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Hybrid Integration Project

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Agenda

- Purpose of today's session
- Context: Enabling Resources
- Opportunities for Hybrid Resources in Ontario
- Evolution of Energy Storage and Hybrid Resources at the IESO
- Hybrid Resources in Other Jurisdictions
- Hybrid Integration Plan – Timelines & Deliverables
- IESO Definition for Hybrid & Co-located Resources
- Questions to Stakeholders

Purpose of Today's Engagement Session

As part of IESO's Enabling Resources initiative, we will be sharing with stakeholders its 2021 work plan for the Hybrid Integration Project.

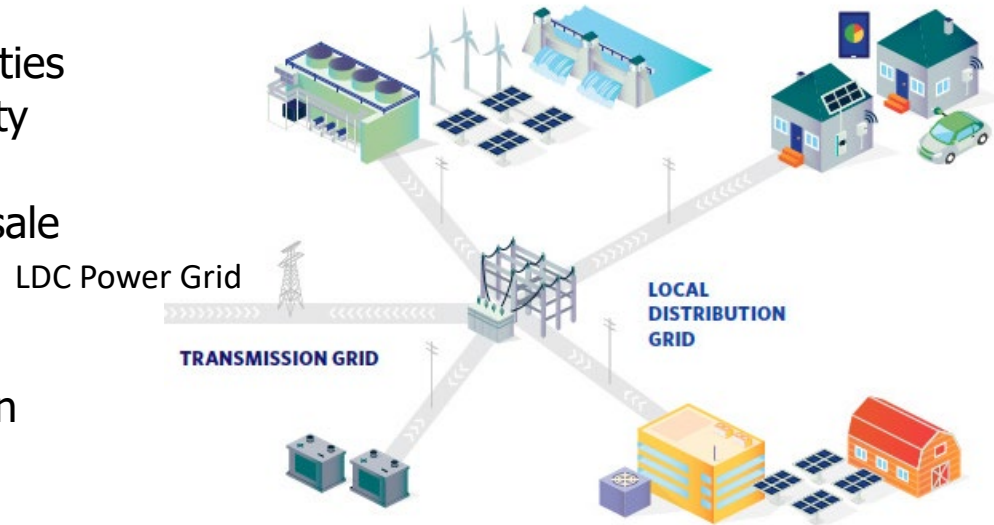
We will seek stakeholder feedback on the following:

- Does the definition of "hybrids" proposed by the IESO make sense?
- What information do stakeholders need to evaluate the potential of Hybrid Resource investments as we evolve our resource adequacy needs?
- Do the timelines and deliverables for the Hybrid Integration Project make sense?

