Introduction to the IESO and Energy in Ontario

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Today's Discussion

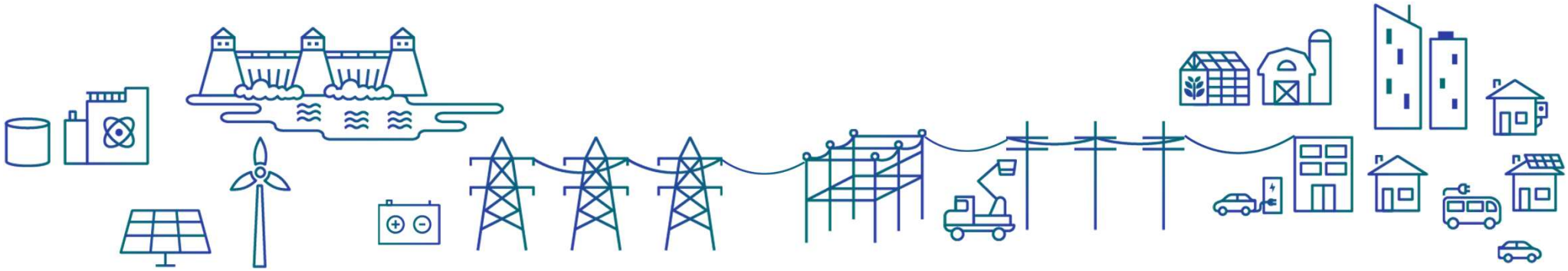
- An overview of the IESO's role in Ontario's electricity sector
- An introduction to Ontario's electricity market, generation fleet and transmission system
- Ongoing and upcoming resource/generation procurements

Introduction to the IESO

Background: The IESO's Role in the Sector

The IESO:

- Manages Ontario' bulk power system through the operation of the wholesale energy market
- Plans for the province's future energy needs
- Procures energy and capacity resources through long-term contracts and wholesale energy markets



Everyday, the IESO interacts with:

Generators (Suppliers) → **Transmitters** → **Local Distribution Companies (LDC)** → **Energy Consumers**

IESO Overview - Reliably Operate the Provincial Power System

Balancing supply and demand second-by-second

Ensuring enough to meet demand 24/7

Working with provincial, state and regional System Operators

Leading the sector on Cyber Security

IESO Control Room

Average 1,000 daily phone calls

Computerized phone system – prioritized during disturbances

Over 22,000 SCADA/Market data points

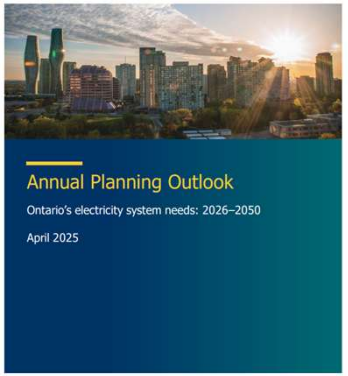
Many are scanned as much as every 3 seconds

288 energy and operating reserve daily dispatches

IESO Overview – Plan for Ontario's Future Energy Needs (1 of 3)

Annual Planning Outlook

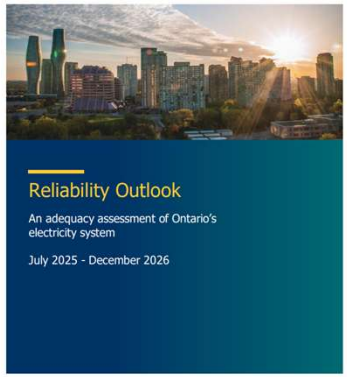
- Forecasting long-term electricity Demand using a 20+ year forecast.
- Includes; projected demand, a resource adequacy assessment, transmission consideration and performance indicators.
- Develops an outlook on transmission and supply to assess resource adequacy to meet that demand and uses the results of the adequacy studies to inform "Planned Actions" to invest in the grid



IESO Overview – Plan for Ontario's Future Energy Needs (2 of 3)

Reliability Outlook

- Every calendar quarter the IESO publishes the Reliability Outlook which looks 18 months into the future
- Assesses Ontario's demand forecast, resource adequacy projections, and the expected state of the province's transmission assets to help inform efficient equipment outage scheduling.
- Includes; adequacy and security of resources and transmission to meet Ontario's forecast demand.



