



OCTOBER 15, 2026

Enabling Resources Program (ERP)

Distributed Energy Resources (DER) Integration Project

Market Integration

Independent Electricity System Operator

Disclaimer

This presentation and the information contained herein is provided for informational purposes only.

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Territory Acknowledgement

The IESO acknowledges the land we are delivering today's webinar from is the traditional territory of many nations including the Mississaugas of the Credit, the Anishnawbe, the Chippewa, the Haudenosaunee and the Wendat peoples and is now home to many diverse First Nations, Inuit and Métis peoples. We also acknowledge that Toronto is covered by Treaty 13 with the Mississaugas of the Credit First Nation.

As we have attendees from across Ontario, the IESO would also like to acknowledge all of the traditional territories across the province, which includes those of the Algonquin, Anishnawbe, Cree, Oji-Cree, Huron-Wendat, Haudenosaunee and in addition to the Métis and Inuit peoples.

Engagement Principles

This engagement is conducted in accordance with the IESO's [External Engagement Framework](#), which includes the following principles:

- **Purposeful** – Initiate meaningful conversations that move the sector forward
- **Inclusive** – Invite many voices and diverse perspectives to the table
- **Timely** – Seek input and insight when it can have the most impact
- **Accessible** – Ensure we meet people where they are on their energy journey
- **Traceable** – Allow everyone to follow the path that is being taken
- **Transparent** – Show how engagement helped shape the final outcome

Shared Commitment to Respectful Participation

To support a focused and constructive discussion:

- We will take questions one at a time; please use the raise-hand feature to enter the speaking queue
- We encourage concise and focused comments to allow time for multiple perspectives
- Participants are encouraged to raise relevant points during the discussion and provide more detailed feedback through the written submission process
- We ask that all participants maintain a respectful and professional tone throughout the session
- Facilitators will guide the discussion and manage participation to stay aligned with today's focus and agenda
- Where necessary, we may disable a participant's microphone to manage participation

Purpose and Agenda

Purpose: To provide the sector with an update on the IESO's ERP DER Integration Project's Market Integration design, and next steps

Agenda:

- ERP DER Integration Project Overview (Recap)
- Market Integration
 - Front-of-the-Meter DER/A Participation Model
 - Front-of-the-Meter DERA Wholesale Market Settlement
 - Front-of-the-Meter DER/A Wholesale Metering
- Next Steps

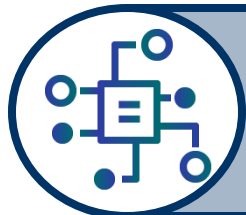


ERP DER Integration Project Overview (Recap)

Drivers for ERP DER Integration Project (Recap)



Support provincial resource adequacy needs, while enabling DERs for distribution-level use



Maintain reliability as expanded DER deployment creates transmission and distribution reliability impacts



Move at the pace of change with flexible, accessible solutions for all LDCs while the regulatory framework evolves

ERP DER Integration Project (Recap)

What

- Implement a pathway for DER aggregations (DERA) to **access the wholesale markets**
- Advance **transmission-distribution (Tx-Dx) coordination**, to support DER participation at both Tx and Dx levels
- Enhance **DER data sharing** between the IESO, LDCs and DER operators.

How

- Update IESO tools, systems, processes IESO Market Rules and Manuals
- Develop a DER data sharing transition plan in consultation with the OEB, LDCs, and DER providers
- Implement mechanisms to:
 - Share information with LDCs, e.g. DR program activation
 - Seek information from LDCs, where system reliability may be impacted

Establishing a foundation for DERA participation in the IESO-Administered Markets (IAM) is a necessary first step to prepare the grid to support future DER growth

DER Integration Project Will **Not** (Recap)

- ✗ Control distribution system assets – *the IESO will continue to dispatch wholesale market resources and activate IESO-procured (e.g. LT1, eDSM, etc.) resources*
- ✗ Control distribution system operations
- ✗ Seek LDC information that is not material to the IESO and does not impact bulk system reliability
- ✗ Seek visibility deep into the distribution system
- ✗ Procure DERs
- ✗ Seek for the IESO to become a Distribution System Operator

