# OEB DSO Consultation

June 23, 2025

Ontario Energy Association

# About the OEA

- The OEA represents a broad spectrum of Ontario's energy industry
  - It's largest LDCs
  - Largest natural gas distributor
  - Power producers of various types and capacity providers
  - Demand response, energy efficiency and innovators
- The OEA has dedicated significant resources and time to DSO discussion and education over the past three years

# Context

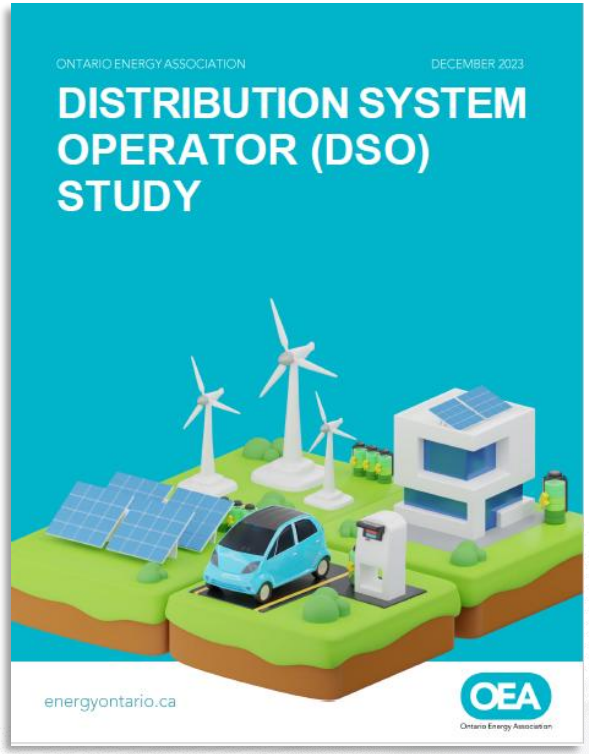
- Ontario's energy demands expanding rapidly
- Abundant adoption of new technology enabling more and varying opportunities to meet expanding needs
- Major focus to date has been on top-down bulk system expansion to meet these needs
  - Little attention paid to:
    - The need to expand distribution system concurrently
    - The potential of the distribution system, via DERs, to cost-effectively reduce the burden of bulk system expansion
    - The potential to provide customers with options to contribute to system needs and opportunities to offset energy costs
- Jurisdictions and utilities around the world are expanding DSO capabilities to help meet system needs

# OEB Provided Background for Consultation

- DNV Consultants Report
  - Jurisdictional review: Germany; Netherlands; Norway/Sweden; UK; U.S. (California, Massachusetts; NY)
  - Qualitative analysis of archetypical models
- Recent OEB Initiatives
  - Framework for Energy Innovation
  - Non-Wires Solutions Guidelines
  - Benefit-Cost Analysis Framework for Addressing System Needs
  - DER Connections Review
  - Joint IESO-OEB targeted call pilot projects
- IESO 2022 DER Potential Study
- IESO Transmission-Distribution Working Group

# OEA DSO Study

- Compared and contrasted the Market-Facilitator (M-F) DSO model (called Total DSO in that report)[1] with the Dual Participation model
- Jurisdictional Scan: UK; Germany; Australia
  - Model overview
  - Review of available quantitative analysis
  - Contrast differences between approaches
  - Revenue models
- Quantitative assessment of potential benefits for Ontario
- Finding: DSO's provide customer benefits
  - Larger customer benefits identified for M-F model




[1]After release of this report in December 2023, the IESO TDWG developed refined definitions. Where "Total DSO" was used in the OEA report, it is equivalent to the "Market Facilitator" definition now being used through the TDWG.