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IESO Overview – Plan for Ontario's Future Energy Needs (3 of 3)

Identifying future needs and informing the development of policy and procurement:

- The IESO translates planning and operational information into a series of planned actions.
- Looking at the province's needs over a variety of timeframes, specific targets are provided in the case of near-term Capacity Auctions but also offer increasing granularity around longer-term needs.

Click here to return to the overview

The Electricity Sector

Electricity Sector – Transmission (Physical Power System)

- Once electricity is generated, it takes a journey across Ontario on high-voltage transmission lines.
- Lines that are **50 kilovolts or higher** are consider part of the **Transmission system.**
- Approximately **30,000 kilometres** of high-voltage transmission lines criss-cross the province.
- The **IESO** directs the flow of electricity across this network and transmission companies handle the day-to-day operation and maintenance of the lines and towers.
- Transmitters are paid through a regulated **uplift charge** that's added to all electricity purchased through Ontario's market.

Generators → Transmitters

Ontario's Electricity System

SELECT A LAYER

- Generation
- Transmission

This layer shows the high-voltage IESO-Controlled Grid which includes 115 kilovolt (kV), 230 kV, and 500 kV transmission lines that span the province. There are over 30,000 kilometres of transmission lines in Ontario.

- 500 kV
- 230 kV
- 115 kV

Note: For areas where two transmission lines run parallel, the higher voltage line is shown.

- Planning Regions
- Oil & Gas Pipelines

MAP COMBINATIONS

- Generation + Transmission
- Planning Regions + Generation + Transmission
- Oil & Gas Pipelines + Planning Regions

Please note that this map is used for illustrative purposes only. All locations are approximate.
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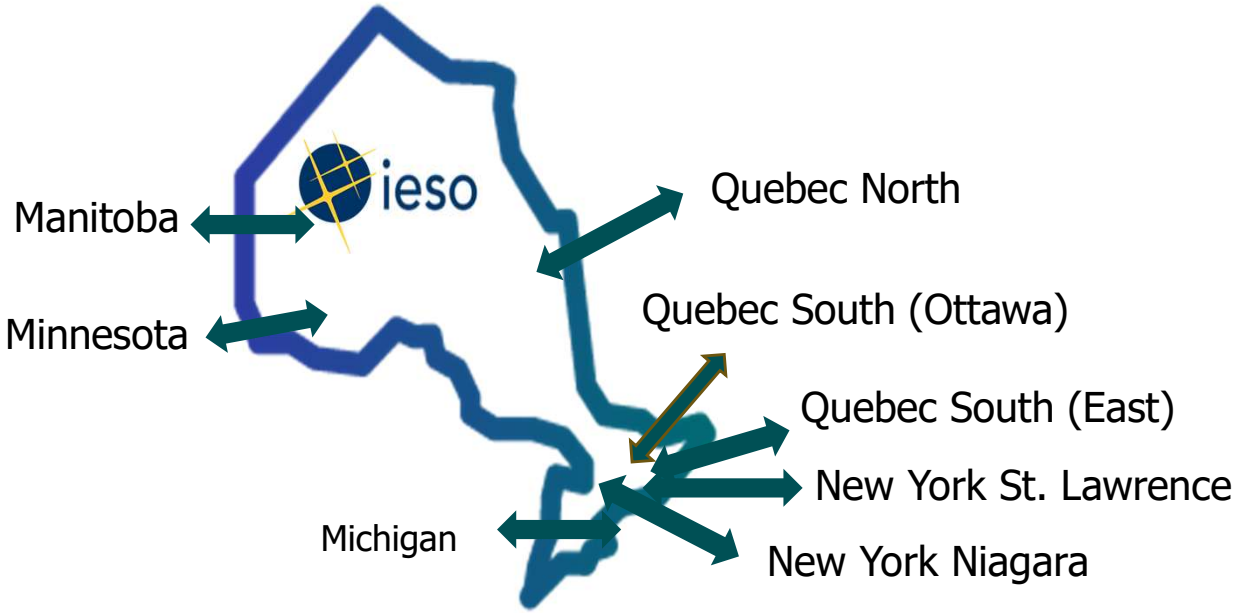
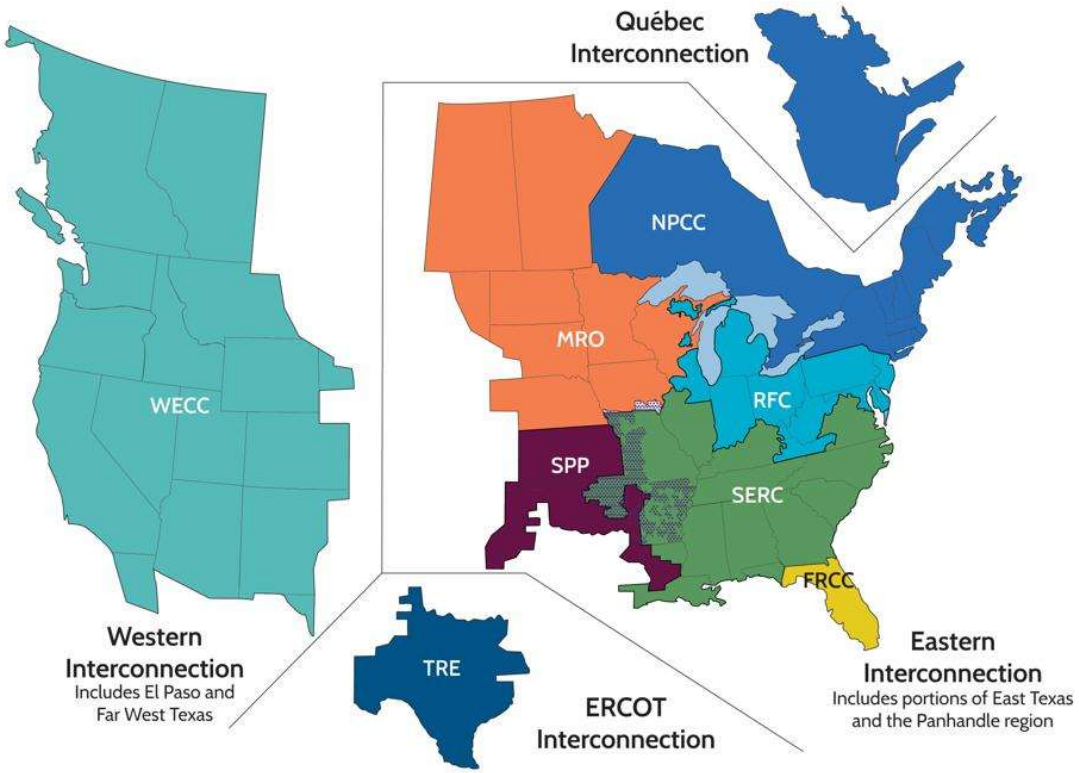
Electricity Sector - Interconnections