DER Integration Project Outcomes (Recap)

Wholesale Market Access for DERs

- Enables IESO procurement of DERs
- Enables wholesale revenue opportunities for dispatchable DERs
- Enables DERs to **simultaneously participate** in IESO markets & LDC programs

Market Operational Coordination (Tx-Dx)

- Strengthen how LDCs and IESO coordinate in the **operational timeframe** for dispatchable DERs that participate in the IAM
- E.g. IESO-contracted BESS facilities
- Supports bulk and local system reliability

IESO-LDC Operational Visibility

- IESO to provide visibility into bulk-system activations e.g. Peak Perks, Peak Performance, Capacity Auction
- LDCs to provide visibility into Dx-level activations
- Provides **situational awareness** for both parties

DER Integration Project Approach (Recap)

ERP is taking incremental steps focused on DER market and operational enablement outcomes within a 5 - 10 year horizon.

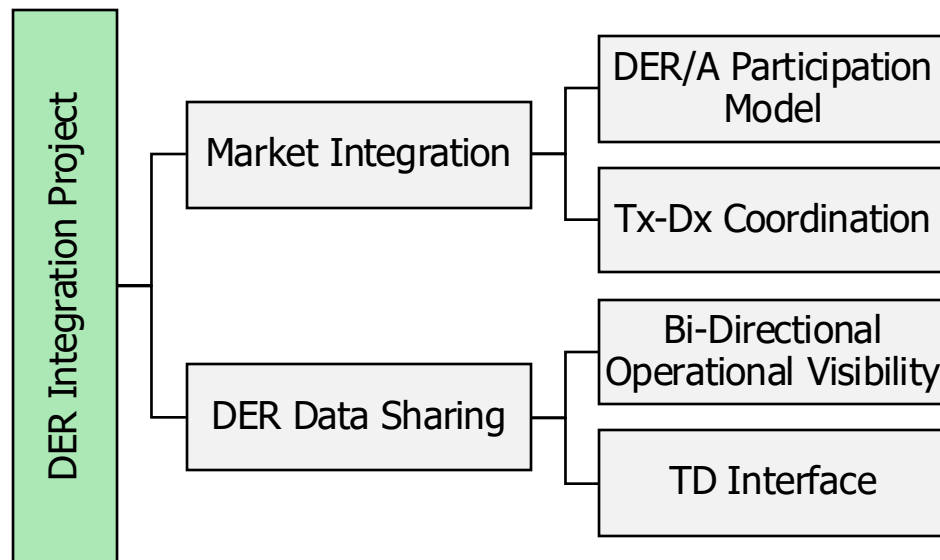
Design Stream	Outcome	Approach
Market Integration	Wholesale market access for DERs	Evolve the IESO's bulk system modeling of Dx-connected resources* Integrate DER/As into the existing wholesale market framework
	Tx-Dx market operational coordination	Develop foundational coordination protocols with LDCs: (1) hosting DERs participating in the wholesale markets, and/or (2) with local non-wires solution (NWS) deployments
Data Sharing	IESO-LDC Operational Visibility	Implement mechanisms for the IESO and LDCs to exchange relevant static and dynamic operational information for DERs regardless of wholesale market participation

Incremental steps include leveraging existing IESO solutions to exchange data to support and settle DERs providing stacked services