# Summary of Qualitative Differences: M-F DSO vs. Dual Participation

| Benefit/Shortcoming | Total DSO | Dual Participation |
|---|---|---|
| DER penetration | 🟢 | 🟡 |
| Customer interests/demand | 🟢 | 🟡 |
| Optimal operation of the distribution grid | 🟢 | 🟡 |
| Improved price signals | 🟢 | 🟡 |
| Improved resource/investment decisions | 🟢 | 🟡 |
| Affordability | 🟢 | 🔴 |
| Clear accountability/simplicity | 🟢 | 🔴 |
| Regulatory changes/influence | 🟡 | 🟡 |
| Market fairness & transparency | 🟡 | 🟡 |
| Expansion of the market to a third Party | 🟢 | 🔴 |

# Summary of UK DSO-enabled Model

## Quick Stats

**Model:** Total DSO

**Number of DSOs:** 1410

**Maturity of model:** >4 years

**Number of customers:** 28 million

**Total load:** 76.7 gigawatts (GW)

## Revenue Model

- Under RIIO-ED2, price cap has been set from April 1, 2023, to March 31, 2028.
- Built upon the existing DNO Performance Based Regulation, revenues set based on Total Expenditures (TOTEX).
- Added new DSO incentives to stimulate flexibility opportunities.
- ROE is capped, any overperformance or underperformance there is a built-in Return Adjustment Mechanism (RAM).

## Key Utility Case Studies

- National Grid (Western Power Distribution)
- Scottish & Southern Electricity Network
- UK Power Networks

# Summary of Germany DSO-enabled model

| Quick Stats | Revenue Model | Key Utility Case Studies |
|---|---|---|
| **Model:** Total DSO<br>**Number of DSOs:** 883<br>**Maturity of model:** >20 years<br>**Number of customers:** over 50 million<br>**Total load:** 218 GW of installed capacity (2020) | • To prevent network operators from setting excessively high network tariffs and earning monopoly rents, an annual revenue cap is assigned to each operator based on the previous year's costs and efficiency.<br>• Distributed generation assets are guaranteed a FiT for 20 years, a connection obligation, and preferred feed-in. | • E.ON<br>• Innogy<br>• EnBW |

# Summary of Australia DSO-enabled model

| Quick Stats | Revenue Model | Key Utility Case Studies |
|---|---|---|
| **Model:** Hybrid model<br>**# Of DSOs:** >10<br>**Maturity of model:** 4 Years<br>**Number of customers:** 16 million<br>**Total load:** 55 GW41 | • Cost recovery through regulated asset base.<br>• Entitled to a fair rate of return determined by the regulator.<br>• Receive operating expenses coverage. | • Ausgrid<br>• AusNet<br>• Mondo |

# Normalized DSO Benefits by Jurisdiction

| | United Kingdom | Germany | Australia |
|---|---|---|---|
| **Model** | Total DSO | Total DSO | Hybrid DSO |
| **Estimated nominal benefits ($CAD billion)** | $150 to $260 | NA | NA |
| **Estimated net benefits (NPV8% $CAD billion) [A]** | $10 to $18 Forecast period - 10 years | $182 Forecast period - 20 years | -$522M to $2.6 Forecast period - 20 years |
| **Number of customers (millions) [B]** | 12 (Only considering SSEN and UKP) | > 50 | 16 |
| **Normalized net benefit ($/customer - annualized)** | $847 to $1,475 | $182 | -$1.7 to $8 |

# Quantitative Analysis Inputs

## Summary of Costs Considered

- **DSO incremental labour cost.** The analysis assumes that each DSO will require incremental labour to develop, deploy, and manage the DSO capabilities. The analysis assumes a ramp up of employees and then eventually a reduction in employees once in sustainment.
- **DSO Technology Costs** assumed for the analysis is related to communication and control of DER. However, the selected technologies are not exhaustive.
- **DER Communication cost** relates to costs required to enable bi-directional flow and allow the DSO and IESO dispatch capabilities. The selected technologies are not exhaustive.
- **DSO-as-a-service** it is assumed that not all LDCs in Ontario will have the capacity or capability to invest and implement DSO. The analysis assumes 6 DSOs will provide DSO services and costs will be recovered under a cost-of-service model.

