Reliability Outlook

An adequacy assessment of Ontario's electricity system

October 2024 to March 2026

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Executive Summary

Ontario's electricity system is prepared for the next 18 months and is expected to have adequate supply for the duration of the Outlook period. Ontario's diverse supply mix continues to help maintain reliability as evidenced by its performance this past summer, when the system performed well during one of the highest peaks experienced in the past 10 years.

Following a summer of warmer-than-normal conditions, electricity demand is projected to increase by 1.7 per cent in 2024. This is forecast to increase to 2.3 per cent in 2025 owing to the addition of large industrial loads to the grid, increasing electrification throughout the economy, and growing economic activity resulting from falling interest rates.

Throughout the Outlook period, the system will be adequate under normal weather conditions. The system is also expected to be adequate during extreme weather conditions with the availability of up to 2,000 MW of imports from neighbouring jurisdictions and other operating actions available to ensure reliability.

Refurbishment of Ontario's nuclear resources is ongoing, with up to three units on outage at any one time across the Bruce and Darlington facilities. Refurbishment of Unit 1 at Darlington Nuclear Generating Station is ahead of schedule, and the unit will be back online by December 2024 – four months earlier than anticipated. Other refurbishment schedules remain on track, while the IESO anticipates the retirement of two units at Pickering by the end of 2024.

In addition to Darlington G1's return to service during this Outlook period, system reliability is further supported by both firm and planned resources including:

- Connection of the 235 MW Oneida energy storage project to the grid, expected in mid-2025;
- Resources secured through the annual Capacity Auction, with 1,310 MW secured for the 2024-25 winter obligation period; and
- All 286 MW in new capacity procured via the Same Technology Upgrades Solicitation, which will begin to come online in May 2025.

Multiple new transmission lines are under development that will increase available supply starting mid-decade. In the immediate term, the Wataynikaneyap Power Transmission Project has been completed, and 13 of the 17 remote First Nation communities in the project are now connected to the IESO-controlled grid in the Northwest. The IESO is also anticipating both the electricity transfer capability into the Northwest and the flexibility and efficiency of the electricity system in that zone to improve once outages are completed, and the benefits of the East-West Tie Expansion – a new 230-kilovolt transmission line between Wawa and Thunder Bay – are fully realized by the end of this year. In the West, the first of two new 230 kV circuits from Chatham SS to Lakeshore SS has just come into service, with the companion circuit expected to be in-service imminently.

As always, the IESO is actively co-ordinating and planning with market participants to maintain reliability. With more overlapping outage requests, some combinations of transmission and/or generation outages could create operating challenges. Market participants are strongly encouraged to plan ahead and closely co-ordinate with the IESO before scheduling outages, particularly in advance of and around the Market Renewal Program's scheduled go-live date in May 2025, when additional outage co-ordination may be required as system changes are tested and synchronized. Market participants are also reminded to be prepared for the possibility that outages may be rejected or rescheduled in order for the IESO to maintain power system reliability.

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1. Introduction

This Outlook covers the 18 months from October 2024 to March 2026, and supersedes the Outlook released on June 20, 2024.

The purpose of the 18-month horizon in the *Reliability Outlook* is to:

- Advise market participants of the resource and transmission reliability of the Ontario electricity system
- Assess potentially adverse conditions that might be avoided by adjusting or coordinating maintenance plans for generation and transmission equipment
- Report on initiatives being implemented to improve reliability within this time frame

This Outlook assesses resource and transmission adequacy based on the stated assumptions, following the Methodology to Perform the Reliability Outlook. Due to uncertainties associated with various assumptions, readers are encouraged to use their judgment in considering possible future scenarios.

Additional supporting documents are located on the Reliability Outlook webpage.

Security and adequacy assessments are published on the IESO website on a daily basis and progressively supersede information presented in this report.

For questions or comments on this Outlook, please contact us at 905-403-6900 (toll-free 1-888-448-7777) or customer.relations@ieso.ca.

2. Updates to this Outlook

2.1 Updates to the Demand Forecast

The demand forecast used in this Outlook is informed by actual demand, weather and economic data through to the end of August 2024, and has been updated to reflect the most recent economic projections including the Bank of Canada interest rate announcement on September 4. Actual weather and demand data for July and August 2024 are included in the tables.

2.2 Updates to Resources

This *Reliability Outlook* considers planned generator outages over the 18-month period, submitted by market participants to the IESO's outage management system as of September 5, 2024. Market participants are required annually to submit information to enable the IESO to conduct reliability assessments. This information, provided to the IESO through Form 1230, was submitted by April 1, 2024.

