER
   - All Direct DERs must be in-service, and all Contributors must be contracted

Local Capacity Auction

- Eligible Registrants with one or more Eligible DERs can participate in the Local Capacity Auction up to their respective Eligible Capacity
- By Aug. 25, 2021, the Pre-Auction Report will be published on the Website
  - Capacity Target (for Commitment Period) = 15 MW
  - Reserve Sub-Target Capacity = 5 MW
  - Local Capacity Auction Offer Window = Oct. 20-21, 2021
  - Maximum Capacity Price = $1.6/kW-day
  - Maximum Energy Price = $2/kWh for Activation Hours
  - Maximum Reserve Price = $2/kW for Reserve Hours

Auction Deposit

- An Auction Deposit will be required from the Eligible Registrant via certified cheque for each Registered DER
  - Auction Deposit = $2/kW multiplied by the Eligible Capacity
  - Will be refunded to the unsuccessful Eligible Registrants
  - For successful Eligible Registrants with existing DERs, refunded following Contract execution and completion of Supplemental Registration
  - For Future DERs, exchanged for Completion Security, which will be refunded following successful completion of the Supplemental Registration

Local Capacity Auction – Offer Submission

- Capacity Offers can be submitted for Eligible DERs (individually) using the Platform during the Capacity Auction Offer Window
  - Applicable to the Availability Window
  - Must not be less than 100 kW and must not exceed the Eligible Capacity
- Offer format of five (5) monotonically increasing price-quantity pairs
  - Quantities must be submitted in minimum increments of 10 kW
  - Price in $/kW-day submitted in dollars and whole cents
  - For each quantity, indicate whether must be fully or may be partially cleared
  - Indicate whether the Eligible DER is Reserve-Capable
  - Prices must be within the minimum/maximum identified in the Pre-Auction Report

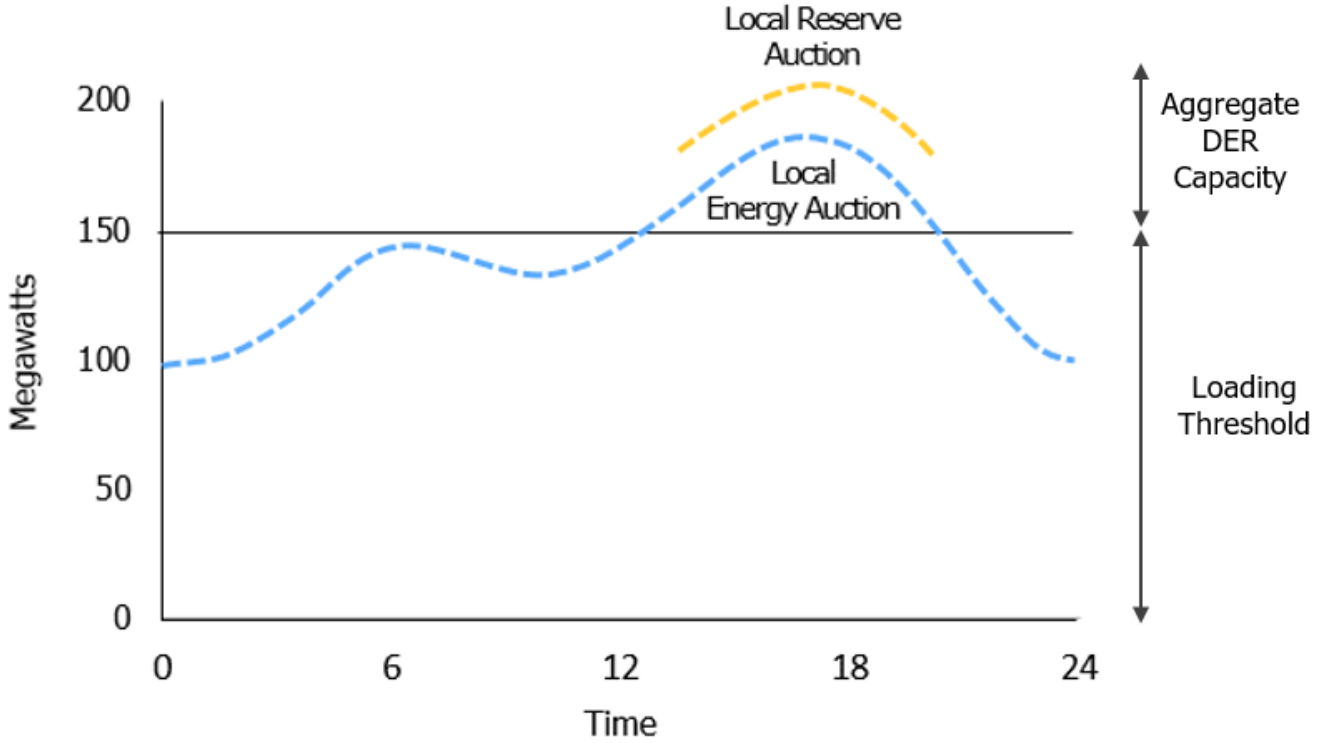
Local Capacity Auction – Auction Clearing