## Summary of Benefits Considered

- **Avoided distribution infrastructure**. The analysis assessed the potential for avoided incremental distribution infrastructure investment. The cost assumptions were based on the system renewal and system service costs of the LDCs participating in the working group.
- **Avoided transmission infrastructure**. The analysis assessed the potential for avoided incremental transmission infrastructure investment. The cost assumptions were based on the system service costs of the transmitter.
- **Avoided wholesale electricity purchases.** The analysis assumed wholesale electricity will be reduced or avoided due to the DER penetration.
- **Avoided transmission line loss.** Analysis assumes with the reduction of wholesale energy purchases, There will be a reduction in potential energy loss as its transmitted through the transmission system.
- **Avoided development of bulk grid generation assets.** Assumes with the deployment of DERs to meet incremental peak demand growth, there will be less requirement to develop bulk system generation assets for resource adequacy.

# Summary of DSO costs and benefits NPV @ 8% for 20-year forecast

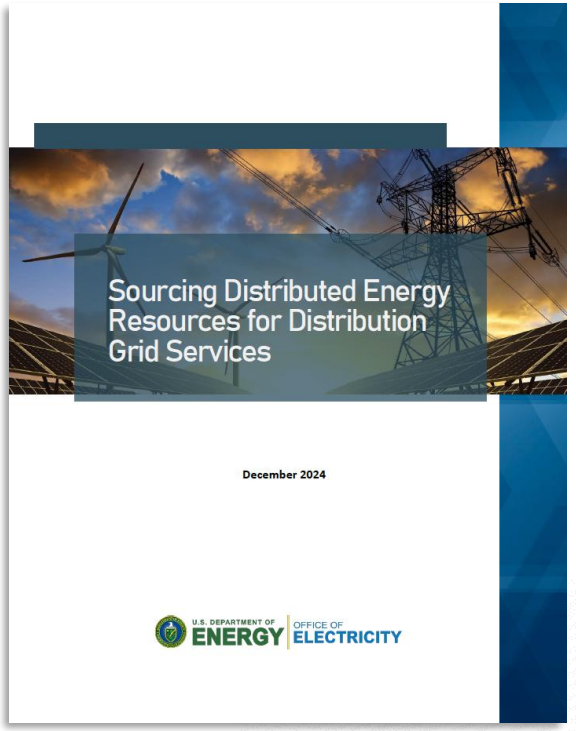
| | M-F DSO model | | Dual Participation model | |
|---|---|---|---|---|
| | *Low Case (NPV @8%) $ Bn* | *High Case (NPV @8%) $ Bn* | *Low Case (NPV @8%) $ Bn* | *High Case (NPV @8%) $ Bn* |
| **NPV @8% costs** | | | | |
| DSO FTE costs | $(0.7) | $(0.7) | $(0.7) | $(0.7) |
| DSO technology costs | (0.5) | (0.9) | (0.5) | (0.8) |
| DSO DER communication costs | (0.1) | (0.4) | (0.5) | (0.7) |
| DSO as-a-service | (0.3) | (0.5) | (0.4) | (0.6) |
| Total NPV of costs | $(1.6) | $(2.5) | $(2.1) | $(2.8) |
| | | | | |
| **NPV @8% benefits** | | | | |
| Avoided distribution infrastructure | $2.3 | $6.6 | $0.8 | $2.3 |
| Avoided transmission infrastructure | 0.4 | 0.9 | 0.2 | 0.3 |
| Avoided bulk generation deployment | 1.0 | 1.4 | 0.4 | 0.6 |
| Avoided wholesale energy price | 2.6 | 4.5 | 1.0 | 1.6 |
| Avoided transmission line loss | 0.5 | 1.0 | 0.3 | 0.6 |
| Total NPV of benefits | $6.8 | $14.4 | $2.7 | $5.4 |
| **NPV net benefit (cost)** | **$5.2** | **$11.9** | **$0.6** | **$2.6** |
| | *$/customer* | *$/customer* | *$/customer* | *$/customer* |
| NPV net benefit (cost) per cust. – 20 yrs. | **$969** | **$2,217** | **$112** | **$484** |
| NPV net benefit (cost) per cust. – annual | **$48** | **$111** | **$6** | **$24** |

