Ontario Energy Association

ENERGY STORAGE CANADA

From Small To Mighty:
Unlocking DERs to Meet Ontario's Electricity Needs

Report Prepared by Power Advisory

December 12, 2024

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Preamble

Ontario Energy Association

ENERGY STORAGE CANADA

- Ontario Energy Association (OEA) and Energy Storage Canada (ESC) retained Power Advisory to work with their members to produce this report to share with the Ontario Ministry of Energy and Electrification
- This report supports the development of an overarching policy and regulatory framework to enable distributed energy resources (DERs) to play a larger role in meeting Ontario's electricity resource needs to support economic growth
- Overall, OEA and ESC are recommending that the Ontario government issue policy direction to the Ontario Energy Board (OEB) and the Independent Electricity System Operator (IESO) to enable Local Distribution Company (LDC)-led DER procurements, as well as make grid modernization investments necessary to integrate and manage DERs
- Enabling an LDC-led DER procurement stream builds on LDCs' existing responsibilities and aligns with development of future local markets for distribution services and upcoming IESO wholesale market enhancements to better integrate DERs

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Executive Summary

A Vision of DERs in Ontario

Overarching Vision: *To enable widespread adoption and deployment of DERs, maximizing value for Ontario's electricity customers through affordability, bill savings, and enhanced resilience; for the electricity grid through improved reliability; and for economic and environmental benefits through emission reductions*

- Ontario's vision for DERs should include:

Allow customers options to manage their energy costs through utilization of DERs	Structure programs, policies, and regulations to facilitate deployment of DERs and reduce red tape	DERs support efficient grid operation, integration of clean energy, reduction in system cost, grid reliability, and reduction in green-house gas (GHG) emissions	LDCs have incentives to accelerate deployment of DERs
DERs receive fair compensation when providing multiple unique services to the wholesale market, distribution grid, and/or end-users	DER adoption and deployment mechanisms are structured to ensure they are technology-neutral and competitively procured, where appropriate	Modernized distribution grid for a high DER future	Evolve programs, policies, and regulations over time to efficiently enable participation in local and wholesale markets

"All of the Above" Means Looking Beyond IESO-Led Procurements

- Ontario demand is forecast to increase from 151 terawatt-hours (TWh) in 2025 to 263 TWh in 2050 – **a 75% increase over 25 years**
- Recent procurements have missed capacity targets, with the Long-Term 1 (LT-1) procurement being the latest example:
  - In total, IESO awarded 2,195 megawatts (MW) of capacity as part of the LT-1 procurement
  - Results fall short of the target (2,500 MW) for LT-1 procuring capacity from expansions and new-build resources
  - Capacity targets from non-storage (i.e., gas-fired) projects also not met in both Expedited Long-Term (E-LT) and Medium-Term 1 (MT-1) procurements
- *Today's IESO-led procurement are not designed for most DERs (e.g., small-scale or behind-the-meter (BTM) resources)*
  - Currently, only DERs > 1 MW that are market participants are eligible to participate in long-term (LT) procurements
  - IESO considered enhanced DER participation, but decided to limit LT-2 procurement to DERs > 1 MW (and market participant)
  - IESO deferring eligibility of aggregate DERs and stand-alone DERs < 1MW until the LT-3 procurement and beyond
- *DERs can and should be procured outside of IESO's processes, aligned with Ontario's "all of the above" approach to meeting our province's resource needs*

Establishing DER Specific Procurement Stream has Strong Justification

- DERs provide value to customers, distributors, and the bulk electricity system:
  - **Strategic and Cost-Effective:** Scalable alternatives like rooftop solar, storage, and demand response offer both energy and capacity while reducing costs compared to large, centralized projects
  - **Quick Deployment**: DERs can be brought online faster than large-scale generation, addressing immediate energy needs flexibly
  - **Community-Friendly:** Smaller-scale projects are less intrusive and more acceptable to host communities, avoiding significant public opposition
  - **Environmental Benefits:** Integration of renewables like solar reduces greenhouse gas emissions, supporting climate goals
  - **Customer Empowerment:** Enables active participation, offering control over usage, costs, and sustainability impacts

Strong Rationale for LDC-Led DER Procurements

- LDCs well-positioned to take on a greater role in DER procurement:

- **IESO Focus on Large-Scale Procurements:** IESO focused on large projects and lacks capacity for smaller, localized DER procurements – making LDCs the better administrator

- **More Accessible Programs:** LDC programs would be tailored to smaller-scale procurement without need to impose minimum size thresholds (e.g., 1 MW), require DERs to register as wholesale market participants, or have complex and lengthy request for proposals (RFP) evaluation and contract negotiation processes

- **Current Role:** LDCs handle key DER contract-related processes already (settlement, connection, admin) and have experience from past programs like the feed-in tariff (FIT) program

- **Customer Access and Choice:** LDCs have direct relationship with customers and can effectively promote DER programs to drive participation and reduce red-tape

- **Distribution System Visibility:** LDCs have insight into grid capacity and can target DER programs to areas with available or planned capacity for maximum benefit

- **Integration with Non-Wires Solutions (NWS):** LDCs can align DER procurements with NWS needs, using DERs to reduce infrastructure costs (i.e., value-stacking)

- **Growing Grid Capabilities:** LDCs are investing in grid modernization, improving their ability to integrate and manage DERs

- **Conservation and Demand Management (CDM) Program Experience:** LDCs have a track record of delivering CDM programs, which equips them to handle DER programs effectively

- **Ability to Target:** LDCs can target programs based on local needs, customer preferences and emerging resources (e.g., electric vehicle (EV) smart charging programs)

Proposed Approach – "Walk-Jog-Run" for DER Integration

- Overall, we are presenting a framework that is consistent with a walk-jog-run approach, that leverages experience of Ontario's LDCs and capabilities of Ontario's DER providers and sets future foundation
    - **"Walk" Phase:** Initiate immediate development of incremental new DERs by focusing on an LDC-led DER procurement and enabling foundational programs and investments (i.e., grid modernization), support LDCs as they evolve toward Distribution System Operator (DSO) roles, preparing the ground for future flexibility markets
    - **"Jog" Phase:** Build on this foundation with enhanced coordination between LDCs and IESO, enabling local flexibility markets, expand DER capacity to meet Ontario's near-term supply needs, providing benefits across both distribution and bulk power systems
    - **"Run" Phase:** Fully integrate DERs into wholesale and distribution markets, with refined market rules, systems, and tools developed by IESO to support DER aggregation and broad participation, this phase establishes DERs as a critical component of Ontario's resilient and dynamic grid
- Enabling an LDC-led DER procurement stream in the near-term builds on LDCs' existing responsibilities and aligns with development of future local markets for distribution services and upcoming IESO wholesale market enhancements to better integrate DERs

Actions to Take Now – Implement LDC-Led DER Procurements

- Ontario government should issue policy direction to OEB and IESO to enable LDC-led DER procurements, as well as make grid modernization investments necessary to integrate and manage DERs
- Overall direction should:
  - Provide customers and DER investors with opportunities and incentives to install DERs to provide energy and services back to the electricity grid, such as small-scale non-emitting generation and storage
  - Allow LDCs flexibility on how to procure DERs, subject to OEB approvals (e.g., procurement processes and/or procurement programs, contracts)
  - Give direction to OEB to allow for cost recovery and remuneration for LDCs to administer DER procurements
  - Establish ex-post evaluation of DERs procured by LDCs
  - Establish settlement of contracts between LDCs and DERs via IESO through the Global Adjustment (GA) for province-wide resource adequacy benefits
  - Convey that DERs procured by LDCs are to be an input into respective LDC planning, IESO power system planning, IESO supply procurements
  - Provide clarity to LDCs on what are considered grid modernization activities, particularly those related to facilitating greater DER penetration (e.g., visibility, operation, control)
- Note: Power Advisory believes that implementation of LDC-led DER procurements does not require legislative, regulatory, or wholesale market rule changes