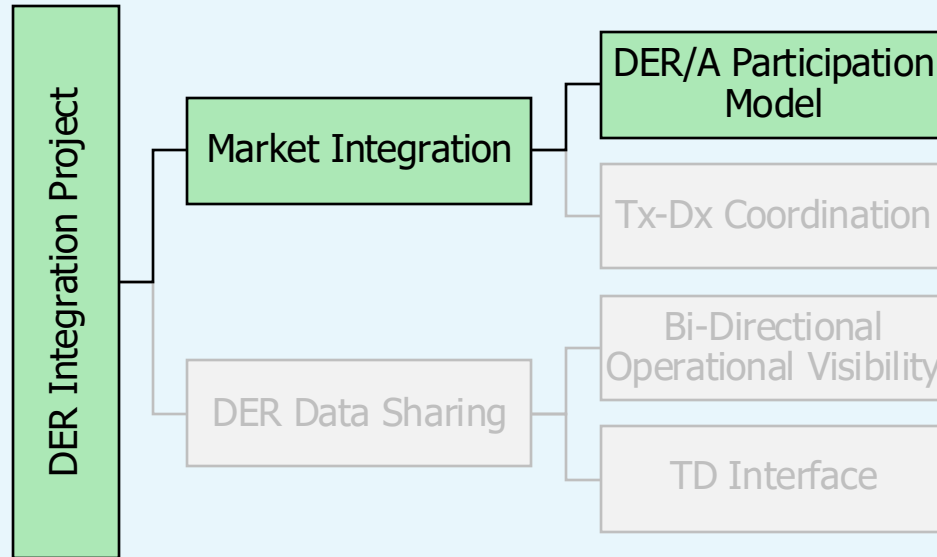
DER Integration Project Design Streams (Recap)

ERP will maintain system reliability in the near-term and prepare for future DER integration at scale.

- 1. Market Integration:** Enable DER/As with dispatchable capabilities to participate in the wholesale electricity markets
- 2. DER Data Sharing:** Advance near-term data sharing & situational awareness of DER activity



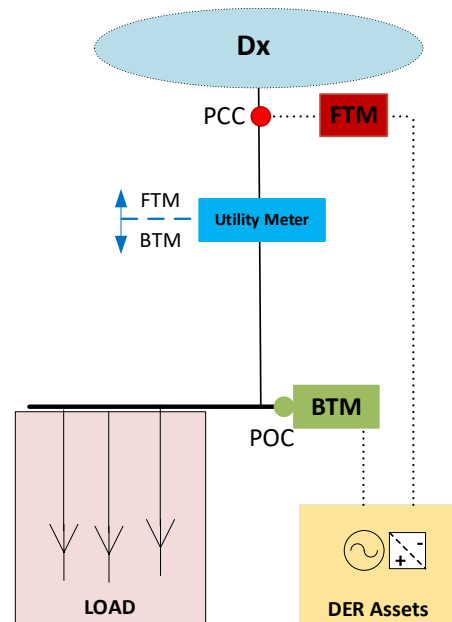
Market Integration: Front-of-the-Meter (FTM) DER/A Participation Model Overview



FTM vs BTM DER

BTM DERs operate behind the customer's meter to serve onsite energy needs, while FTM DERs connect directly to the utility grid and participate in electricity markets and grid services.

Behind-the-Meter (BTM) DER	Front-of-the-Meter (FTM) DER
Connected behind the customer's utility meter at the Point of Connection (POC).	Connected on the utility side of the customer's utility meter at the Point of Common Coupling (PCC)
Located within the customer's facility.	Connected directly to the distribution system (Dx).
Primary purpose is to reduce grid consumption, manage demand charges, improve resilience, and export excess energy when permitted.	Primary purpose is to sell electricity, provide capacity and ancillary services, and support grid needs.
Customer-focused operation and benefits.	Grid and market-focused operation and benefits.
Energy is primarily used onsite before any export.	Energy is primarily supplied to the electricity system.



FTM DER/A Market Participation Model Overview

ERP will enable FTM DERs to access the wholesale energy and/or operating reserve (OR) markets:

- Directly as **standalone resources** which will **continue** to participate based on their individual technology/resource-type (no change from today), or
- Through an aggregator as **contributors** to eligible **DER Aggregations** which will be operated as quick-start, 5-minute dispatchable resources (new ERP feature)

DERAs participating in the IESO-Administered Markets (IAM) must be:

- Between 1 MW and 20 MW in size,
- Formed within an allowable aggregation boundary, and
- Composed of DER contributors capable of connecting front-of-the-meter (directly injecting energy into the distribution system)

ERP is developing separate participation models for front-of-meter (FTM) and behind-the-meter (BTM) DER/A.
This presentation focuses on FTM; a future engagement will present BTM.