# Summary costs and benefits NPV @ 8% for 20-year forecast

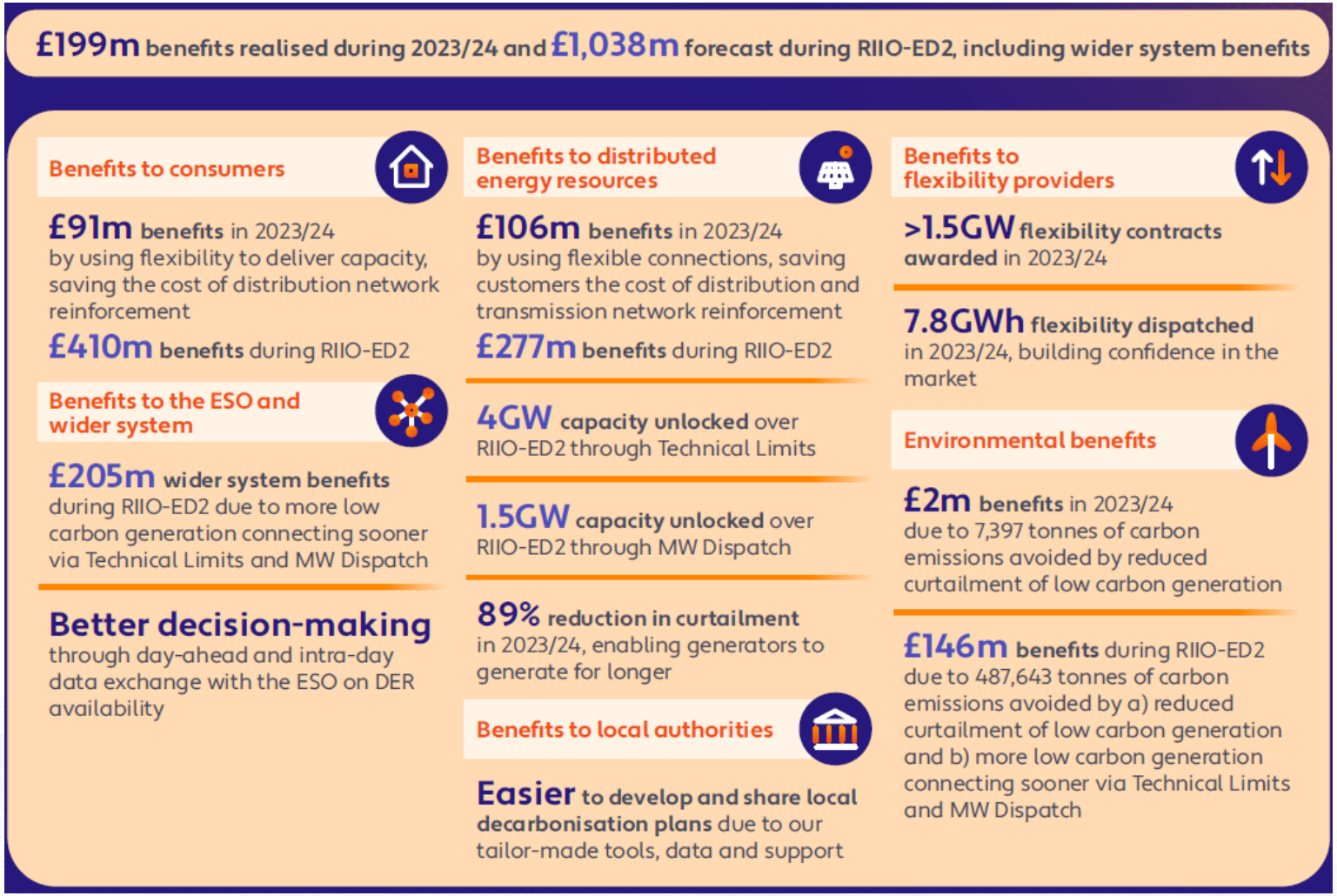
| | Market-Facilitator DSO Model | | Dual Participation Model | |
|---|---|---|---|---|
| | Low Case (NPV @8%) $ Bn | High Case (NPV @8%) $ Bn | Low Case (NPV @8%) $ Bn | High Case (NPV @8%) $ Bn |
| **NPV @8% costs** | $(1.6) | $(2.5) | $(2.1) | **$(2.8)** |
| **NPV @8% benefits** | $6.8 | $14.4 | $2.7 | **$5.4** |
| **NPV net benefit (cost)** | **$5.2** | **$11.9** | **$0.6** | **$2.6** |