- Ontario's transmission systems is connected to neighbouring provinces and states.
  - **Manitoba, Quebec, New York, Michigan and Minnesota**
- Allows electricity to be imported into and exported out of the province.
- Being part of this larger, interconnected grid is **important for reliability**.

Regional Power Grids



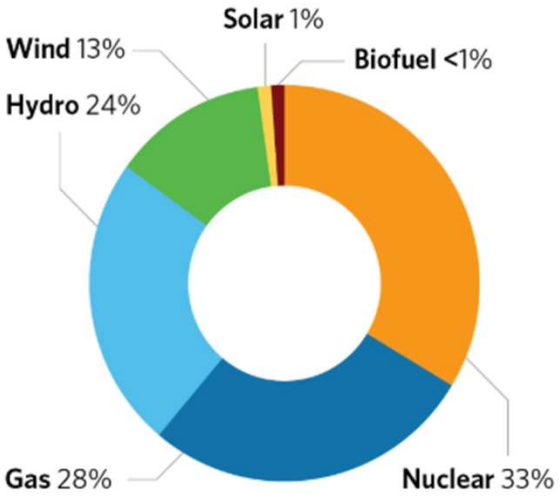
Electricity Sector - Generators

- Installed capacity of more than **35,000 megawatts**
- Majority of our generation is dispatchable
- **Dispatchable** generators submit **offers into the market** to sell their electricity
- **Non-dispatchabl**e generators **submit schedules or forecasts** to the IESO indicating how much electricity they will likely inject for a given day