Minimum Size Requirement for FTM Market DER/As

Decision:

The IESO's 1 MW minimum size requirement will be maintained for standalone DERs and DERAs participating in the IESO-Administered Markets.

Rationale:

- Programmatic opportunities for smaller DERs (<1MW) already exist (Peak Perks, Performance) and are expected to increase in the near-term (5-10 years)
- ERP enablement of smaller DERs through aggregations (i.e., DERAs)
- Incremental approach building on existing IESO tools and processes minimizes complexity and operational risks

Aggregation Boundaries for FTM Market DERAs

Decision: A DERA participating in the IAM may only include contributors connected to the IESO-Controlled Grid (ICG) through a common Transmission-Distribution Interface (TDI)

- By default, each load serving station* on the ICG is a TDI
- ERP is developing a framework to formally establish, maintain, and periodically (e.g. annually) re-assess TDIs between the IESO and LDCs based on criteria to maintain both transmission and distribution system reliability
- Groups of load serving stations (e.g. along the same transmission corridor) may be assigned to a TDI where a mutual opportunity or operational need is identified between the IESO and an LDC

Rationale:

- A TDI is common reference point for the IESO and host LDC to coordinate operation of DERAs in the IAM
- The TDI Framework provides a scalable mechanism to expand geographic aggregation boundaries for DERAs while maintaining transparent wholesale market signals and ensuring their activity on the ICG respect the unique needs of host LDCs and their local systems and customers

Design of the **TDI Framework** will be shared with stakeholders through ERP's **DER Data Sharing design stream**; the next public engagement will be held on **Friday, October 16.**

DER Contributor Requirements for FTM Market DERAs

To accurately settle a DERA and maintain transparent and efficient wholesale market outcomes, all DER contributors within a DERA must be:

- Connected to the ICG through a common Transmission-Distribution Interface (TDI) and served by the same LDC,
- A generation or storage technology capable of injecting energy, and
- Connected front-of-the-meter (FTM) to an IESO-approved wholesale metering installation* when actively operating as part of the DERA to provide bulk services in the IAM

Market Participant Requirements for FTM DERAs

In the IAM, a DERA is a technology-agnostic market resource and its **aggregator is the market participant** registered with the IESO:

- 1) The IESO will schedule, dispatch, and monitor the DERA.
 - The aggregator has the flexibility to utilize the DER contributors to its DERA in any combination to comply with dispatch and meet obligations.
- 2) A DERA's operational capabilities and its availability to the wholesale markets is its dispatch data and outage submissions
 - It is the aggregator's responsibility to ensure any energy and/or operating reserve offered into the IAM can be delivered when called upon by the IESO
- 3) A DERA whose services have been reserved by the LDC must be communicated by the aggregator to the IESO through the DERA's dispatch data submission
 - This ensures IAM schedules respect distribution-level needs and dispatch signals are consistent with local control signals

The IESO will settle the DERA with the aggregator based on the bulk services it provides through its contributors.

Example: DERA Market Participation

Example: Consider a **5 MW dispatchable DERA** with two DER contributors: a **3 MW BESS contributor** and a **2 MW BESS contributor**.

	Scenario	Price 1	Quantity 1	Price 2	Quantity 2	Price 3	Quantity 3
1)	LDC reserves DERA for 2 MW; 3 MW remains available for bulk services	-\$2000/MWh	2 MW	\$15/MWh	3 MW	\$20/MWh	5 MW
2)	DERA is fully available for bulk services	\$10/MWh	2 MW	\$15/MWh	3 MW	\$20/MWh	5 MW

Locational Marginal Price (LMP)	Scenario 1 Economic Dispatch	Scenario 2 Economic Dispatch
\$25/MWh	5 MW	5 MW
\$17/MWh	3 MW	3 MW
\$12/MWh	2 MW	2 MW
\$0/MWh	2 MW	0 MW

This is an illustrative example of a DERA providing services simultaneously to the LDC and IESO. **A future engagement will explore value stacking in further depth**, including prioritization, metering and settlement.

Example: DERA Market Participation (cont'd)

Assuming the **5 MW dispatchable DERA market resource** receives a **2 MW dispatch**, the aggregator can leverage the full capabilities of its DER contributors to comply with dispatch.