Consideration within Current Ontario Government Policy Consultations

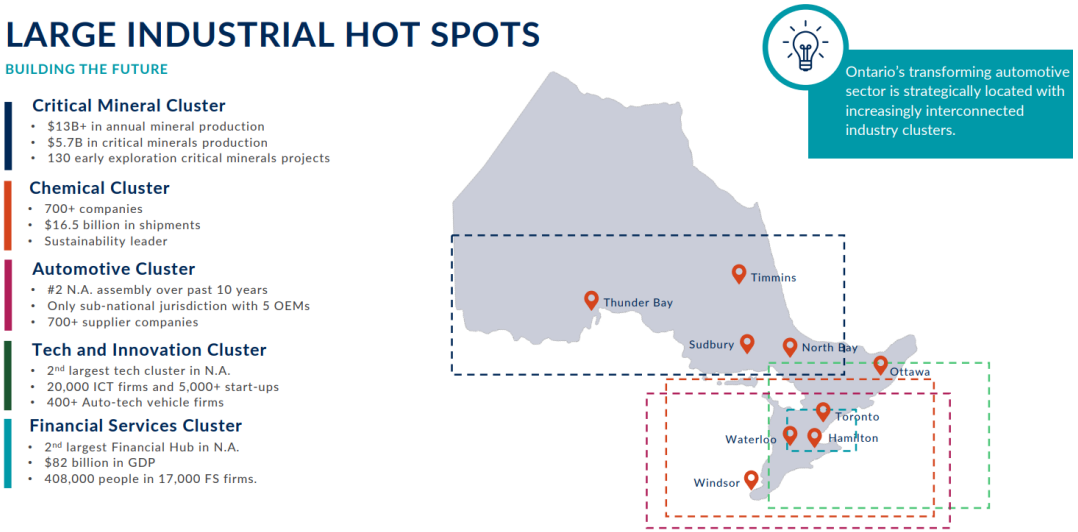
- The Ontario government is currently consulting on development of an **Integrated Energy Plan (IEP)** to shape Ontario's future energy system
- LDC-led DER procurement:
  - Aligns with IEP's recognition of the role of DERs in the energy mix
  - Supports **affordability of energy for customers** and **cost-effectiveness of planned energy resources**
  - Advances **cost-effective procurement of electricity resources**, delivering value to customers and the grid
  - Supports **availability and reliability of supply**, transmission, or distribution of energy to consumers
  - Advances **modernization of energy infrastructure** systems while **promoting innovation that benefits customers**
  - Aligns with **enhancement and expansion of energy infrastructure and resources to support economic growth** and trade
- Including LDC-led DER procurements within the IEP framework ensures alignment with provincial energy objectives and provides a pathway for efficient, innovative, and customer-focused energy solutions

Other Actions to Support Accelerated Deployment of DERs

- In addition to enabling **LDC-led DER procurements,** to accelerate DER adoption and enhance their contribution to Ontario's energy system, the Ontario government should support the following actions:
  - **Expand IESO's Annual Capacity Auction Targets:** Increase participation of demand response resources, including enabling a greater share of aggregated resources by raising "virtual zonal limits"
  - **Accelerate DER Integration into Wholesale Markets:** Through IESO's DER Market Design Vision, reduce the minimum participation threshold (i.e., below 1 MW), improve transmission-distribution (T-D) coordination, and enable multi-resource aggregations
  - **Expand Wholesale Market Services for DERs**: Develop mechanisms to allow DERs to provide all eligible services that DERs are technically capable of providing, such as operating reserve and frequency response (ancillary services)
  - **Eliminate Gross Load Billing for BTM DERs:** Remove this unnecessary cost burden for connected DERs to improve economic feasibility
  - **Streamline Interconnection and Settlement Processes:** OEB should continue to enhance consistency and transparency in interconnection, metering, and settlement requirements to reduce barriers for DER deployment
  - **Support Development of LDC-led Local Flexibility Markets:** Collaborate with LDCs to develop and manage local flexibility markets that integrate DERs more efficiently, enabling tailored grid solutions and optimizing localized energy dispatch

Conclusion – The Role for DERs is Clear

- LDC-led DER procurements can help and be tailored to address energy and capacity needs that are emerging at strategically significant locations that have been identified by Invest Ontario as experiencing industrial growth
- Invest Ontario has identified that customers are seeking quicker project connection timelines and certainty of electricity service:
    - Quick deployment ability of DERs is an attractive option to supplement and avoid potential delays and opposition related to larger-scale infrastructure procurement and network expansion to meet new load
    - LDC-led procurements would not be constrained by minimum size or market participation requirements and other complications (such as those encountered in IESO-led procurements)



1. Purpose of This Report

Background

- OEA and ESC have retained Power Advisory to work with their members to produce this report which supports development of an overarching policy and regulatory framework to enable DERs to play a larger role in meeting Ontario's electricity resource needs to support economic growth
- This report recognizes unique characteristics of Ontario's electricity sector:
  - Ontario needs significant amounts of new electricity resources (supply, distribution, and transmission) in the near-term to meet growing electricity demands
  - IESO-led procurements for electricity supply are focused on large-scale resources, and IESO has deferred consideration of DERs in its mainstream procurements (i.e., LT-2)
  - Pathway to procure large-scale resources is challenging (i.e., environmental impact, costs, community support, transmission capacity, permitting and approvals)
  - DERs must play a greater role in meeting Ontario's bulk supply needs, and have benefits to distribution and transmission grids, as well as enabling customer choice and affordability
  - Given current role of LDCs (i.e., connection, settlement, planning, operations, program delivery, etc.), this report asserts that LDCs should take a greater lead in procurement of DERs
- While the focus of this report is not DSOs *per se*, it will remain consistent with current OEA advocacy efforts, and reinforce needs for T-D coordination and grid modernization investments as DER uptake increases

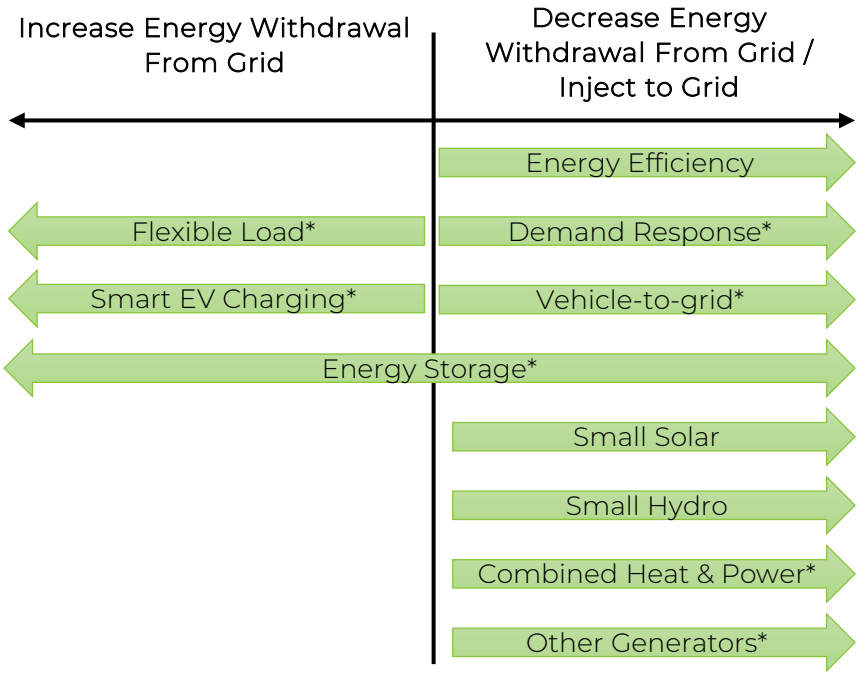
Consistency with Ontario's Policy and Vision

- This report is complementary and consistent with the government's Ontario's Affordable Energy Future: The Pressing Case for More Power, which sets out "**A pro-growth agenda that takes an all-of-the-above approach to energy planning**"
- Ontario's priorities include empowering energy customers to participate in the grid by expanding DERs:
  - There is ongoing opportunity to expand use of DERs where it is cost-effective and beneficial to meeting local and system needs
  - Customers would benefit from increased opportunities for customer-sited generation and storage that offers bill savings or resiliency benefits for residential, small business, and farm customers
  - There are opportunities to examine broader implementation of projects piloted by OEB and IESO that have demonstrated customer, local, and system benefits
  - There is an opportunity to improve collection and sharing of DER data to mutual benefits of LDCs, OEB, IESO, customers, and DER developers
- The recommendations in this report establish a pathway for Ontario to immediately move forward with additional deployment of DERs, recognizing Ontario's near-term supply needs, while maximizing benefits that DERs provide to distribution systems, transmission system, and customers more broadly

2. Value of DERs and a Vision for Ontario

What are DERs?

- DERs are smaller–scale devices that can either use, generate, or store electricity and are connected to distribution systems
- DERs can include renewable generation, energy storage, EVs, and technology to manage electricity load
- DERs can be located within a customer's premises (a.k.a., BTM) or connected directly to the distribution system (a.k.a., front-of-the-meter, or 'FTM')
- DERs can operate passively or respond to price signals and/or dispatch instructions
    - Some DERs operate passively (e.g., residential solar), and may inject and/or withdraw energy based on resource availability or customer needs
    - Some DERs are dispatchable, where injection and/or withdrawal of energy is controlled by an operator



**Denotes resources that are typically considered to be responsive (i.e., dispatchable or controllable), other resources typically operate passively (i.e., baseload or intermittently)*

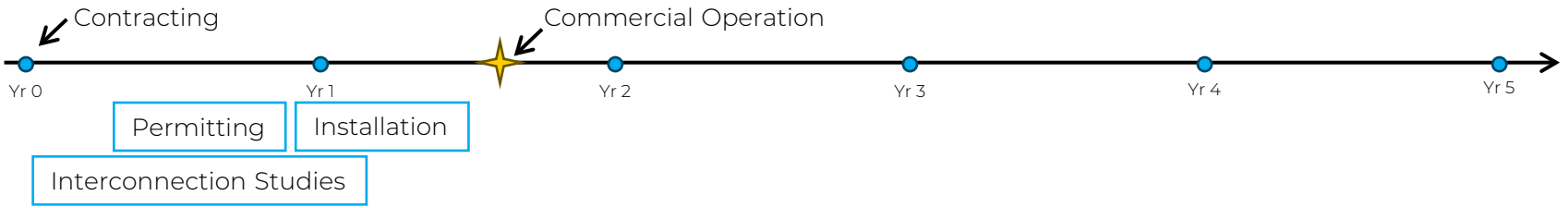
DERs Can Provide Value to Customers, Distributors, Bulk Electricity System