Generators

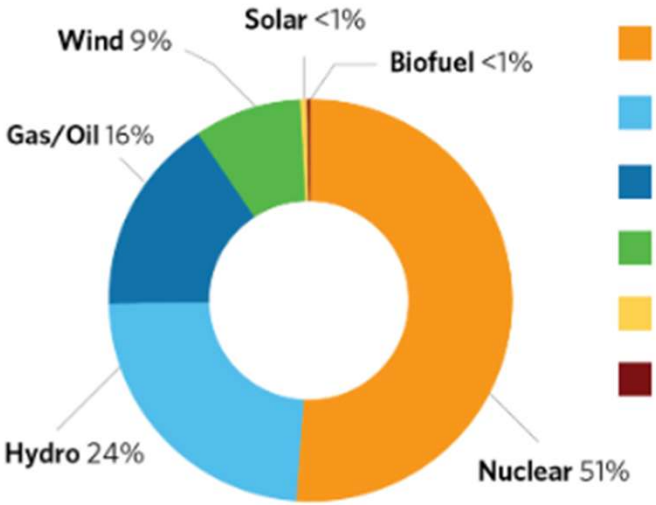
Ontario's Electricity Supply Mix

Grid-connected capacity in 2024 totalled 37,205 MW.



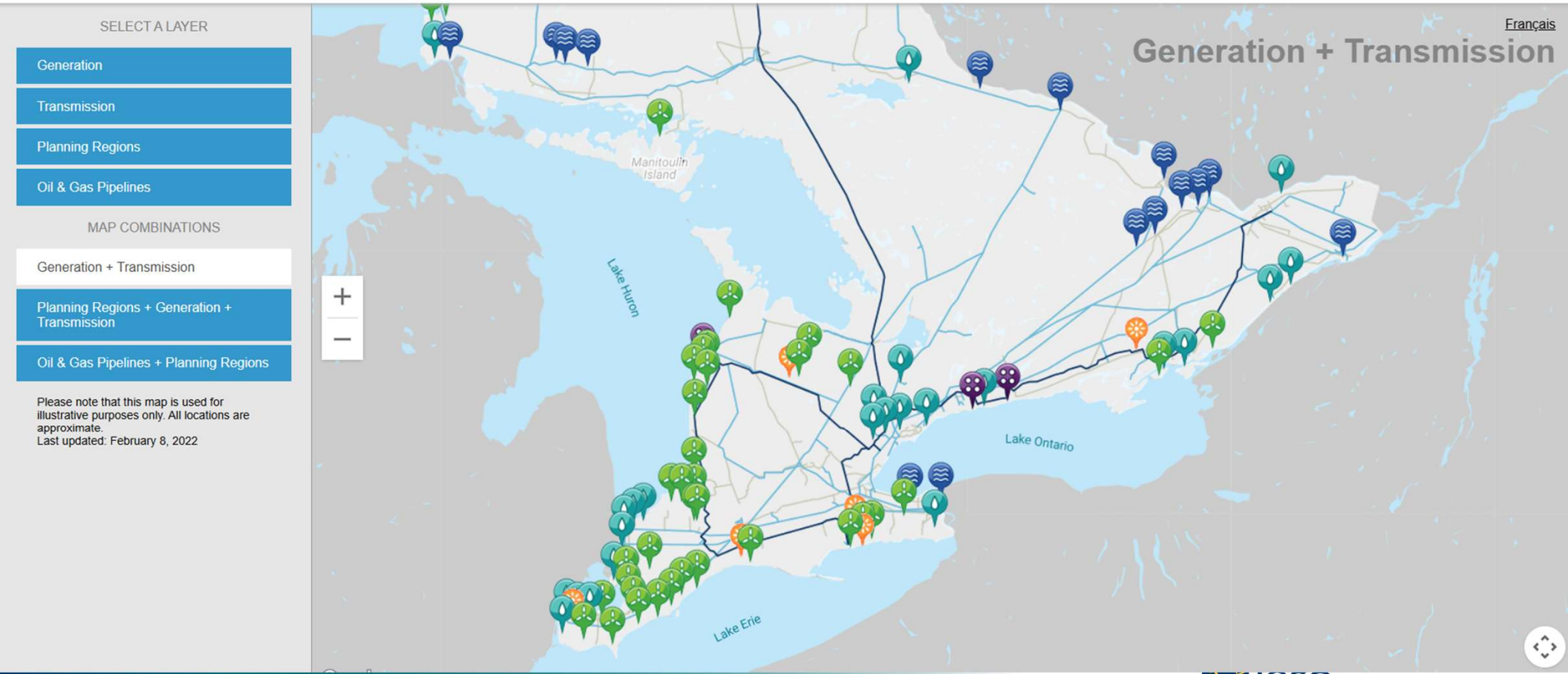
Nuclear	12,184 MW or 33%
Gas/Oil	10,450 MW or 28%
Hydro	8,862 MW or 24%
Wind	4,943 MW or 13%
Solar	478 MW or 1%
Biofuel	287 MW or <1%