# U.S. Department of Energy Study

- "it will be incumbent to use distributed energy resources (DER) to reduce the cost of electrification and address load growth constraints"
- DERs "will increasingly be important to manage local distribution needs affordably"
- "Today, however, the focus is mainly on using DER to solve bulk system needs primarily or concurrently to solve distribution challenges through traditional top-down planning processes. These approaches often miss the synergistic benefit realized by managing DER at the edge for distribution and then considering the resulting net load changes at the bulk power system"
- "a distribution to bulk power system-oriented "bottom-up" paradigm shift is important when developing strategies to manage and value DER integration and utilization, particularly in high DER and electrification scenarios"
- "**Recommendation:** Employ a bottom-up approach to consider DER optimization first at the distribution level before use for bulk power systems"



# UK Power Networks DSO Performance Report 2023/24



# UK Power Networks DSO Performance Report 2024/25

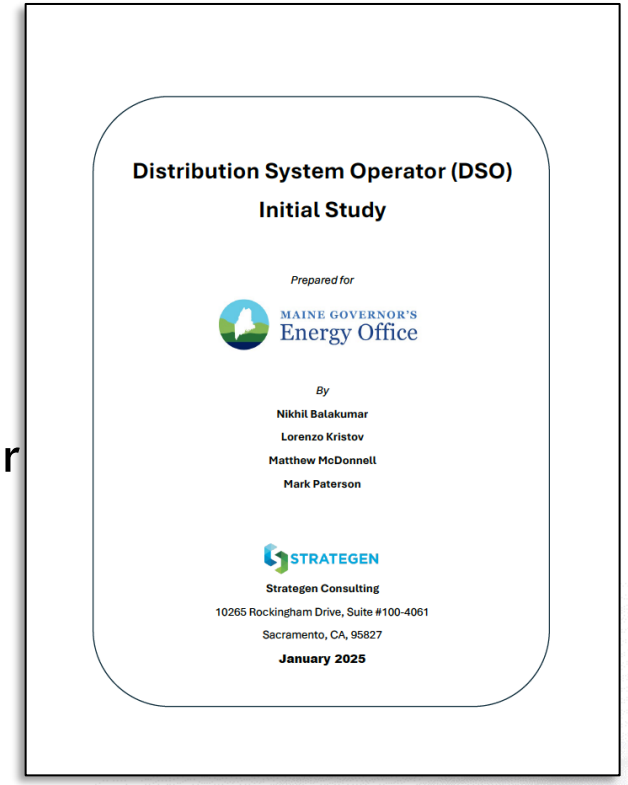
| Beneficiary | Benefit | 2023/24 | | 2024/25 | | RIIO-ED2 | |
|---|---|---|---|---|---|---|---|
| | | ED2 plan | Actuals | ED2 plan | Actuals | ED2 plan | Latest forecast |
| Consumers | Avoided or deferred reinforcement costs from using flexibility, reducing consumer contributions to distribution costs | £99m | £91m | £99m | £114m | £493m | £563m |
| DERs | Avoided or deferred reinforcement costs from using flexible connections, reducing costs to connecting customers | £44m | £106m | £44m | £92m | £220m | £694m |
| Wider system | Reduced wholesale electricity costs from improved network access for renewable DERs | £39m | £0m | £42m | £12m | £228m | £215m |
| Environmental | Value of reduced carbon emissions from improved network access for renewable DERs | £1m | £2m | £2m | £10m | £14m | £142m |
| Local authorities | Reduced resource costs from decarbonisation planning tools | £0m | £0m | £0m | £4m | £0m | £8m |
| **Total** | | £182m | **£199m** | £187m | **£232m** | £955m | **£1,624m** |