- An electronically sealed-offer, single round, pay-as-clear price format
- 2021 Local Capacity Auction will have a Capacity Target for Energy service and a Reserve Sub-Target Capacity for Reserve service
- Unconstrained clearing: Platform will order Capacity Offers from least to most expensive and select Capacity Offers until the Target Capacity is met
  - If the Reserve Sub-Target Capacity is not met, the constrained process will be used
  - Constrained clearing: Platform will select Capacity Offers (Reserve) to meet the Reserve Sub-Target Capacity first, and then seeks to meet the Capacity Target
- The Local Capacity Clearing Price and Local Reserve Clearing Price will be equal in the unconstrained clearing but may differ in the constrained clearing

Local Capacity Auction – Post Auction

- Post-auction report to be issued on October 27, 2021 and include:
  - the Local Capacity Clearing Price and if applicable, the Local Reserve Clearing Price the capacity and if applicable, the Reserve-Capable capacity cleared
  - the Local Capacity Obligation, and if applicable, Local Reserve Obligation for each successful Eligible Registrant
- A Contract will be issued for each successful Eligible DER and will specify the Local Capacity Obligation and if applicable, Local Reserve Obligation
  - Contract must be accepted and entered into by Nov. 30, 2021 via the Platform
  - Completion Security = $2/kW × Eligible Capacity will be required for Future DERs
- Upon Contract execution, the Contracted DER becomes qualified for the Local Energy Auctions and if applicable, Local Reserve Auctions

Illustration of Local Energy & Reserve Concepts



Local Energy Auction & Local Reserve Auction

- The 2021 Local Capacity Auction will secure Local Capacity for the Commitment Period defined as May 1, 2022 until October 31, 2022
  - A Contracted DER will be activated or deployed for a maximum of ten (10) events
- Availability Window is from noon to 9PM EDT on Business Days
  - An Activation Notice and/or Deployment Notice per Availability Window
- To satisfy their Local Capacity Obligation and if applicable, Local Reserve Obligation, Participants are required to participate in Local Energy Auctions and if applicable, Local Reserve Auctions during the Commitment Period by
  - submitting Bids or Offers (Energy) and Offers (Reserve), as applicable
  - submitting Outage or non-performance event information
  - responding to activations and if applicable, deployment instructions