- Non-dispatchable DERs have energy value, but little capacity value (i.e., helping to meet peak demand needs)
- Dispatchability is a pre-requisite to provide operational value (e.g., ancillary services such as frequency regulation, etc.)
- BTM resources can also provide value directly to customers (e.g., bill reductions and back-up power)

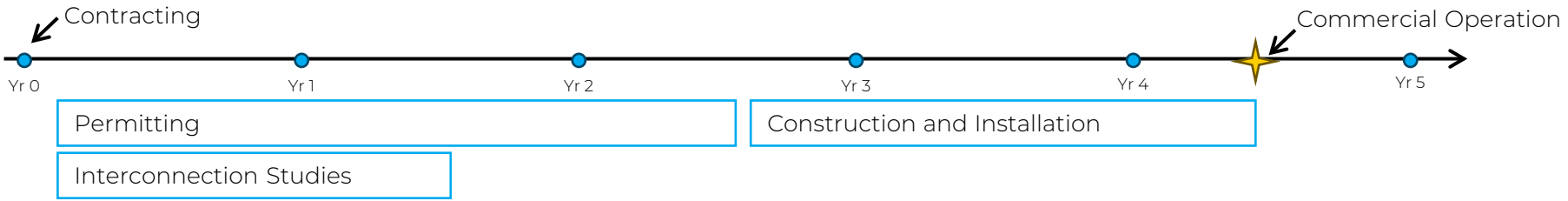
Value Category	Resource Adequacy	Transmission	Distribution	Customer
Energy	Real-time delivery of energy to meet demand needs	Transmission line losses	Distribution line losses	Avoided energy costs
Capacity	Availability to provide energy to meet peak demand	Avoided new transmission facilities	Avoided new distribution facilitates	Avoided demand charges
Operational	Ancillary services (e.g., operating reserve, regulation, etc.)	Volt-VAR control	Volt-VAR control	Resiliency/back-up
Environmental	Certain technologies reduce GHGs (i.e., reduced fuel)	Reduced land-use impacts	Reduced land-use impacts	Certain technologies reduce GHGs (i.e., reduced fuel)

DERs Can Be Developed and Deployed Quickly Relative to Large-Scale Generation

Illustrative DER Development Timeline



Illustrative Large-scale Resource Development Timeline



Report Prepared by Power Advisory LLC for OEA and ESC (2024).

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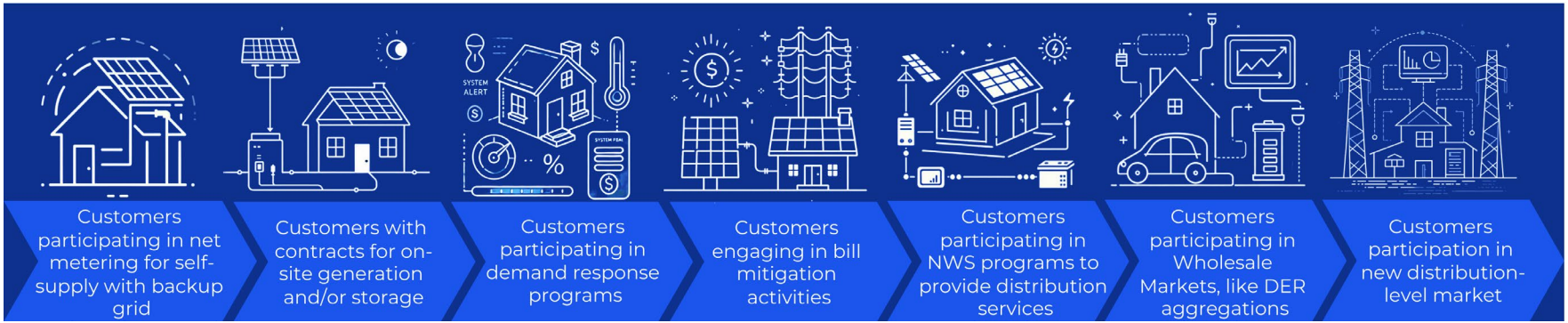
DERs receive fair compensation when providing multiple unique services to the wholesale market, distribution grid, and/or end-users	DER adoption and deployment mechanisms are structured to ensure they are technology-neutral and competitively procured, where appropriate	Modernized distribution grid for a high DER future	Evolve programs, policies, and regulations over time to efficiently enable participation in local and wholesale markets

Walk, Jog, Run Approach

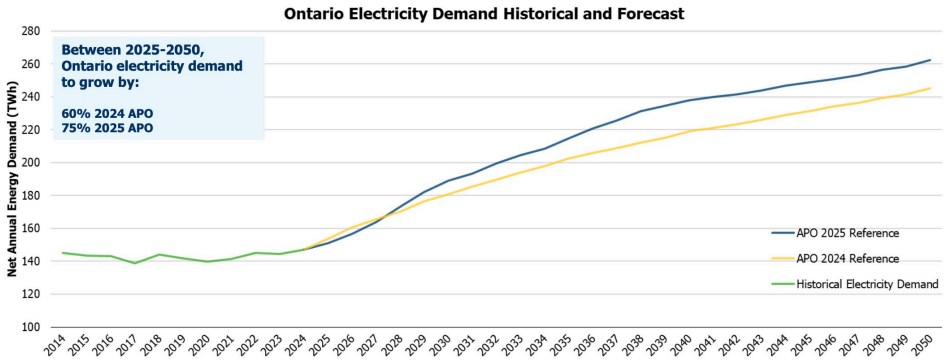
- This vision aligns with a “walk-jog-run” approach, allowing a gradual increase in market complexity to support DER adoption effectively.
    - Starting with foundational programs and existing regulations (“walk”), Ontario can leverage past initiatives and transition to more dynamic, collaborative models in both wholesale and distribution markets (“jog” and “run”)
    - This phased approach respects Ontario’s unique history, roles, and responsibilities, ensuring a stable and adaptable path toward a robust DER market



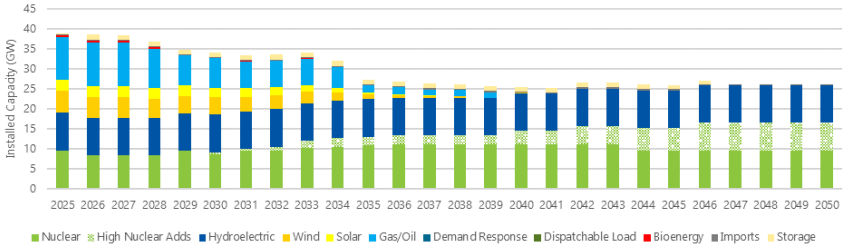
3. Ontario's Current Electricity Landscape

Demand to Grow Fast and New Supply Needed

- Ontario demand forecast to increase from 151 TWh in 2025 to 263 TWh in 2050 **– 75% increase over 25 years**
- Significant demand growth forecast by IESO, due to mining/mineral extraction, data centers, steel production, EV production and its associated supply-chains, and hydrogen production

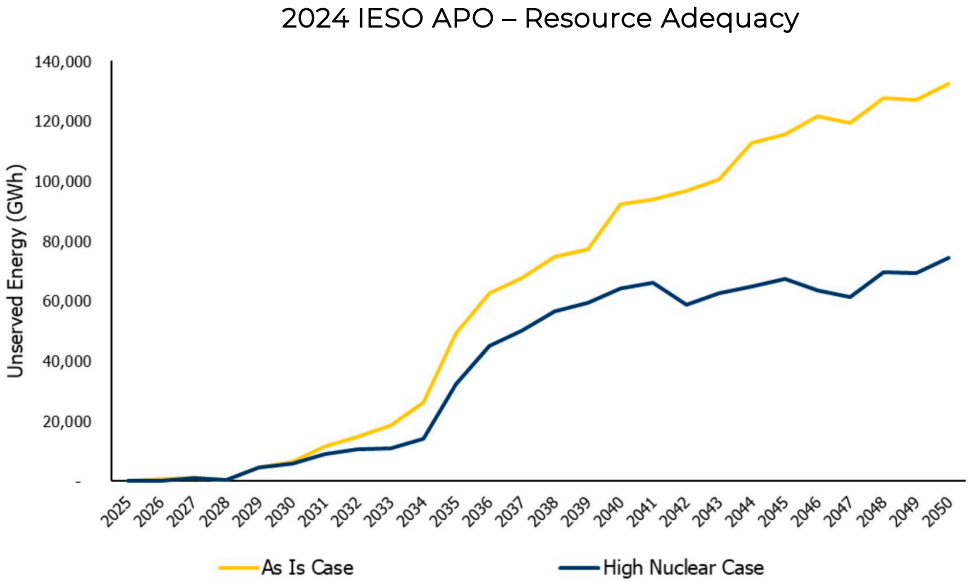


- During this period, Ontario's electricity supply capacity declining, even under an "As-Is" scenario, which includes all existing and committed generation until expiry of contracts, rate-regulated generation, and new resources from the E-LT RFP and three small modular nuclear reactors
- Even with a "High Nuclear" case – adding ~4.8 gigawatts (GW) at Bruce and ~2 GW refurbishment at Pickering – Ontario faces significant needs for new supply