3 MW BESS Output	2 MW BESS Output	DERA Output
0 MW	2 MW	2 MW
1 MW	1 MW	2 MW
2 MW	0 MW	2 MW
3 MW	-1 MW (charging)	2 MW



Market Integration: FTM DERA Wholesale Market Settlements

Wholesale Market Settlements Principles

- Settlement of market resources must align with how they participate in the IAM - auditable, transparent and accurate
- Financial transactions on statements should reflect verifiable physical delivery of energy which can be mapped to the issued dispatch instruction that tie back to the submitted offer
- The IESO does not intend to model a DERA's contributors or control how individual contributors respond to meet the DERA dispatch – therefore we intend to settle the aggregate's performance against its dispatch

Wholesale Market Settlements – FTM DERA

- IESO intends to settle these market resources by adapting the single model storage resource (SMSR) settlement design (single delivery point / continuous offer curve)
- The IESO shall settle with the market participant aggregator, and the aggregator shall be responsible for settling with its contributor DERs

Wholesale Market Settlements – FTM DERA

- A DERA will offer into the Energy and Operating Reserve (OR) day ahead markets (DAM) and receive a financially binding schedule and locational marginal pricing (LMP) based on submitted data
- Where a DERA is unable to follow its DAM schedule, it should be reflected in its RT offers and must buy/sell back at RT prices – balancing charges will apply
- When a DERA's energy measurement reflects that the OR schedule could not have been delivered, OR Accessibility claw-back charges will apply
- Startup and speed no load (SNL) costs for DERAs will not be modelled and will be set as zero

These activities and requirements are consistent with other resources participating in the IAMs

Wholesale Market Settlements – Settlement Timelines

- FTM DER/As will receive their statements and invoices based on the current market settlement rules and calendar applicable to energy market resources
- 10BD for preliminary settlement statement; 20BD for final settlement statement; 10BD after month end for invoice; 2BD after invoice to complete payments to IESO; 4BD after invoice when receiving payments from the IESO
- Submit Notice of Disagreement as per applicable market rules where there is a disagreement with the settlement statements
- Recalculated Settlement Statements may be issued as per the settlements calendar published on our website



Market Integration: Front-of-the-Meter (FTM) DER/A Wholesale Metering

Objective and Expectations

Objective

Enable broader FTM DER participation through streamlined wholesale metering requirements while preserving metering data integrity and market confidence

Expectations

Seek stakeholder feedback to identify opportunities to reduce barriers and support the integration of FTM DERs in achieving project objectives.

Metering Data Integrity

Why it is Important

- In a wholesale market, even a small metering error can result in:
 - Incorrect market settlements
 - Revenue losses or overpayments
 - Regulatory non-compliance
 - Disputes between market participants

Metering Data Integrity (Cont'd)

Key Components of Wholesale Metering Data Integrity

Metering Data Component	Purpose
Accuracy	Ensure measurements reflect actual energy flows
Completeness	Capture and retain all required meter data
Consistency	Maintain alignment across systems and data sources
Validation & Verification	Detect, investigate, and resolve data anomalies
Security	Protect data from unauthorized access or modification
Auditability & Traceability	Enable full transparency and verification of data changes

Wholesale Metering Framework Requirements

Requirements	Objective
Measurement Canada Compliance	Ensure wholesale meters remain revenue-grade and comply with type approval, verification, sealing, and maintenance requirements.
Financial Neutrality	Accurately allocate energy, charges, and payments while avoiding unintended financial impacts to market participants.
Physical-to-Settlement Traceability	Maintain a clear link between settlement outcomes and authoritative sources such as metering data, dispatch instructions, schedules, prices, and outages.
Approved Metering Boundaries	Preserve authoritative registration points and metering hierarchies to support energy accounting, loss allocation, and market integrity.
Settlement Time Alignment	Ensure metering, scheduling, dispatch, and settlement processes remain time-aligned to prevent pricing and settlement discrepancies.
Equitable Participant Treatment	Apply consistent requirements to participants operating under similar conditions, with exceptions governed by approved market rules.