2.3 Updates to the Transmission Outlook

This Outlook also considers transmission outage plans that were submitted to the IESO's outage management system by August 13, 2024.

3. Demand Forecast

Forecasted energy demand is projected to grow over this Reliability Outlook period, with a projected increase of 1.7% for 2024 and 2.3% for 2025. Economic activity and underlying energy demand are expected to strengthen as interest rates are lowered over the course of the forecast. Additionally, electricity demand is increasing over the latter part of the forecast as large loads in the form of electric arc furnaces, electric vehicle (EV) battery manufacturing facilities, and data centres are forecast to be added to the system.

The IESO is responsible for forecasting electricity demand on the IESO-controlled grid. This demand forecast covers the period from October 2024 to March 2026 and supersedes the previous forecast released in June 2024. Tables of supporting information are contained in the 2024 Q3 Outlook Tables.

Weather-adjusted electricity demand increased by 0.9% to 138.0 TWh in 2023. The interest rate increases of 2022 and 2023 slowed economic growth, and in turn, the growth in electricity demand. For 2024, demand is projected to grow 1.7% to 140.3 TWh and is generally informed by the underlying economic trends. The Bank of Canada cut interest rates twice in recent months, and those cuts, combined with any further rate reductions over the remainder of 2024 may strengthen economic growth over the remainder of the forecast period. For 2025, demand is projected to increase 2.3% to 143.6 TWh as a number of large industrial loads are added to the system. The IESO continues to monitor the evolving economic situation and the timelines of these new large loads to assess the likely impacts to electricity demand over the 18-month horizon. Economic and population growth will lead to an increasing underlying trend in electricity demand over the forecast period. The demand for electricity is forecast to increase significantly over the latter part of 2025 as a number of large loads contribute to the growth trend.

The demand forecast faces significant uncertainties in both the economic outlook and in terms of new loads on the system. Interest rate impacts can lag significantly and carry a risk to economic growth. Geopolitical events contribute to economic uncertainty and instability should they spread to other countries. Additionally, the large industrial loads seeking connection to the grid represent a significant risk to the forecast should those projects be delayed, accelerated, cancelled, or altered in a significant way. At the same time there are a number of firms indicating interest in locating in or expanding production in Ontario that have not been included in the forecast due to a current lack of information or commitment. Should those loads materialize, 2025 electricity demand could exceed 144 TWh and approach 149 TWh in 2026.

Table 3-1 | Forecast Energy Demand Summary

Year	Normal Weather Energy (TWh)	% Growth in Energy
2024	140.3	1.67%
2025	143.6	2.34%

Table 3-2 | Forecast Seasonal Peaks

Season	Normal Weather Peak (MW)	Extreme Weather Peak (MW)
Winter 2024-25	21,898	23,120
Summer 2025	23,243	25,309
Winter 2025-26	22,294	23,189

Table 3-3 | Weekly Energy and Peak Demand Forecast

Week Ending	Normal Peak (MW)	Extreme Peak (MW)	Load Forecast Uncertainty (MW)	Normal Energy Demand (GWh)
06-Oct-24	17,958	19,542	554	2,480
13-Oct-24	17,677	18,652	786	2,474
20-Oct-24	17,594	18,049	507	2,442
27-Oct-24	17,819	19,080	392	2,520
03-Nov-24	17,977	19,337	318	2,557
10-Nov-24	18,645	19,991	416	2,603
17-Nov-24	19,307	19,679	601	2,668
24-Nov-24	19,989	20,274	342	2,749
01-Dec-24	20,218	20,908	607	2,803
08-Dec-24	20,779	21,528	409	2,872

Week Ending	Normal Peak (MW)	Extreme Peak (MW)	Load Forecast Uncertainty (MW)	Normal Energy Demand (GWh)
15-Dec-24	20,972	22,071	555	2,902
22-Dec-24	21,037	22,144	690	2,938
29-Dec-24	18,869	20,397	362	2,737
05-Jan-25	20,343	21,238	528	2,866
12-Jan-25	21,631	22,660	570	2,989
19-Jan-25	21,658	22,700	547	3,008
26-Jan-25	21,898	23,120	483	3,027
02-Feb-25	21,863	22,873	404	3,012
09-Feb-25	21,340	22,142	734	2,945
16-Feb-25	20,872	22,030	635	2,945
23-Feb-25	20,708	22,109	581	2,898
02-Mar-25	20,600	22,169	501	2,901
09-Mar-25	20,078	21,521	531	2,831
16-Mar-25	19,552	21,188	649	2,785
23-Mar-25	19,002	20,497	611	2,721
30-Mar-25	18,527	19,673	569	2,654
06-Apr-25	18,165	19,046	567	2,593
13-Apr-25	18,055	18,505	471	2,561
20-Apr-25	18,016	18,580	496	2,495
27-Apr-25	17,717	18,054	531	2,457
04-May-25	17,700	19,346	721	2,474
11-May-25	17,705	19,919	849	2,462
18-May-25	18,023	21,393	845	2,487