Ontario Needs Energy and Not Just Capacity

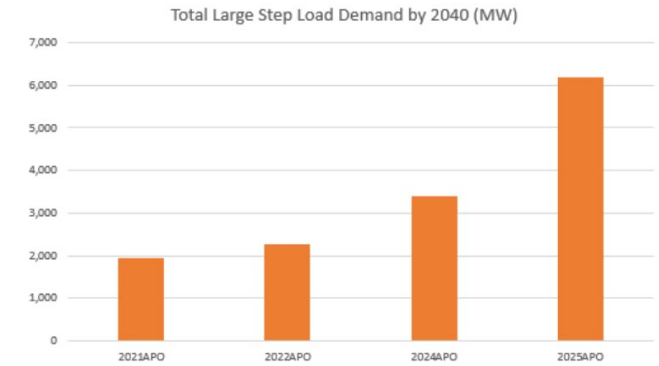
- Even in a “High Nuclear” case, there continues to be a growing resource adequacy (i.e., supply) need (energy), as demand grows and resources reach end of their commitment period
- Size of resource adequacy gap depends on resource availability following expiry of contracts and success in ongoing IESO procurement of new resources
- IESO LT-2/LT-3/LT-4 procurements meant to help address this need, but in-service dates for this new supply not expected until 2029/30
- Recent IESO-led procurement (e.g., LT-1) have not met their procurement targets
- DERs, such as solar, can help supply needed energy

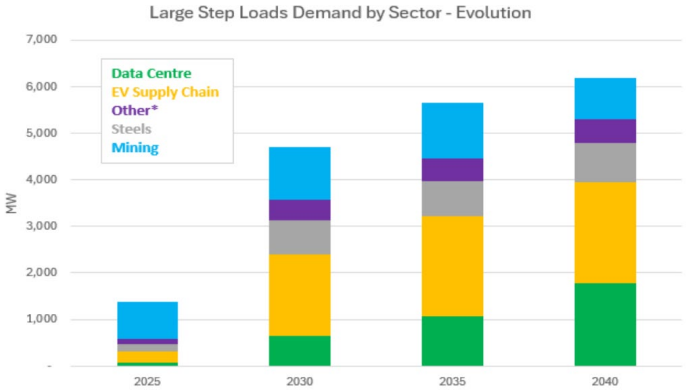


Potential unserved energy

New Industrial Demand but Can it Be Supplied?

- There have been several significant new industrial loads announced in the past two years in Ontario
- Ontario is likely an attractive market for manufacturers that prioritize non-emitting and cost-effective electricity supply
- Risk that large new loads will find it challenging to connect in an increasingly constrained transmission system
    - In a recent downward revision to GHG demand forecast in the Windsor-Essex region, IESO noted that "connection costs are putting downward pressure on customer commitment"
    - IESO's 2025 Annual Planning Outlook (APO) demand forecast slightly lower than the 2024 APO demand forecast (2025 to 2027 period), which may reflect project cancellations or delays
- Creating a policy environment to "*empower customers to install innovative technologies to generate or store energy on-site to reduce costs and improve resiliency*" can mitigate supply risks and further increase Ontario's attractiveness for new industrial loads (connected to either to distribution or transmission systems)

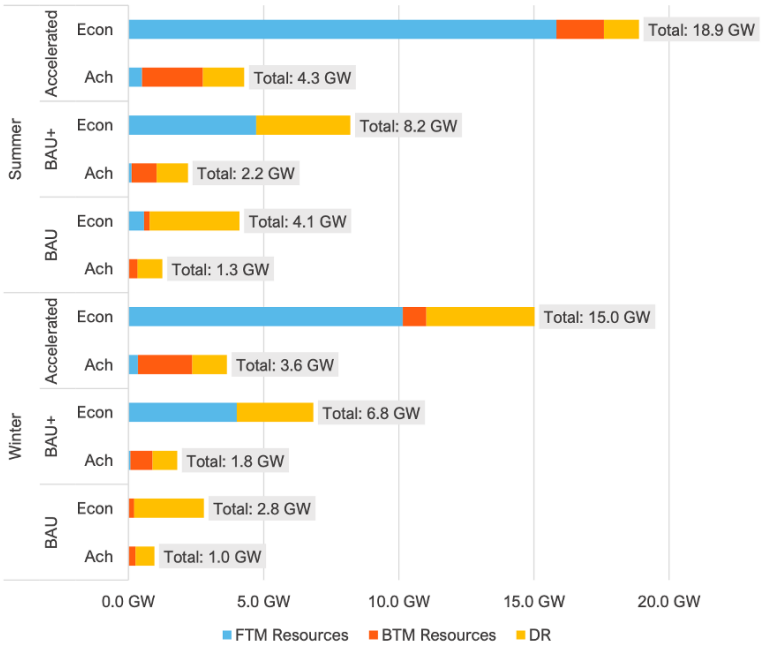




"All of the Above" Means Looking Beyond IESO-led Procurements

- Recent procurements have missed capacity targets, with LT-1 being the latest example:
  - In total, IESO awarded 2,195 MW of capacity as part of the LT-1 procurement
  - Results fall short of the target for LT-1 of procuring over 2,500 MW of capacity from expansions and new build resources
  - Capacity targets from non-storage (i.e., gas-fired) projects also not met in both the E-LT and MT-1 RFPs
- Furthermore, attrition of capacity from contract awards to commercial operation always occurs – therefore, it is likely that not all contracted projects in LT-1 will reach commercial operation
- *Today's IESO-led procurements are not designed for most DERs (e.g., small-scale, and/or BTM)*
  - Currently, only DERs > 1 MW that are wholesale market participants eligible to participate in LT procurements
  - IESO considered enhanced DER participation, but decided to limit LT-2 RFP to DERs > 1 MW (and market participant)
  - IESO is deferring eligibility of aggregate DERs and stand-alone DERs < 1 MW until the LT-3 RFP and beyond
- *DERs can and should be procured outside of the IESO's processes, aligned with Ontario's "all of the above" approach to meeting our province's resource needs*

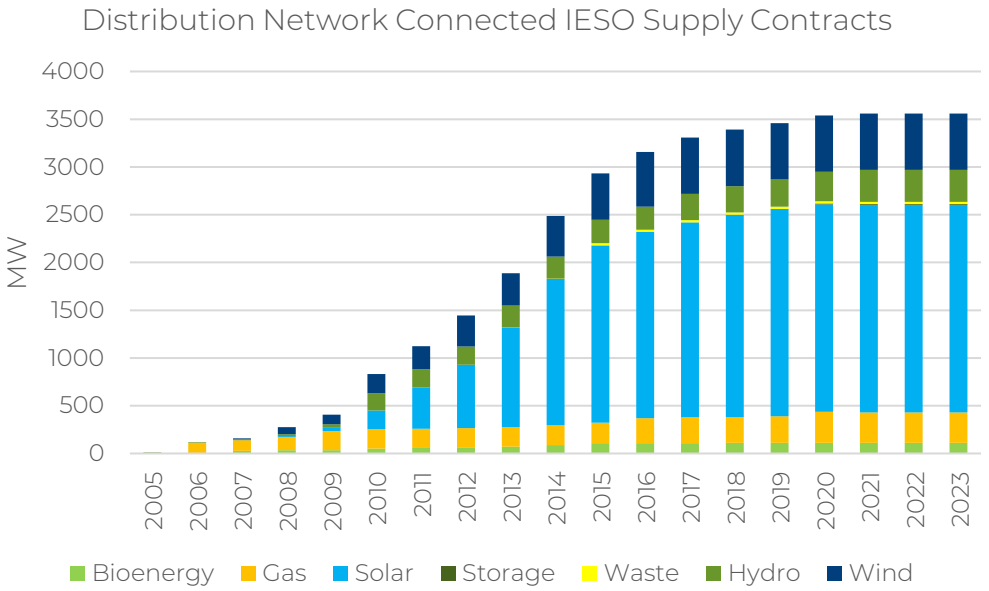
DERs are Economic in Ontario to Meet Resource Supply Needs



- IESO completed a DER Potential Study in 2022, demonstrating that DERs are economic in Ontario; however, significant amount of DERs not achievable given market dynamics and barriers to participation
  - Economic potential means cost-effective (i.e., benefits outweigh costs)
  - Achievable potential a subset of economic resources that are likely to emerge given current market barriers and limitations
- This analysis, while somewhat dated, leveraged 2021 IESO APO as a Business As Usual (BAU) case, with a BAU+ case reflecting expected near-term increases, and an Accelerated scenario reflecting net-zero and electrification trends
- Overall, results demonstrated that even in a low demand scenario (i.e., BAU), more than 4 GW of DER is economic in Summer of 2032, but only 1.3 GW is achievable given current market and regulatory constraints