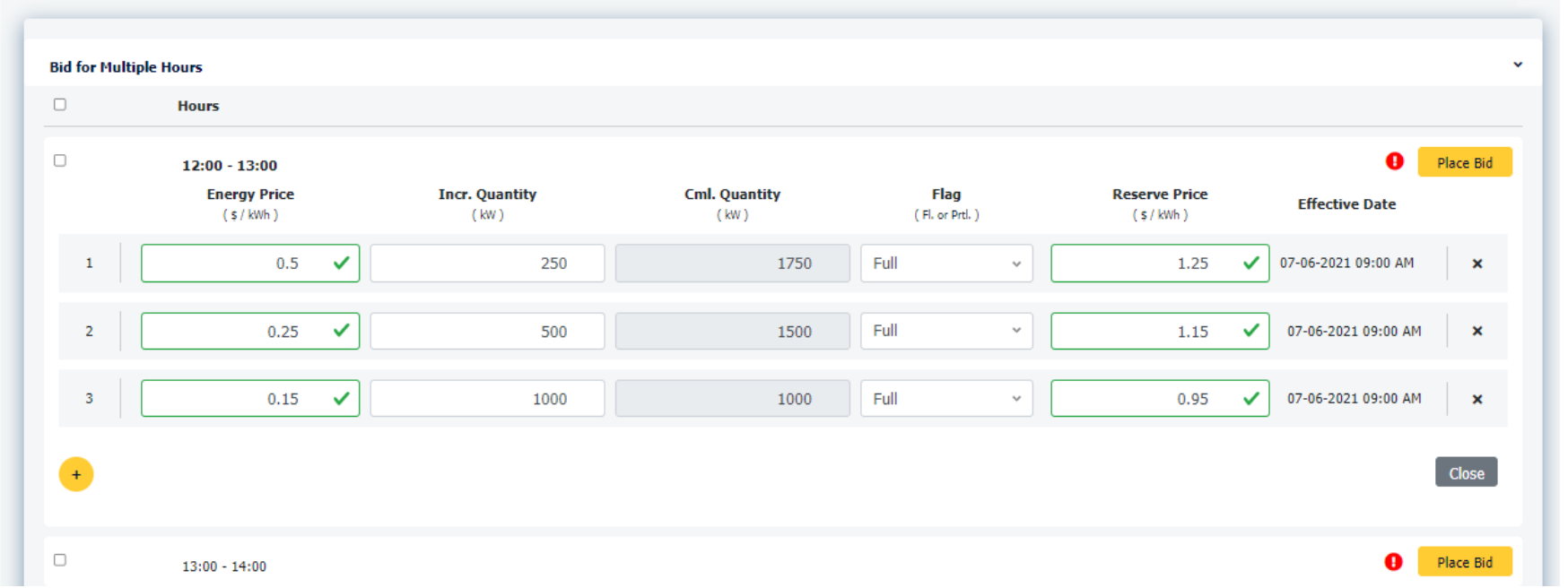
Local Energy Auction & Local Reserve Auction (cont'd)

- Local Energy Auctions and Local Reserve Auctions will run in a sequential clearing process for each hour of an Availability Window in which there is a Local Requirement
- Sequential clearing process will first run the Local Energy Auction and then run the Local Reserve Auction with remaining Offers (Reserve)
  - Activation Notices for Energy and Reserve Notices for Reserve can be issued for a minimum of one hour and up to four consecutive hours
- Deployments of Reserve will be in 5-minute Deployment Intervals, which could sum up to four consecutive hours

Bid or Offer (Energy) & Offer (Reserve) Format

- Local Capacity Obligation must be made available and Bid or Offered (Energy) into the Local Energy Auction for each hour of an Availability Window
- Local Reserve Obligation must be made available and Offered (Reserve) into the Local Reserve Auction for each hour of an Availability Window
- Bids or Offers (Energy) and Offers (Reserve) will be in the form of five (5) monotonically decreasing or increasing price-quantity pairs
  - Quantities must be submitted in minimum increments/decrements of 10 kWh
  - Price in $/kWh will be submitted in dollars and whole cents
  - For each quantity, indicate whether must be fully or may be partially cleared
  - If applicable, a price in $/kW at which the Participant will provide 1 kW of Reserve