The existing wholesale metering framework requirements will remain.

Scope – FTM DER/A Metering

- All FTM DER/As are an integral part of the *IESO control area*, i.e., they participate in the wholesale market and are scheduled and settled by the IESO, regardless of whether they provide services to the bulk power system or the distribution system
- Only generation-based FTM DERs are within scope, including solar PV, wind generation, gas generators, and battery energy storage systems (BESS). Demand response or flexible load and Behind-the-Meter (BTM) DER/As are excluded from this scope for this engagement discussion.

Existing Wholesale Metering Framework

- Market settlement by the IESO requires the use of wholesale metering installations to measure injections and withdrawals for every 5-minute interval, 24/7.
- Metering data is collected directly by the IESO (unlike other ISOs) upon completion of the operating day to begin the process of preparing settlement data, which is followed by execution of the IESO's settlement process.

Existing Wholesale Metering Framework (Cont'd)

- From today's metering perspective, a DER that is directly connected into the distribution system, also referred as a FTM DER, is equivalent to an *embedded generator* as currently defined in the *market rules*
- While FTM DER/As may provide stacked services to both the bulk and distribution systems, the wholesale meters cannot identify or separate between services. As such when deemed to have market participation, those resources will remain within the *IESO control area* under the current project scope

FTM DERA Measurement Framework - Current

- A FTM DER represents a physical facility with a measurable connection point
- Today, all FTM DERs are directly measured using a registered wholesale meter (RWM); no baseline calculations are used
- DERA represents a virtual aggregation model of multiple FTM DER facilities
- DERA settlement values must be established using:
 - Compliant FTM DER-level metering
 - Approved aggregation methodologies established by IESO
 - Consistent calculation and validation processes

FTM DER/A Measurement Framework – DER vs DERA

Step	Physical DER	DER Aggregate
Process Flow	Meter → Validate → Allocate → Settle	Multiple Meters → Validate → Aggregate → Allocate → Settle
Metering Configuration	Revenue Wholesale Meter (RWM) installed at the FTM DER Point of Coupling (PCC)	RWM installed at each participating FTM DER PCC
Data Collection	Retrieve meter data from a single RWM	Retrieve meter data from all participating RWMs
Validation	Perform VEE (Validation, Estimation & Editing)	Perform VEE (Validation, Estimation & Editing)
Aggregation	Not required	Aggregate metering quantities across participating DERs
Loss Adjustments	Apply required loss adjustments	Apply required loss adjustments
Settlement Quantity Creation	Create settlement-ready quantities	Create settlement-ready quantities
Allocation Targets	• DER/A Energy DP • Host LDC Energy DP • Transmission DP (if applicable)	• DERA Energy DP • Host LDC Energy DP • Transmission DP (for applicable FTM DERs)
Settlement	Settlement-ready data sent to IESO settlement system for charge calculation by delivery point	Settlement-ready data sent to IESO settlement system for charge calculation by delivery point
Key Difference	Settlement based on a single DER meter	Settlement based on aggregated quantities from multiple DER meters

Demonstrates process flow and requirements of a DER versus a DERA.

DER/A Wholesale Metering Proposal

- Utilize the existing wholesale metering *market rules* and requirements applicable to *embedded generators* for FTM DER/As that wish to receive energy payments from the market.
- Market Rules, Chapter 6, Section 4.6 also provides additional metering flexibility for *embedded generators* with a capacity below 2 MVA (e.g. only alternate meter).



Next Steps

Feedback and Next Steps

To provide feedback on today's session, please use the feedback form on the [ERP DER Project engagement webpage](#) and submit to IESO Engagement at engagement@ieso.ca by **October 30, 2026**.

Next Steps:

October 16 – 30, 2026	Feedback timeline for stakeholders Once received, IESO will respond to the feedback in writing, and will include the feedback into the design or conduct 1:1 sessions with the specific stakeholder for clarification
December 14-16, 2026	Design Stream: Market Integration - Review of the following design modules: - Connection & Registration; Grid & Market Operations; Metering & Settlements

Thank You

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