Most DERs in Ontario Under Contract with IESO

- Most contracted DERs in Ontario were acquired between 2010 and 2016
- Limited increase in DERs acquired since that time
- Additional to IESO-contracted supply, there is a limited amount of net-metered and non-contracted BTM supply (e.g., facilities with back-up generation as well as embedded Class A customers with storage and/or generation)



Uptake of DERs in Ontario is Low

- Calculating the exact volume of DERs in Ontario today is challenging, given different procurement models (i.e., centralized IESO-led procurement, LDC NWS, and customer-installed/BTM facilities) and lack of any tracking process/mandate
- However, overall uptake/deployment almost certainly lower than its economic potential, this can be broadly attributed to:
    1. Policy and regulatory impediments
        - Ontario does not currently have a dedicated approach to deploying DERs (e.g.,, specific policy objectives, regulatory guidelines, clear and consistent direction to agencies, etc.)
    2. Pricing and revenue uncertainty
        - DERs can offer highly targeted benefits to local grids; however, Ontario has thus far not had transparent granular locational and temporal pricing signals that would effectively guide proponents to deploy DERs where they would be most valued – this creates revenue uncertainty that deters investment
    3. Lack of cohesive planning
        - Planning processes at all levels – distribution, regional, bulk systems – often conducted with inadequate consideration of time and processes needed to explore and potentially procure DERs, even when non-wires solutions/DERs are considered they have tended to be narrowly focused on a limited set of use-cases that do not give the resource opportunities to unlock its full value

Challenges and Opportunities – DER Deployment

- Wide-scale DER deployment faces challenges resulting from fundamental components of electricity policy in Ontario, including:
  - Market Price: Wholesale market price of energy (i.e., the hourly Ontario energy price (HOEP)) does not reflect full cost of energy (i.e., due to contracted and regulated supply), weakening the business case for FTM DERs
  - Ontario Electricity Rebate: Universal subsidies that lower customers' bills can reduce a customers' financial incentives to invest in DERs, as their potential savings are diminished, weaking the business case for BTM DERs
- That said, recognizing realities above, there are clear opportunities to facilitate DERs through:
  - Regulatory Certainty: Providing clarity and stability around key regulations (e.g., GA, net metering) would make it easier to predict long-term financial benefits, encouraging DER investment
  - Revenue Certainty: Providing customers and investors confidence in stable revenue streams would encourage DER investment
  - Expanding Programs: Creating programs to promote cost-effective DER adoption, outside pilot programs, would facilitate DER development
  - DER Procurements: Structured procurement opportunities for DER services would expand revenue options and, as a result, DER uptake

DERs are Currently Limited in the Wholesale Market

- DERs face barriers to participating in the wholesale market administered by IESO, due to a 1 MW minimum threshold and stringent metering and telemetry requirements, making it challenging for many to offer energy and ancillary services (e.g., operating reserve, frequency response)
    - Currently, IESO only provides one participation model for aggregated DERs through Hourly Demand Response in the annual Capacity Auction, where individual DER contributors may be less than 1 MW but the total aggregation must be at least 1 MW
- IESO efforts to address DER integration:
    - Since 2019, IESO's Innovation Roadmap highlighted need for better DER integration, leading to formal consultations on a DER Market and Design Vision in 2021
    - Proposed reforms include lowering the minimum threshold, enabling aggregation, establishing T-D coordination protocols, and streamlining market participation
- However, there are no firm timelines for DER market reforms, as IESO focuses on their Market Renewal Program and integrating energy storage and hybrid facilities
- IESO must continue to explore near- and longer-term opportunities for DER participation in the wholesale market (including ancillary services), however **advancing DER deployment need not wait for IESO's wholesale market reforms**

Potential for Aggregated DERs Remains Untapped

- Developers and customers face a lack of compensation frameworks with adequate, reliable revenue streams for DERs providing services across bulk supply, transmission, and distribution levels
- Unlike large-scale generation with long-term contracts (20+ years) from IESO, aggregated DERs lack revenue certainty
- There is a need to establish a **level-playing field** for DERs, including BTM and FTM storage, to unlock full value streams aligned with following system objectives: affordability, reliability, clean energy integration, decarbonization, customer equity, and access – for example:
    - Incentivize efficient and cost-effective DER services through **granular pricing signals**, rate design, structured programs, and **longer-term procurement tools** for bulk and distribution system needs
    - Enhance coordination across system, regional, transmission, and distribution planning to provide lead time for integrating DERs and NWS, benefiting ratepayers and communities

Facilitating Access to DER Value Stack

- Enabling greater access to various value streams and incentivizing LDCs to support DERs would promote a more flexible, resilient, and integrated energy system across Ontario
- However, DERs currently have restricted access to the full range of value streams, including customer savings, distribution services, transmission relief, and bulk system contributions, limiting their impact and profitability
    - Programs and initiatives are developed in silos, with IESO considering bulk system benefits, wholesale market pricing and bulk system procurements, LDCs considering NWS, and OEB considering rate design options
    - Current DER framework does not provide access to all value streams offered by DERs, resulting in a missed opportunity for the electricity system to benefit fully from DERs
- LDCs should be incentivized and enabled with clear regulatory policy and processes (e.g., remuneration framework, grid modernization investments) for making investments (e.g., hardware, software, and workforce) to optimize DER integration and deployment, as well as facilitate participation in the wholesale market where DERs could contribute valuable bulk system support
- Without mechanisms to unlock DERs' full value, Ontario is missing out on the potential benefits like improved local reliability, flexibility services (e.g., peak demand support), more flexible connection options, and enhanced grid resilience

Today's Challenge – Meeting Ontario's Energy Needs with an "All of the Above" Approach

- Ontario has a significant need for new electricity resources to meet growing demand for electricity
- That said, development of large-scale electricity infrastructure takes time and has unique challenges, such as:
  - Permitting Delays: Complex, multi-level regulatory requirements lead to approval bottlenecks
  - Siting Challenges: Geographic, environmental, and community constraints complicate siting of new infrastructure
  - Community Concerns: Public opposition to environmental and property impacts risks delaying projects
  - Interconnection Challenges: Limited grid capacity and regulatory hurdles slow new resource integration
  - Policy Uncertainty: Unclear long-term policies deter investment and complicate planning (e.g., federal regulations related to gas-fired generation)
- While IESO is responsible for resource adequacy, it remains focused on large-scale resources and is not well-suited or resourced to aggressively develop and deploy DERs
  - IESO's current resource adequacy framework contemplates regular technology-agnostic procurements that don't always recognize nuances of smaller-scale resource development and their ability to provide multiple, stackable benefits

Ontario Needs More DERs

- Ontario's growing electricity needs call for flexible, cost-effective solutions, and DERs offer an underutilized path to address these demands:
  - Strategic and Cost-Effective: DERs, including rooftop solar, storage, and demand response (DR), offer a scalable alternative to large, centralized projects with the ability to provide both energy and capacity
  - Community-Friendly: DERs' smaller scale generally causes less environmental and visual impact, making them more acceptable to host communities and less likely to face public opposition compared to larger infrastructure projects
  - Quick Deployment: DERs can be brought online more rapidly than large-scale resources, allowing Ontario to meet immediate energy demands more flexibly
  - Value Stacking at Local and Bulk Levels: DERs offer benefits across the grid by supporting both localized energy needs and the broader power system
  - Environmental and Sustainability Benefits: DERs often rely on renewable resources like solar, which aligns with customer climate goals by reducing GHG emissions
  - Supports Customer Empowerment and Engagement: DERs enable customers to actively participate in the energy market, giving them control over energy usage, costs, and environmental impact
- Pursuing DERs more aggressively is an obvious option to help Ontario strategically and cost-effectively meet local and regional supply needs