Context: IESO's Enabling Resources Initiative

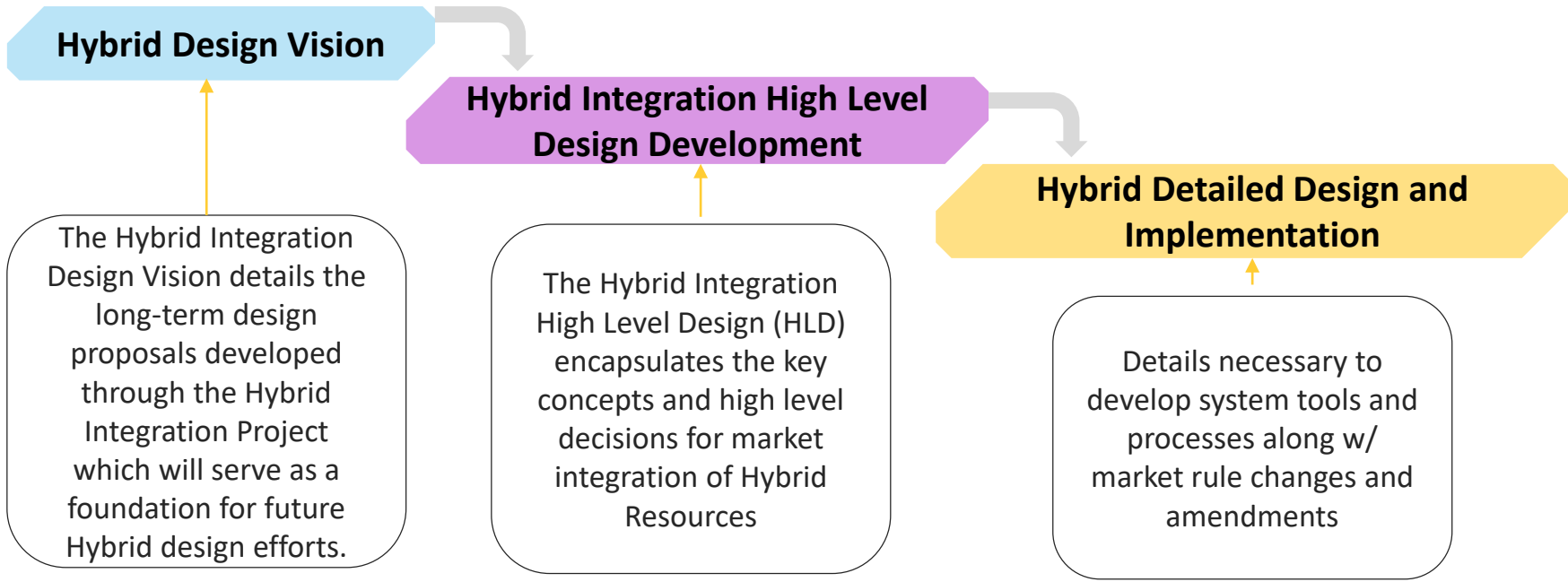
The Enabling Resources Initiative will result in an integrated plan that outlines the sequencing, timing, and scope of activities by the IESO to enable existing electricity resources to provide electricity system services in the renewed Ontario wholesale market.

This engagement will focus on market integration of hybrid storage-generation resources.



Context – Hybrid Integration – Design Work Stages

Today marks the beginning of the IESO's engagement on the Design Vision



Context: Ontario's Forecasted Electricity Supply Needs

A capacity gap emerging mid-decade will require new options

The IESO is continuing discussions with stakeholders to provide more clarity about capacity needs and how they will be met. Efforts are also underway to enable a broader range of resources to participate, which will facilitate innovation and drive down costs through increased competition.

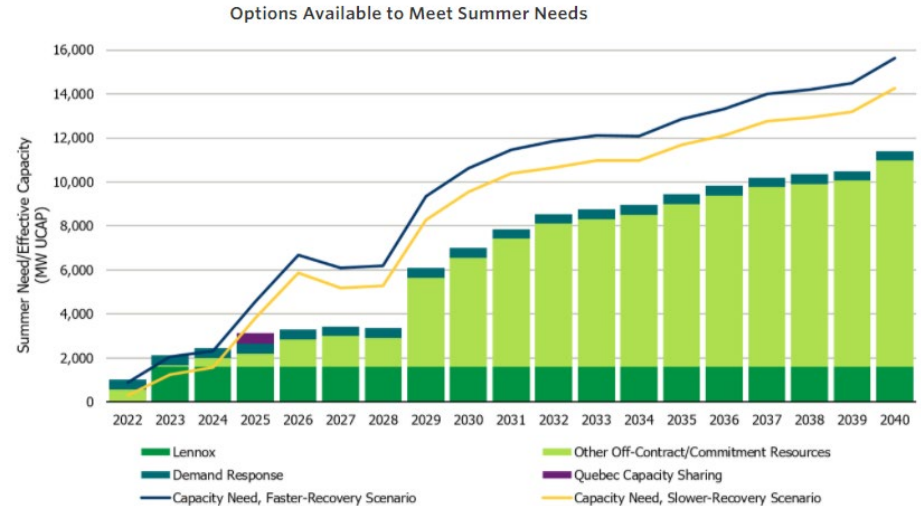


Figure 1. Options available to meet summer needs [1]

[1] Source: IESO 2020 Annual Planning Outlook

Potential opportunities for Hybrid Storage-Generation in Ontario

Wind and solar contracts set to expire in Ontario

400 MW wind coming off contract in 2026

Expiring contracts along with declining technology costs could drive development of hybrid resources in Ontario over the next decade as resource owners improve asset reliability and expand capabilities by adding energy storage.