# UK Power Networks DSO: Other Highlights from 2024-25

- 13 GWh of flexibility dispatched 2024-25
- 194 MW of flexible connections added 2024-25
- Accelerated 10 connections through use of innovative connection solutions
- Enabled 165 GWh of additional generation
- £14 bill reduction per domestic customer
- Participating consumers saving on average £54

# Maine Governor's Energy Office DSO Study

- "As demonstrated across many global examples, distribution utilities will increasingly need to develop options for the flexible connections of DER to integrate more DER and at lower cost than under traditional interconnection approaches.
- A top-down, centralized model … falls short in accommodating the rise of distributed energy resources (DERs)
- The future electricity system will need to evolve toward a bottom-up planning approach that leverages granular data from DERs to better integrate them into the grid
- A core focus of the report is the role of administering a market platform for DERs at the distribution level…Such a platform allows for the tracking of DER activities in real-time, ensuring that these resources align with system reliability needs and providing a historical record for planning
- A demonstrable reduction in electricity costs for customers
- Improved electric system reliability and performance"


Distribution System Operator (DSO)
Initial Study

*Prepared for*

MAINE GOVERNOR'S Energy Office

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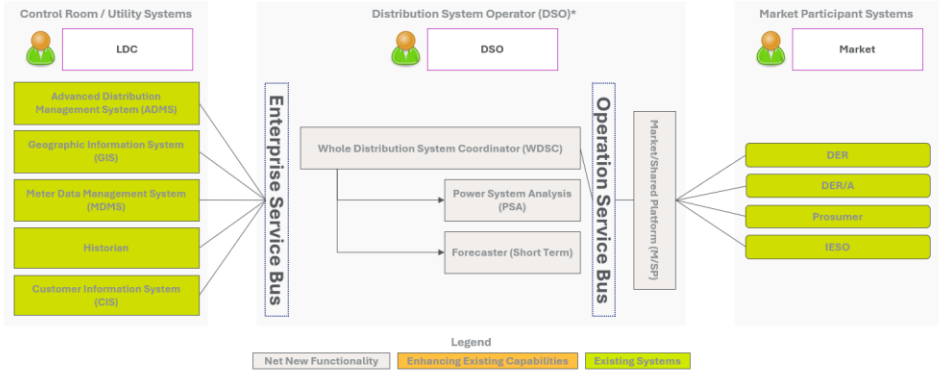
# TDWG Foundation

- The IESO-led Transmission-Distribution Coordination Working Group (TDWG) has undertaken extensive work for the past 2.5 years
- They have established a baseline framework for operational and planning coordination
- This work is an excellent foundation for working towards full DSO capabilities in a manner that ensures proper sector coordination
- Visibility, communication, and dispatch should be managed by the LDC