Rationale for DER-Specific Procurement Stream

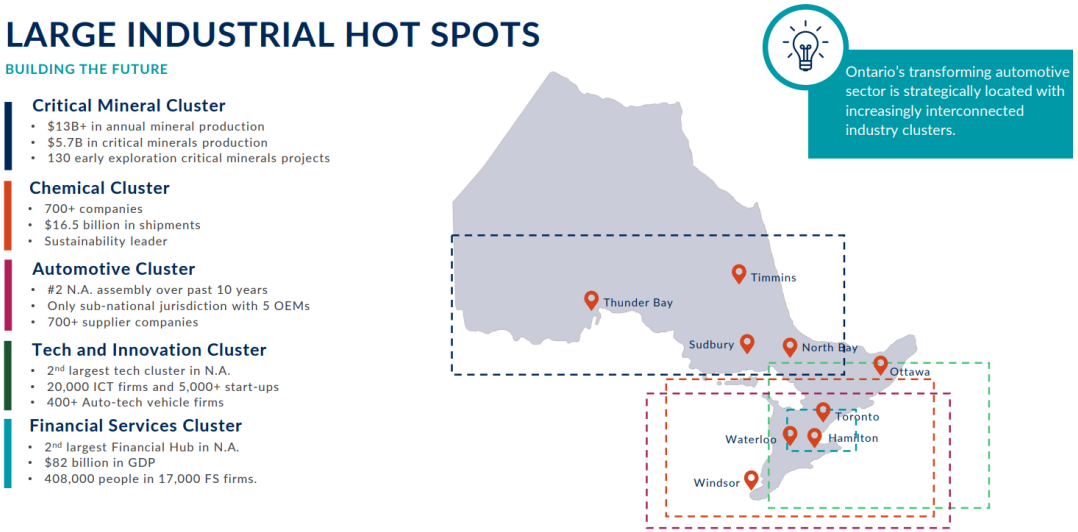
- Creating a dedicated procurement stream for DERs would enable Ontario to leverage these resources effectively while addressing their unique characteristics, distinct from large-scale generation projects:
  - **Limitations of Current IESO-led Procurement Structure:** IESO's procurement processes favour large-scale resources that participate in the wholesale market, where DERs, particularly those under 1 MW, are excluded from this market due to current rules, and upcoming changes do not yet address DER integration
  - **Distinct Development Requirements for DERs:** DERs differ from large-scale resources in development timelines, permitting, and grid integration – they can be deployed faster, face simpler permitting, and often encounter fewer community challenges
  - **Streamlined Procurement Approach:** A dedicated procurement stream would reduce red tape/administrative burdens, speed up approvals, and address Ontario's immediate grid needs without the lengthy timelines associated with large projects
  - **Simplified Contract Terms for Greater Participation:** A DER-specific procurement process would enable simplified contracts that are more accessible for smaller operators, fostering participation
  - **Capturing Value-Stack Benefits Unique to DERs:** DERs offer localized benefits like voltage support, load balancing, and peak shaving that large-scale resources cannot provide, and a dedicated procurement stream would help Ontario leverage these advantages, benefiting distribution networks and local communities while creating a more resilient energy system

Preparing for the Future

- Establishing a DER-specific procurement stream is essential for preparing Ontario's energy landscape for the future and aligns with the province's long-term vision for integrating DERs:
  - Increasing Customer Participation: Greater engagement from residential, commercial, and industrial customers, by simplifying processes and creating clearer pathways for investment
  - Enabling Incremental New DER Development: Streamlined procurement will facilitate the rapid deployment of DER projects
  - Meeting Local Needs with Tailored Services: A DER-specific stream enables localized energy solutions to address unique community challenges
  - Long-Term Vision for DER Integration: A DER-specific procurement stream supports a long-term vision for a flexible, responsive, and customer-centric energy system
  - Alignment with Local Flexibility Markets: Enables the development of new DERs in the near-term as Ontario's LDCs begin to deploy local markets for distribution services (i.e., NWS acquisition method)
- Overall, establishing a DER-specific procurement stream, separate from existing IESO processes, will position Ontario to rapidly deploy beneficial DERs in the near-term, while enabling the market to evolve and become responsive to future LDC needs for localized energy solutions

Load Growth Hot Spots – Clear Role for DERs

- LDC-led DER procurements can help and be tailored to address energy and capacity needs that are emerging at strategically significant locations that have been identified by Invest Ontario as experiencing industrial growth
- Invest Ontario has identified that customers are seeking quicker project connection timelines and certainty of electricity service:
  - Quick deployment ability of DERs is an attractive option to supplement and avoid potential delays and opposition related to larger-scale infrastructure procurement and network expansion to meet new load
  - LDC-led procurements would not be constrained by minimum size or market participation requirements and other complications (such as those encountered in IESO-led procurements)

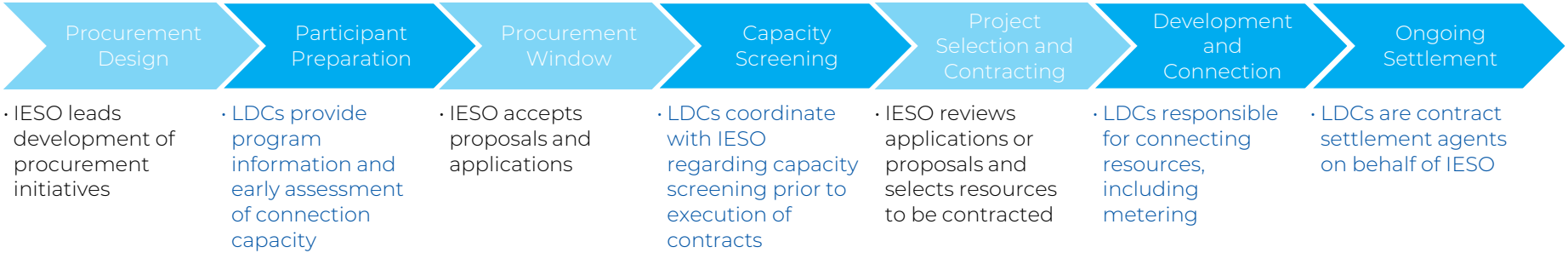


4. LDC-Led DER Procurements

Today's IESO-led Procurements – LDCs Should Have an Active Role Procuring and Contracting

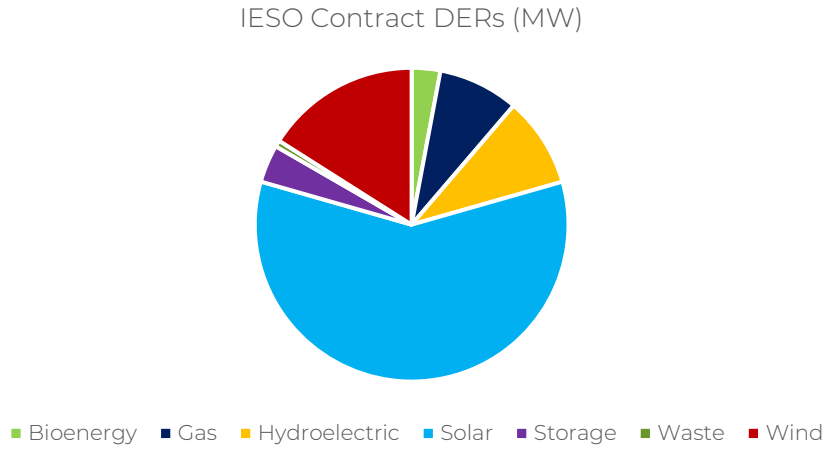
- LDCs have historically played, and continue to play, a significant role in DER procurement and contract management by:
  - Advertising programs on their websites and providing connection availability information to prospective developers
  - Coordinating with IESO on capacity screening during the RFP/procurement phase
  - Managing resource connections, including entering into connection agreements
  - Acting as settlement agents on behalf of IESO post-contract, in accordance with OEB's Retail Settlement Code
- Given current roles of LDCs, it is not unreasonable for LDCs to take on a more active role in DER procurements

Typical stages of electricity resource procurements and current role of LDCs



Historical Perspective of DERs in Ontario

- Graph to the right shows supply capacity of DERs contracted by IESO as of Q2 2024
- Majority of embedded contracts are microFIT contracts with contracted capacities of 10 kilowatts or less
- LDCs measure the amount of electricity injected onto the grid using meters owned and operated by LDCs
- Contract payments issued according to LDCs' standard billing cycle
- 99% of IESO's contracts for DERs are solar generation

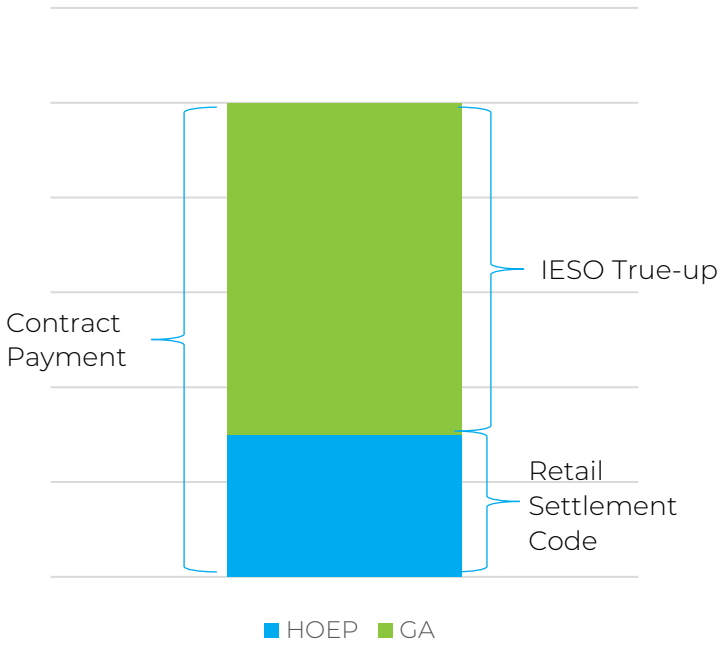


microFIT Contracts

Fuel Category	No. of Contracts	Contract Capacity (MW)
Bioenergy	1	0.01
Solar	29,960	257.87
Wind	3	0.01
Grand Total	29,964	257.89

IESO Contract Payments Made by LDCs

- Many of IESO's contracts are "contracts for difference", whereby contract payments reflect the difference between what is received by the market and the contract price
- While IESO is ultimately the contract counterparty with the DER owner, LDCs make contract payments on behalf of IESO
- LDCs make the full contract payment to DER contract holders on behalf of IESO
    - LDCs are obligated to pay HOEP for all electricity supplied by DERs per the Retail Settlement Code
    - Therefore, each month LDCs submit true-up settlement statements to IESO, to account for differences between HOEP and contract prices
    - This difference is accounted for in GA



Example – Missed Opportunity?