Recent announcements about potential funding from the federal government could further drive hybrid development.

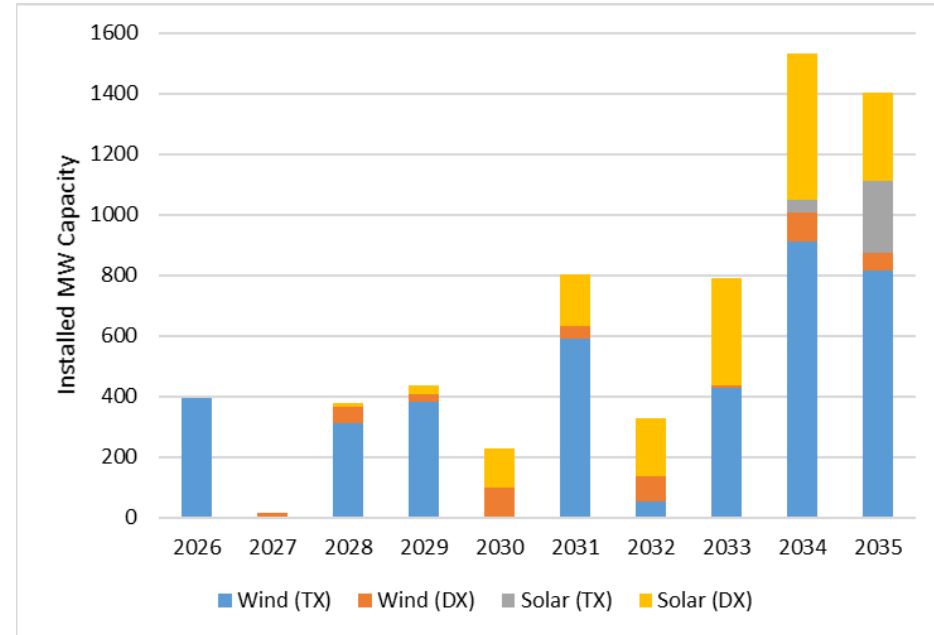


Figure 2. MW of Expiring Contracts by Year & Resource Type [2]