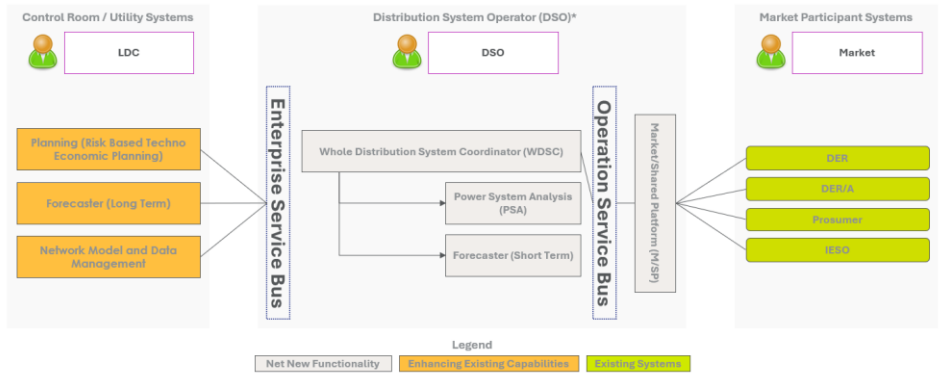
Proposed DSO Architecture – Operational Elements

*Elements required for day-to-day DSO operation*




Proposed DSO Architecture – Planning Elements

*Elements required for longer-term decision making and coordination*



# LDC Leadership: Capabilities & Key Initiatives

| alectra<br>Discover the possibilities | hydro one | TORONTO HYDRO | HydroOttawa |
|---|---|---|---|
| • **Centricity Project**: demonstrates transitioning from traditional distribution operations to a more active and intelligent system operator role, enabling the integration of DERs.<br>• **IESO York Region NWA Demonstration Project**: North America's first distribution-level local electricity market.<br>• Alectra, acting as the Distribution System Operator (DSO), facilitated third-party competition to secure and dispatch participating DERs. | • **myEnergy Rewards**: local demand response program<br>• **Flexibility Engagement Initiative**: a non-wires alternative (NWA) pilot that aims to explore how distributed energy resources (DERs) can provide flexibility services to the grid<br>• DER Enablement and grid modernization Strategy | • **Local Demand Response at Cecil Transformer Station**: a NWA program, aimed at leveraging behind-the-meter DERs to address short-term station capacity constraints<br>• **Benefit Stacking Pilot**: explored how customer-owned DERs can provide services to both the distribution grid and the bulk system.<br>• Grid modernization strategy development | • **EV Everywhere program**: leveraging AI to manage EV charging and integrate it more effectively with the electricity grid<br>• Grid modernization strategy development |

# OEA Local Flexibility Market Project

- The Local Flexibility Market project seeks to establish a unified LDC-led approach to procuring local energy flexibility from distributed energy resources (DERs)
- The primary objective is to create a common customer experience across Ontario to simplify DER participation and reduce market barriers
- Leveraging leadership from larger utilities (Hydro One, Toronto Hydro, Hydro Ottawa, Alectra) to design and implement a scalable platform architecture
- Once developed, smaller LDCs can opt in to the platform as ready, benefiting from shared standards, tools and vendor partnerships
  - DSO as a service will be available for smaller LDCs
- Supports provincial goals for reliability, affordability, and decarbonization by aligning local system needs with market-based DER solutions.
- Lays foundational groundwork for future DSO capabilities, including visibility, coordination, and market integration of DERs at the distribution level

# Reflections on Key Topics from Staff Paper

1. DSO Models
   - Regulated; Dual Participation; Market Facilitator; Total DSO
   - **OEA Reaction**: the OEA endorses the Market Facilitator model. However, we need clarity on functions and outcomes not just form.
2. Degree of Separation
   - None; Functional; Legal; & Ownership separation
   - **OEA Reaction:** the focus on separation models is premature.
3. Activation Mechanisms
   - Rule-based; Program-based; Market-based
   - **OEA Reaction:** A market-based approach is essential.
4. Regulatory Considerations
   - What can an LDC do under current structure
   - **OEA Reaction:** The regulatory background is helpful. Further regulatory action can follow based on implementation experience.
5. Ontario's Path to DSO Implementation
   - **OEA Reaction:** The roadmap is undefined