- IESO's Peak Perks™ program employs smart thermostats to incentivize participants for lowering their electricity consumption during peak summer times
- As of February 2024, more than 100,000 Ontario residents have enrolled
- Upon enrollment, customers receive a $75 virtual prepaid Mastercard, plus an additional $20 each year they remain in the program – participants may be activated for up to 10 events annually
- Summer of 2023, Peak Perks was activated on six occasions, with the final event in early September resulting in a maximum one-hour peak demand reduction of 54 MW
- Although the program is technically capable of doing so, it is not designed to offer any benefits to the local distribution grid
- Improved coordination between bulk system benefits and local needs could allow these resources to be utilized not only for bulk capacity but also to address local distribution needs

IESO-led Procurements Not Intended for High DER Deployment

- Current IESO-led procurement model primarily (and rightly) focuses on bulk system benefits, such as delivering energy and capacity to meet bulk system needs – these benefits are essential and are appropriately the priority for IESO
- As a result, IESO-led procurements well suited for large-scale facility acquisition, but a barrier to small-scale DER deployment, for example:
  - Lengthy process
  - Minimum standalone size of 1 MW
  - Must register as wholesale market participant
  - Municipal support resolution requirements
  - Complex RFP with rated and mandatory evaluation criteria
  - Contract negotiation
- This bulk-centered focus and process significantly limits the role of LDCs (and DERs), leaving them in a reactive position
  - LDCs must evaluate each DER connection request on a case-by-case basis, often lacking resources or frameworks needed to proactively plan for DER integration in areas where local grid capacity or customer demand could benefit most
  - This reactive model can result in missed opportunities for strategically developing DERs in high-impact locations, delaying potential benefits like enhanced reliability, customer empowerment, and local economic growth
- A more effective DER procurement approach would empower LDCs to proactively identify areas of high potential for DER integration, aligning DER development with specific local needs and maximizing both system-wide and localized benefits across Ontario's grid

Strong Rationale for LDC-Led DER Procurements

- LDCs well-positioned to take on a greater role in DER procurement:

- **IESO Focus on Large-Scale Procurements:** IESO focused on large projects and lacks capacity for smaller, localized DER procurements – making LDCs the better administrator
- **More Accessible Programs:** LDC programs would be tailored to smaller-scale procurement without need to impose minimum size thresholds (e.g., 1 MW), require DERs to register as wholesale market participants, or have complex and lengthy RFP evaluation and contract negotiation processes
- **Current Role:** LDCs handle key DER contract-related processes already (settlement, connection, admin) and have experience from past programs like FIT
- **Customer Access and Choice:** LDCs have direct relationship with customers and can effectively promote DER programs and drive participation and reduce red-tape
- **Distribution System Visibility:** LDCs have insight into grid capacity and can target DER programs to areas with available or planned capacity for maximum benefit
- **Integration with NWS:** LDCs can align DER procurements with NWS needs, using DERs to reduce infrastructure costs (i.e., value-stacking)
- **Growing Grid Capabilities:** LDCs are investing in grid modernization, improving their ability to integrate and manage DERs
- **CDM Program Experience:** LDCs have a track record of delivering CDM programs, which equips them to handle DER programs effectively
- **Ability to Target:** LDCs can target programs based on local needs, customer preferences and emerging resources (e.g., EV smart charging programs)

Expanding LDCs' Role in DER Procurements Support Ontario Government Objectives

- An enhanced LDC role addresses multiple objectives and priorities of Ontario's "pro-growth" energy and economic development agenda as expressed in *Ontario's Affordable Energy Future* and other policies such as the proposed electricity demand-side management framework

- LDC-led DER procurements support:
    - Meeting expected increase in electricity system demand, driven by economic growth, housing development, electrification and the energy transition
    - Making programs more responsive to local customer needs through enhanced involvement of LDCs
    - Giving customers (i.e., residential, business, farm customers) greater choice and access to programs to help manage their energy bills, participate in the wholesale market (or not) as well as resiliency
    - Providing household and businesses more choice and control over their energy sources
    - Improving the reliability of the electricity system with cost-effective demand-side resources, reducing need to build new electricity infrastructure (e.g., distribution, transmission, generation)
    - Expanding use of DERs where cost-effective and beneficial to meeting local and system needs
    - Providing clarity and predictability to LDCs so they can modernize their infrastructure to provide energy and services that customers need into the future

LDC-Led DER Procurements Incremental to Activities under Current Framework

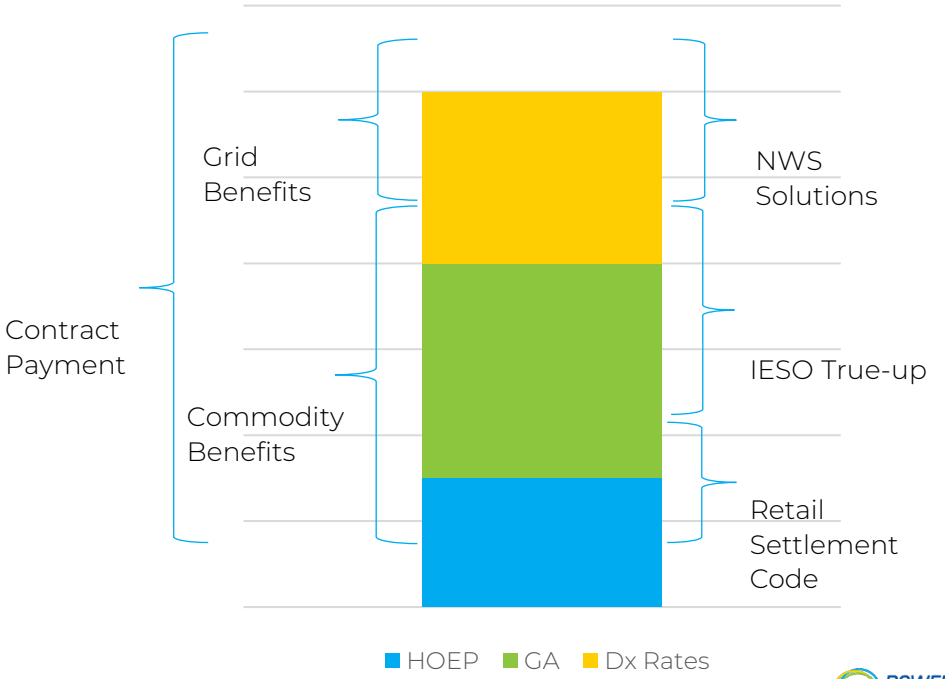
- LDCs would assume a proactive role in DER procurements, with activities building on their existing functions, where new responsibilities would include:
  - Development of programs by establishing eligibility criteria and procurement types, ensuring alignment with local hosting capacity and specific DER resource needs, such as NWS benefits
  - Accepting applications or proposals in response to procurement initiatives
  - Evaluating applications and selecting resources for contracting based on the established procurement design

Typical stages of electricity resource procurement and proposed incremental role of LDCs (green)

Procurement Design	Participant Preparation	Procurement Window	Capacity Screening	Project Selection and Contracting	Development and Connection	Ongoing Settlement
· LDCs lead design of DER procurement initiatives, including contract design	· LDCs provide program information and early assessment of connection capacity	· LDCs accept proposals or applications during the procurement window	· LDCs coordinate with IESO regarding capacity screening prior to contract execution	· LDCs support review of proposals or applications and arrange contracting	· LDCs responsible for connecting the resource, including metering	· LDCs are settlement agents on behalf of IESO

LDCs Would Continue to Recover Costs Associated with Bulk System Benefits From IESO

- LDCs make full contract payments to DER contract holders
  - LDCs obligated to pay HOEP for all electricity supplied by DERs per the Retail Settlement Code
  - LDCs submit settlement statements to IESO to account for bulk system benefits and true-ups
  - If applicable, LDCs' payments to DERs could attribute applicable distribution services as NWS, consistent with OEB guidelines on NWS to LDCs
- To be clear, LDCs would not be taking on any incremental obligation with respect to paying for bulk system benefits