[2] Source: IESO 2020 Annual Planning Outlook Assumptions

Evolution of Hybrid Resource Integration at IESO

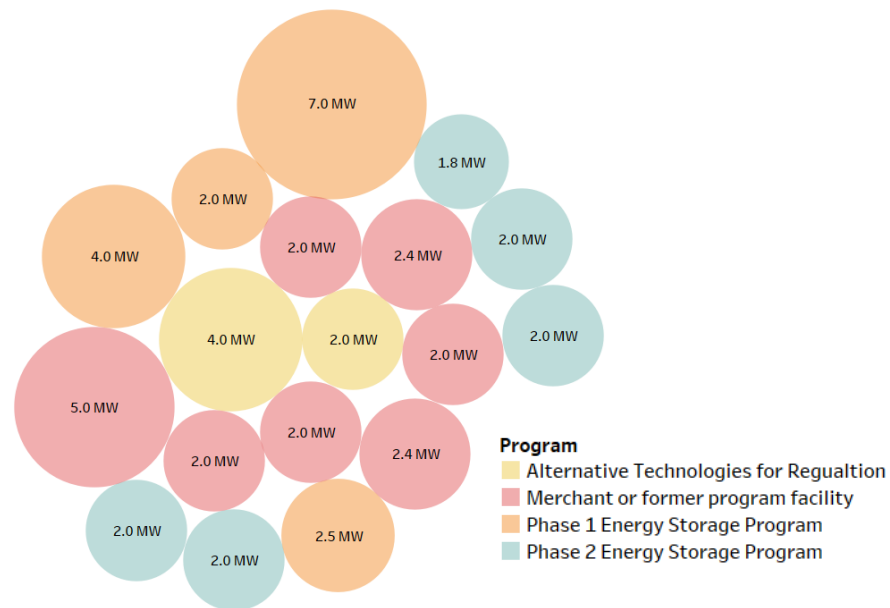
Phase 1 Energy Storage Program

- Field learnings from eight energy storage facilities registered in IESO's administered markets

Storage Design Project

- Energy storage interim framework finalized by IESO Storage Design Project and implemented by IESO in February, 2021 – **foundational work for hybrid resource integration**

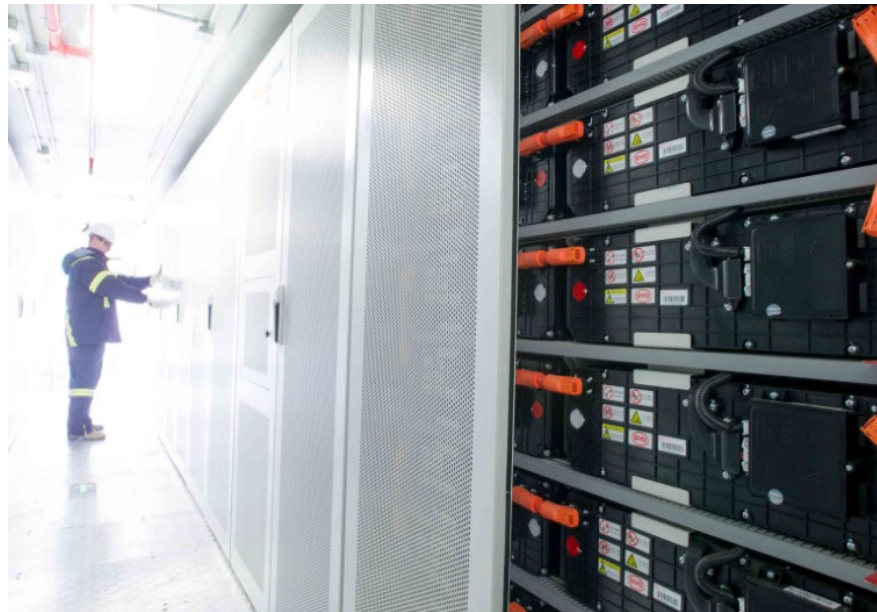
Energy Storage facilities in IESO Administered Markets
(as of March 31, 2021)



Evolution of Hybrid Resource Integration at IESO - 2

Alternative Technologies for Regulation (ATR)

- **Mission:** investigate capabilities of new technologies to provide regulation services
- Live field testing with two storage facilities providing conventional and fast regulation service – results soon to be published by IEEE
- **Groundwork for first hybrid facility proof-of-concept project**



Hybrid Research and Innovation at IESO

- **2021 Grid Innovation Fund targeted call for Enabling Resources** (Hybrid and Distributed Energy Resources)
- Proof-of-concept field research to validate technical capabilities and future design issues
- Optimization of storage and renewable capacity at facilities and system-wide levels
- Investigation of Hybrid development potential at existing Ontario generation facilities



Investments in Hybrid Resources in North America

- As of the beginning of 2020, U.S. jurisdictions have **400+ hybrid** projects installed or in their interconnection queues, driven by U.S. Investment Tax Credits (ITC) ^[1]
- These projects total **85,000 MW** of generation capacity and **11,000 MW** of storage capacity
- Renewed 2021 Government Funding for clean technologies in both Canada and US will increase existing North American capacity

[1] Integrating Hybrid Resources into Energy and Ancillary Service Markets, Electric Power Research Institute (EPRI)