# Proposal 1: LDCs assess the need for DSO capabilities

**Proposal 1: Require distributors to assess the need for DSO capabilities to be implemented to address system needs**

- The OEA would like to emphasize the significant work that has already been done on the need for DSO capabilities, and we should instead focus on defining the core technical capabilities that are essential for a functional DSO in Ontario

# Proposal 2: Develop a simplified DSO Model

- **The OEA rejects proposal #2**
- Creating a "simplified" DSO model risks understating the complexity involved, and inadvertently locking Ontario into a model that delivers minimal opportunities and investment, at a time when DERs should be providing significant and growing benefits
- Rather than framing the discussion around simplicity, the focus should be on defining the minimum technical requirements necessary to enable a DSO

# Proposal 3: Further Development of Advanced Models

- **The OEA supports proposal #3 as it best reflects the utilities' role as DSO**
- The OEB should establish a clear roadmap for DSO implementation—one that defines the end-state vision, key milestones, and a structured path forward
- To support this, a sector-led working group should be formed to co-develop the DSO model and the implementation roadmap
- A strong precedent for this approach is the UK's ENA Open Networks initiative.
- A functional DSO requires core capabilities—particularly in planning and operations—that must be in place for any model to be viable
- Once those are established, a phased roadmap can be layered on to guide implementation

# Proposal 3: Further Development of Advanced Models

- To ensure consistency and meaningful outcomes, the sector—particularly LDCs—should work collaboratively with the OEB to define the minimum technical requirements, system need triggers, and appropriate staging
- The Government of Ontario's Integrated Energy Plan (IEP) and directive to the OEB explicitly calls out the role of LDCs and supports development of Distribution System Operator (DSO) capabilities
- It is imperative that the sector-led working group is provided clear instruction to not slow or stall the important work related to DSO that is already happening
- This approach will help align expectations, avoid duplication, and ensure that deliverables support a coherent and scalable path to DSO implementation

# The OEB's Critical Role

- The OEB's presence at the table is essential and we appreciate the OEB holding this consultation
- The OEB should define a clear end-state vision to align sector efforts and investments.
- The OEB can support sector-led capability building through collaborative planning and working groups.
- The OEB should defer structural regulatory changes until operational needs and lessons are better understood.
- The OEA encourages the OEB to recognize that effective management of distributed resources requires distribution-level expertise. Empowering LDCs to take a leadership role will enable better coordination of stacked services and benefits, ultimately driving cost savings for customers

# Summary: Navigating Ontario's DSO Evolution

- **The Challenge & Opportunity:** Ontario faces rapidly expanding energy demands and needs to leverage the full potential of Distributed Energy Resources (DERs) to meet system needs cost-effectively, rather than solely focusing on bulk system expansion
- **OEA's Vision: The Market-Facilitator (MF) DSO Model:** Building on three years of dedicated DSO discussion and education, our analysis confirms the Market-Facilitator (MF) DSO model offers the most significant net benefits for Ontario's grid and customers
- **Key Recommendations for the Path Forward:**

| Recommendation | Description |
|---|---|
| **1. Establish a Sector-Led Working Group** | Form a collaborative group of LDCs and DER providers to define a shared roadmap, including a clear market framework (MF) end-state vision and key milestones |
| **2. Prioritize Minimum Technical Requirements** | Avoid introducing a “simplified” DSO model. Instead, define the baseline technical capabilities required for any functional DSO, ensuring long-term scalability |
| **3. Leverage LDC Leadership** | Empower experienced LDCs to lead the development of common platforms and customer-facing solutions that others can adopt, modeled on international success stories |
| **4. Build Capabilities Before Legislating** | Pause legislative or structural reforms (e.g., legal separation) until operational capabilities are mature. Focus first on building real-world DSO functionality |

# Thank you

Ontario Energy Association