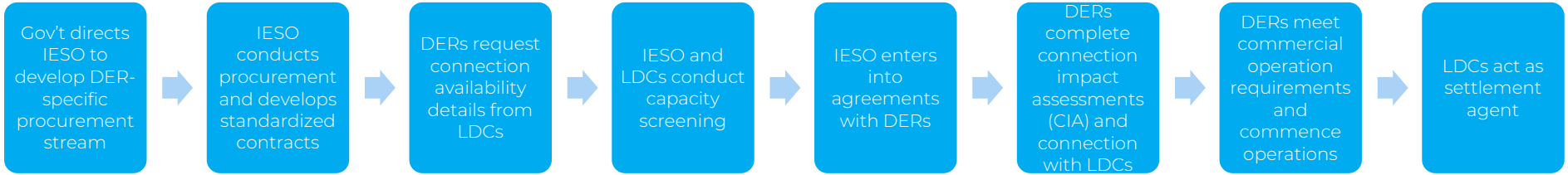


High-level Overview of Proposed Process

- The overarching approach could leverage mechanisms already established in past CDM frameworks
- Master service agreements between IESO and LDCs establish energy and capacity targets, expectations for costs, milestones dates, EM&V requirements, etc.
- DERs procured by LDCs would be accounted for in IESO resource adequacy assessments to avoid duplication and over-procurements (between IESO and LDCs)
- Cost recovery for bulk system benefits would flow through existing mechanisms via the master service agreement with IESO, where LDCs would not take on financial or performance risks associated with DER bulk system benefits

Comparison of Approaches

Historical Approach (IESO-led DER procurements)



Current Approach (IESO-led procurements)

Proposed Approach (LDC-led DER procurements)

Examples of DER Procurement Processes

- Procurement processes could depend on customer type (e.g., residential, commercial, industrial) and/or resource type (solar, storage, DR, etc.), and could be used in multiple combinations
- Examples of procurement types include:
  - **Programs:** Initiatives designed to encourage DER development or incentivize participation, typically including incentives, defined eligibility criteria and objectives (e.g., DR programs, EV smart charging programs, etc.)
  - **Standard Offering:** Standard prices or contracts for eligible resources, offering simplicity and certainty for participants, especially for smaller-scale DER investors
  - **RFP/Contract:** Competitive open-call procurement where projects are selected based on predefined criteria
  - **Local Capacity Auction:** Market-based auction where DERs are procured for specific locations with capacity constraints, thereby optimizing grid performance
  - **Local Energy Market:** A platform allowing DER owners to sell excess energy or grid services to local users or the grid, fostering decentralized energy trading and increasing revenue opportunities

Actions to Take Now – Implement LDC-Led DER Procurements

- Ontario government should issue policy direction to OEB and IESO to enable LDC-led DER procurements as well as make grid modernization investments necessary to integrate and manage DERs
- Overall direction should:
  - Provide customers and DER investors with opportunities and incentives to install DERs to provide energy and services back to the electricity grid, such as small-scale non-emitting generation and storage
  - Allow LDCs flexibility on how to procure DERs, subject to OEB approvals (e.g., procurement processes and/or procurement programs, contracts)
  - Give direction to OEB to allow for cost recovery and remuneration for LDCs to administer DER procurements
  - Establish ex-post evaluation of DERs procured by LDCs
  - Establish settlement of contracts between LDCs and DERs via IESO through the GA for province-wide resource adequacy benefits
  - Convey that DERs procured by LDCs are to be an input into respective LDC planning, IESO power system planning, IESO supply procurements
  - Provide clarity to LDCs on what are considered grid modernization activities, particularly those related to facilitating greater DER penetration (e.g., visibility, operation, control)
- Note: Power Advisory believes that implementation of LDC-led DER procurements does not require legislative, regulatory, or wholesale market rule changes

Regulatory and Remuneration Framework for LDCs and DERs

- A range of regulatory and remuneration frameworks can be considered:
  - Performance Incentives: Financial rewards based on achieving specific performance metrics (e.g., energy savings targets)
  - Shared Benefits: Agreement to share benefits resulting from DER procurements
  - Fee for Service: Administration fee for implementing programs
  - Performance-Based Rate Making: Adjusting rates based on LDC performance delivering DER programs
  - Forward-Looking and Ongoing Development of Regulatory Framework
    - Examining how distribution planning processes can improve to use of DERs to defer traditional infrastructure, forecast DER uptake, optimize DER siting and connections
    - Identifying foundational and more advanced grid modernization investments needed to facilitate, integrate, and manage high(er) rates of DER penetration
    - Reviewing how the roles and responsibilities of LDCs in a future of high DER penetration differ from traditional ideas of a “distribution system” and “distribution activity”

5. Conclusions

Proposed Approach – "Walk-Jog-Run" for DER Integration

- Overall, we are presenting a framework that is consistent with a walk-jog-run approach, that leverages experience of Ontario's LDCs and capabilities of Ontario's DER providers and sets future foundation
    - **"Walk" Phase:** Initiate immediate development of incremental new DERs by focusing on an LDC-led DER procurement and enabling foundational programs and investments (i.e., grid modernization), support LDCs as they evolve toward DSO roles, preparing the ground for future flexibility markets
    - **"Jog" Phase:** Build on this foundation with enhanced coordination between LDCs and IESO, enabling local flexibility markets, expand DER capacity to meet Ontario's near-term supply needs, providing benefits across both distribution and bulk power systems
    - **"Run" Phase:** Fully integrate DERs into wholesale and distribution markets, with refined market rules, systems, and tools developed by IESO to support DER aggregation and broad participation, this phase establishes DERs as a critical component of Ontario's resilient and dynamic grid
- Enabling an LDC-led DER procurement stream in the near-term builds on LDCs' existing responsibilities and aligns with development of future local markets for distribution services and upcoming IESO wholesale market enhancements to better integrate DERs

Expected Outcomes and Stakeholder Benefits

- There are multiple benefits to this proposed approach:
  - **Customer Participation:** Customers gain more options to participate in energy markets, access potential bill savings, and actively contribute to grid reliability and sustainability through DER programs
  - **Accelerated DER Deployment:** Addresses Ontario's supply needs more efficiently, leveraging both distribution and bulk systems, and reducing red tape
  - **Enhanced Grid Flexibility and Resilience:** Local and bulk systems benefit from DERs' flexibility, improving reliability and adaptability
  - **Aligned Stakeholder Goals:** This approach ensures that IESO, LDCs, DER providers, and customers work cohesively, with complementary participation in both wholesale and distribution markets
  - **Maximized DER Value:** Evolving market rules and tools unlock DERs' full potential, offering a range of services for improved system performance and value for all stakeholders

Need for IESO Engagement in Proposed Approach

- The proposed approach allows IESO to continue to focus on matters related to wholesale market participation, which continues to be a priority for DER providers:
  - Advancing the Enabling Resource Programs: IESO should sustain its efforts in the Enabling Resource Programs to support the evolving needs of DERs and ensure these resources are fully integrated into Ontario's energy landscape
  - TDWG Coordination: IESO should continue to lead the Transmission-Distribution Working Group (TDWG), fostering collaboration and alignment between transmission and distribution system operators for smoother DER integration
  - Post-Market Renewal Optimization: Following the launch of the Market Renewal Program, IESO should continue seeking ways to optimize DER participation, ensuring these resources can effectively compete and contribute to the wholesale market
  - Removing Market Barriers: By identifying and addressing barriers, IESO can enable market participants to fully provide the services they are capable of, enhancing the reliability and efficiency of Ontario's electricity grid

DERs – The Future in Ontario

- *Future end goal*: "If DER is to become a central component of the power system, it needs to be fully integrated into the operation of the power system and actively provide support, in a manner similar to larger generators."
  - Energy Transformation Taskforce, *Distributed Energy Resources Roadmap*, prepared for the Western Australian Government, December 2019

- As DER penetration increases, there is an increased need to evolve policies, regulations, and market rules to advance more active participation as well as more active management and control of DERs, such as:
  - IESO's TDWG and Enabling Resources Program continue work (i.e., wholesale market integration)
  - LDCs will need to invest in grid modernization hardware and software as well as workforce to enable more active participation in markets and abilities to offer additional value and services to the system (i.e., DERs providing services to the local network and/or creating local markets)
  - Ensure technical and safety connection standards (i.e., OEB and Electrical Safety Authority) are consistent and aligned with active DER participation

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Glossary

APO	Annual Planning Outlook
BAU	Business as Usual
BTM	Behind-the-meter
CDM	Conservation and Demand Management
CIA	Connection Impact Assessment
DER	Distributed Energy Resource
DR	Demand Response
DSO	Distribution System Operator
E-LT	Expedited Long-Term
ESC	Energy Storage Canada
EV	Electric Vehicle
FIT	Feed-in Tariff
FTM	Front-of-the-Meter
GA	Global Adjustment
GHG	Greenhouse Gas
GW	Gigawatt
HOEP	Hourly Ontario Energy Price
IEP	Integrated Energy Plan
IESO	Independent Electricity System Operator
LDC	Local Distribution Company
LT	Long-Term
LT-1	Long-Term 1
MT-1	Medium-Term 1
MW	Megawatt
NWS	Non-Wires Solution
OEA	Ontario Energy Association
OEB	Ontario Energy Board
RFP	Request For Proposals
T-D	Transmission-Distribution
TWh	Terawatt-hour