Planned Hybrid Integration Work w/ Other System Operators

ISO/RTO	Forecasting	Market Mitigation/ Physical Withholding	Market Participation & Software Scheduling	Capacity Accreditation and Most Offer Obligation	Offer Parameters	Interconnection	Resource Planning	Metering and Telemetry
CAISO	✓		✓	✓	✓	✓		✓
NYISO			✓	✓			✓	✓
ERCOT	✓	✓	✓		✓	✓	✓	✓
MISO	✓		✓	✓	✓	✓	✓	✓
PJM			✓	✓			✓	✓
SPP				✓			✓	
ISO-NE			✓	✓				✓

Data source: Electricity Market Integration of Energy storage and Hybrid Storage-Plus-Renewables Technologies, EPRI

Hybrid Integration Project: Near-term Deliverables

Deliverable	Date
Stakeholder Engagement 1 : Schedule and scope of activities, draft definitions	Q2 – 2021
Hybrid Resource Participation Models	Q2 – 2021
List of Requirements and Barriers to participation of each model	Q2 – 2021
Stakeholder Engagement 2: Feedback on Participation Models, Requirements and Barriers, and framework of Hybrid Integration Vision document	Q2 – 2021
Alternatives Technologies to Regulation (ATR) – Hybrid Research field experiment	Q2 - ongoing
Draft Hybrid Integration Vision Document	Q4
Stakeholder Engagement 3: Feedback on Hybrid Integration Vision document, ATR Hybrid research work, and draft schedule for Hybrid High Level Design Development	Q4
Targeted Grid Innovation Fund call for Enabling Resources (including Hybrid Research Projects)	Q4
Finalize IESO Hybrid Integration Vision Document	Q1 - 2022

Definitions in Other Jurisdictions

NYISO:

- Co-located Storage Resource (CSR): A combination of a single intermittent renewable generation unit and a single energy storage unit co-located behind a single Point of Interconnection (PTID), that participates in the wholesale market as distinct resources. Resources co-located with load shall not qualify as a CSR.
- Hybrid Storage Resource (HSR): A combination of generation and energy storage units co-located behind a single Point of Interconnection, that participates in the wholesale market as a single resource with a single PTID. Resources co-located with load shall not qualify as a HSR.

Definitions in Other Jurisdictions – 2

CAISO:

- Co-located Resources: Multiple Resource IDs behind a single point of interconnection
- Hybrid: Single Resource IDs, with multiple mixed-fuel components behind a single point of interconnection

Other Jurisdictions

- Definitions to be developed as part of other System Operator planned Hybrid Integration work.

IESO Draft Definitions – Considerations

- Do not want to limit participation to intermittent resources only. Definitions allow for all generators regardless of fuel type
- Specific to the combination of energy storage + generator(s)
- Generator + generator combinations not considered because they can potentially be incorporated into IAMs without an integration project

IESO Draft Definitions – Co-located & Hybrid Facility

Co-located Facility

“A combined facility consisting of electricity storage and generation facilities located behind a single connection point, that participates in the IESO markets as separate resources.”

Hybrid Facility

“A combined facility consisting of electricity storage and generation facilities located behind a single connection point, that participates in the IESO markets as a single **bi-directional** resource.”

Questions for Stakeholder Participants

- Feedback on the definitions (Co-located Facility and Hybrid Facility)
- What information do stakeholders need to evaluate the potential of Hybrid Resource investments as we evolve our resource adequacy needs?
- Do the timelines and deliverables for the Hybrid Integration Project make sense?
- Are stakeholders supportive of the objectives and approach detailed in the draft Hybrid Integration Project Engagement Plan?

Submitting feedback

- Please use the feedback form found under the April 21, 2021 entry on the [Hybrid Integration Project webpage](#)
- Send written feedback to engagement@ieso.ca by May 12, 2021

Next Steps

- Collect stakeholder feedback (deadline May 12th)
- Topics for next engagement session in June:
 - Proposed participation models
 - List of barriers for participation

Thank You

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