Bid or Offer (Energy) & Offer (Reserve) Format Diagram



Local Energy Auction - Activation & DLMP

- Standby Notice is issued by 07:00 EDT on Business Days if
  - the most recent Loading Forecast shows a Local Requirement
  - the Standby Shadow Price is greater than or equal to $0.1/kWh (i.e. $100/MWh)
- An Activation Notice will be issued to the Participant no later than 2 hours in advance of the first Activation Hour
  - Bids or Offers existing in the Platform as of 09:00 EDT on that day will be used
- Bids or Offers will be accepted if:
  a) among the least-cost set needed to meet a Local Requirement
  b) ≤ the Activation Shadow Price, reflecting transmission level need
- Distribution Locational Marginal Price (DLMP) will be set at higher of highest priced Bid or Offer accepted in a) and the Activation Shadow Price in b)

Local Reserve Auction - Scheduling & Deployment

- For each Activation Hour of the Local Energy Auctions, the DSO will determine whether there is a Local Reserve Requirement
- Reserve Notices will be issued no later than two hours ahead of the first Reserve Hour (and concurrent with Activation Notices)
- Offers (Reserve) remaining following the Local Energy Auction will be included, with the highest price accepted setting the Local Reserve Price
  - If the Local Reserve Requirement cannot be met, then the process will "back out" Reserve-Capable DER from the Local Energy Auction until the requirement is met
- The DSO may issue a Deployment Notice in respect of a Reserve Hour, indicating Deployment Intervals and Quantity Deployed
  - Energy Price = higher of i) DLMP and ii) the Contracted DER's Bid or Offer (Energy)

Activations & the ICI Program

- In the Demonstration, Direct DERs and Contributor DERs that are Class A customers are permitted to also participate in the Industrial Conservation Initiative (ICI) program alongside the Demonstration
- Participants can simultaneously respond to an Activation Notice in the Demonstration that overlaps with an expected top five system coincident peaks
- However, baselines used in the Demonstration may be impacted if energy was reduced earlier in the day due to an expected system coincident peak
  - In these types of circumstances, non-performance charges will apply in the Demonstration if the Participant cannot meet its activation or deployment

Outages, Test Events, & Contributor Management

- During an Outage, Bids or Offers must be updated to reflect the actual capability of the Contracted DER and the Availability Charge will apply
  - Outage Notice for Planned Outages submitted prior to the Commitment Period
  - For Forced Outages, Outage Notice provided as soon as possible
  - Outage caused by a force majeure event does not constitute a Forced Outage
- Up to two Test Activations and two Test Deployments may be conducted
  - An Advisory Notice will be provided one day in advance of a test
  - Failing a test will result in Capacity Charge and may result in a subsequent test
- Aggregator may change Contributor DER during the Commitment Period
  - Contributor DER can be added/removed in the last 14 Business Days of the month in order to take effect on the first day of the following month

Demonstration Settlement

Monthly Payment = Availability Payments	Function of Local Capacity Obligation (kW) and Local Capacity Clearing Price ($/kW-day) as well as Local Reserve Obligation (kW) and Local Reserve Clearing Price ($/kW-day)
+ DLMP Payment	Function of Quantity Delivered/Reduced (kWh), Activation Hours, and DLMP less Hourly Ontario Energy Price (HOEP)
+ Local Reserve Payment	Function of Quantity Reserved (kW), Reserve Hours, and Local Reserve Price ($/kW)
+ Deployment Payment	Function of Quantity Delivered/Reduced (kWh), Deployment Intervals, and higher of DLMP or price Bid or Offered (Energy) less HOEP
+ Test Payments	Sum of Test Activation Payments (at $0.25/kWh) less HOEP, Test Reserve Payments (at $0.03/kW), and Test Deployment Payments (at $0.25/kWh) less HOEP
- *Non-Performance Charges*	Sum of Availability Charge, Capacity Charge, and Dispatch Charge

Non-Performance Charges

Non-Performance Charges	
=	
Availability Charge	claws back the Availability Payments for hours in the Availability Window in which Bids or Offers are not submitted for the Contracted DER, including for Contracted DER with a Local Reserve Obligation
+	
Capacity Charge	claws back the full month's Availability Payment, if a Test Activation for Energy or Test Deployment for Reserve is failed (20% dead band)
+	
Dispatch Charge	claws back the Availability Payments for hours which the Contracted DER does not deliver its Quantity Activated or Quantity Deployed (15% dead band)