2024 Energy Output

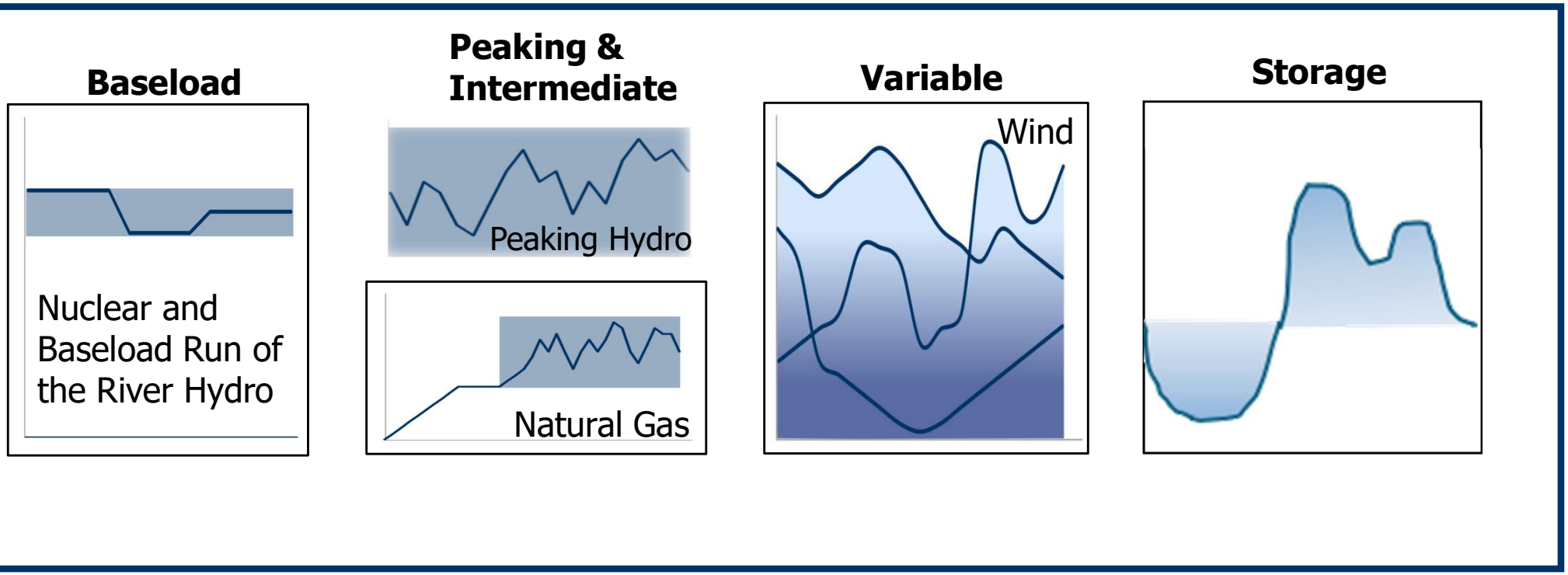


Nuclear	80 TWh or 50.9%
Hydro	37.8 TWh or 24.1%
Gas/Oil	24.7 TWh or 15.7%
Wind	13.4 TWh or 8.5%
Solar	0.8 TWh or <1%
Biofuel	0.4 TWh or <1%

Ontario's Electricity System



Ontario's Generation Fleet: Operating Characteristics



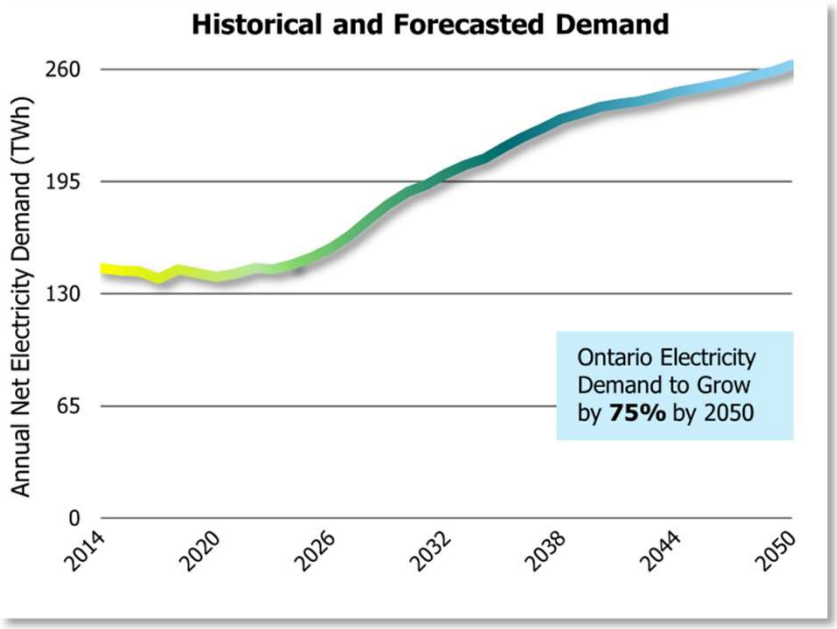
Ontario's Changing Electricity Landscape

This is a **pivotal point** for the electricity system. Ontario is entering a period of growing needs – by 2050, **electricity demand is expected to grow by 75%.**

These needs are being driven by **continued electrification** as well as **recent developments in industrial and data centre growth**.

This demand growth is happening in the midst of expiring generator contracts and nuclear refurbishments.

To meet the emerging needs, **Ontario will need to reinvest in, and acquire new, electricity infrastructure**, including new supply, transmission and distribution assets.



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IESO Overview – Resource Adequacy and Procurement

- The IESO plays a key role in Procurement of electricity resources, working under the policy direction of the government, and under the authority granted through the IESO Market Rules.
- This includes designing and administering procurement processes to acquire new electricity resources or re-contracting existing resources.
- To address the emerging needs, a multi-pronged approach has been implemented to maintain our reliable, affordable and sustainable electricity system.

The **Resource Adequacy Framework** includes five main mechanisms:

1. Capacity Auction

2. Medium-term Commitments

3. Long-term Commitments

4. Programs

5. Bilateral Negotiations

Long-Term 2 (LT2) Procurement Overview

The IESO is undertaking annual long-term procurements to meet the needs emerging in 2029 to 2034

LT2 Procurement Window	Energy Target	Capacity Target
Window 1	3 TWh	600 MW
Window 2	1-3 TWh	400 MW
Window 3	2-4 TWh	300 MW
Window 4	2-4 TWh	300 MW

Energy:

- 14 terawatt-hours (TWh) of resources able to inject energy at all times (approximately 6,000 MW)
- E.g., bioenergy, wind, solar

Capacity:

- 1,600 megawatts (MW) of dispatchable resources
- E.g. gas, storage, bioenergy

Local Generation Program

Background and Context

The LGP is a **contracting program**, focused on locally sited, distribution-connected generation facilities sized between 100kW and 10MW.

- **Re-Contracting Stream**: Over 1,600 distribution connected energy generation contracts are expiring over the next 10+ years
- **New Build Stream:** Recognizing that, the IESO is engaging on the design of **a re-contracting stream** to offer opportunities for continued investment and operations in those assets.
- Given the increasing demand for energy in Ontario, the IESO is also seeking to create a to support new distribution connected generation throughout the province.

Program Goals – Local Generation

- Simplify participation for suppliers
- Ensure cost-effective re-contracting of existing assets
- Encourage new investments in local generation
- Support municipal clean energy goals and regional reliability

Re-contracting: Eligibility

- Available for energy producing technology types such as **biogas, wind, solar, and gas-fired** generators (including CHPs)
- Facilities with contracts expiring within 5 years of a given window:
  - Example: In a 2026 application period, facilities with contracts expiring before 2031 would be eligible. In 2027, contracts expiring before 2032 would be eligible, etc.
- Leveraging the design of the IESO's medium-term procurements, the IESO is proposing 5-year re-contracting terms
- This means that a facility with a contract expiring in 2030 that bids in 2026 could be awarded a new contract that runs from 2031 to 2036

New Build: High Level Design Proposal

- A technology neutral approach for energy generation offering long-term contracts (20 years);
- Target quantities may be informed by both provincial-wide energy needs and locational / regional considerations; and,
- Similar to the Long-Term 2 procurement, other policy considerations may be applicable (e.g. economic participation in the project by an Indigenous Community, Municipal and LDC support, agricultural land use considerations).