Demand Response Baselining – C&I

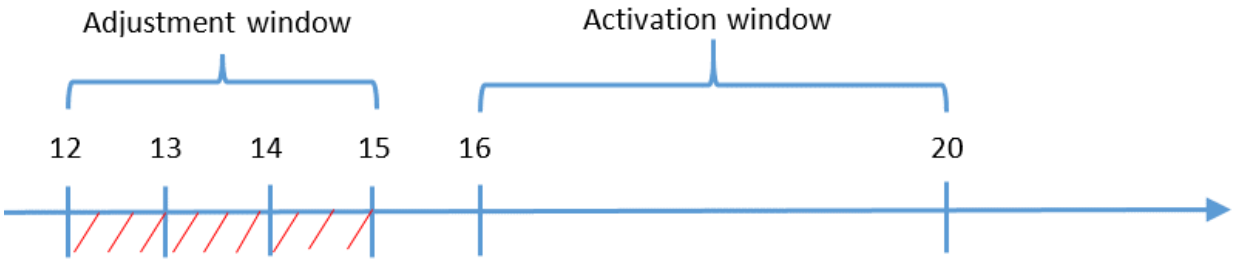
- For Aggregator DERs under the C&I customer category, the baseline for each Activation Hour will be calculated as

$$\text{Baseline}_h = \text{Standard Baseline}_h \times \text{In-Day Adjustment Factor}_h$$

- Standard Baseline: average of the highest 15 historical consumption values in a given hour "h" of the last 20 Suitable Business Days in preceding 35 days
  - Suitable Business Days are Business Days that are not Activation Days
- In-Day Adjustment Factor (IDAF) is the average consumption values in the Adjustment Window on the actual Activation Day divided by the average consumption in the Adjustment Window hours in the highest 15 of 20 Suitable Business Days
  - IDAF adjusts the baseline to reflect day-of activation consumption behaviour

Demand Response Baselining – C&I (continued)

- Adjustment Window is the 3 hours occurring 1 hour before an activation event



Demand Response Baselining – Residential

- For Aggregator DERs under the Residential Customer category, a randomized control trials (RCT) baseline methodology is used
  - Evaluates the difference between a "treatment" and "control" group
  - "Treatment" group are Contributors activated as per Activation Notice
  - "Control" group is 150-350 randomly selected Contributor DERs
- The baseline for each Activation Hour will be calculated as

$$\text{Adjusted Control Group Load}_h = \text{Total Consumption}_h \div \text{\# of Contributors in Control Group}_m \times \text{Same-Day Adjustment}$$

  - Total Consumption is the measurement data for the control group for the hour
  - Same-Day Adjustment factor is the ratio of average consumption between the two groups during the Adjustment Window on the actual activation day

Stakeholder Feedback Requested

Stakeholder feedback is being sought on the following

- With respect to your DER (note: this will not be shared publicly):
  - Is your DER a Reserve Capable DER (i.e. capable of responding to a Deployment Notice within 30 minutes)?
  - Is your DER a new DER that is not yet in operation? Will you be seeking a connection impact assessment and/or connection cost agreement?
- With respect to the Demonstration design (will be shared publicly):
  - Are any of the design parameters or requirements in the Demonstration problematic for your potential participation? Are there any elements that can be adjusted to better facilitate your participation?

Stakeholder Feedback Requested (continued)

Please use the feedback form found under the July 20 entry on the IESO York Region Non Wires Alternatives Demonstration Project webpage to provide feedback and send to engagement@ieso.ca by August 11, 2021

Next Steps

Timing	Engagement Activity
July 20, 2021	Webinar
August 11, 2021	Stakeholder feedback due
August 24, 2021	Responses to stakeholder feedback posted Final Demonstration Project Rules posted
August 25, 2021	Pre-Auction Report issued Initial Registration opens
September 15, 2021	Initial Registration closes
October 20-21, 2021	Local Capacity Auction Offer Window
October 27, 2021	Post-Auction Report issued

Thank You

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