Week Ending	Normal Peak (MW)	Extreme Peak (MW)	Load Forecast Uncertainty (MW)	Normal Energy Demand (GWh)
25-May-25	18,008	21,371	1,175	2,426
01-Jun-25	19,640	22,086	1,330	2,507
08-Jun-25	20,037	22,442	1,292	2,551
15-Jun-25	21,746	22,679	1,055	2,621
22-Jun-25	22,341	23,485	835	2,680
29-Jun-25	22,819	24,422	754	2,743
06-Jul-25	22,937	24,519	1,016	2,743
13-Jul-25	23,196	25,020	814	2,864
20-Jul-25	23,243	25,157	838	2,925
27-Jul-25	23,217	25,309	1,035	2,944
03-Aug-25	23,139	25,230	841	2,960
10-Aug-25	22,878	24,914	958	2,883
17-Aug-25	22,838	25,029	985	2,905
24-Aug-25	22,800	24,863	1,362	2,875
31-Aug-25	22,909	24,713	1,413	2,857
07-Sep-25	22,199	24,083	1,370	2,737
14-Sep-25	22,288	23,454	680	2,715
21-Sep-25	21,032	22,365	781	2,630
28-Sep-25	19,426	21,557	420	2,596
05-Oct-25	18,454	20,392	554	2,563
12-Oct-25	18,174	19,101	786	2,555
19-Oct-25	18,079	18,480	507	2,523
26-Oct-25	18,303	19,524	392	2,600

Week Ending	Normal Peak (MW)	Extreme Peak (MW)	Load Forecast Uncertainty (MW)	Normal Energy Demand (GWh)
02-Nov-25	18,470	19,754	318	2,636
09-Nov-25	19,115	20,450	416	2,682
16-Nov-25	19,773	20,108	601	2,748
23-Nov-25	20,458	20,722	342	2,831
30-Nov-25	20,715	21,374	607	2,882
07-Dec-25	21,301	22,026	409	2,958
14-Dec-25	21,484	22,558	555	2,987
21-Dec-25	21,573	22,649	690	3,023
28-Dec-25	20,383	22,286	362	2,879
04-Jan-26	20,763	22,652	528	3,000
11-Jan-26	22,138	23,110	528	3,134
18-Jan-26	22,294	23,189	570	3,151
25-Jan-26	21,817	22,949	547	3,220
01-Feb-26	21,792	22,996	483	3,148
08-Feb-26	21,551	22,966	404	3,093
15-Feb-26	21,332	22,676	734	3,095
22-Feb-26	21,356	22,837	635	3,052
01-Mar-26	21,351	22,250	581	3,042
08-Mar-26	21,039	21,506	501	2,992
15-Mar-26	20,233	21,816	531	2,933
22-Mar-26	20,012	21,481	649	2,882
29-Mar-26	19,661	20,720	611	2,793
05-Apr-26	18,851	19,675	569	2,687

4. Resource Adequacy

Ontario's power system continues to operate in a period during which generation and transmission outages will be difficult to accommodate. The IESO expects these conditions to persist for the foreseeable future. Market participants are strongly encouraged to plan ahead and coordinate with the IESO to prepare the system and ensure planned outages can be appropriately scheduled. Additional outage coordination is expected to be required in relation to Market Renewal Go Live in May 2025.

The IESO expects to have sufficient reserves for the entirety of this outlook period under both normal and extreme weather conditions. However, Ontario may have to rely on up to 2,000 MW of supply from other jurisdictions and/or additional operating actions in order to ensure reliability under extreme weather conditions. The IESO will work closely with market participants to schedule outages during these periods.

This section assesses the adequacy of resources to meet the forecast demand. Resource adequacy is one of the reliability considerations used for approving generation and transmission outages. When reserves are below required levels, with potentially adverse effects on the reliability of the grid, the IESO will reject outage requests based on their order of precedence. Conversely, when reserves are above required levels, additional outages can be contemplated, provided other factors – such as local considerations, operability or transmission security – do not pose a reliability concern. In those cases, the IESO may place an outage at risk, signaling to the facility owner to consider rescheduling the outage.

Ontario's existing installed generation capacity is summarized in Table 4-1. The forecast capability at the Outlook peak is based on the firm resource scenario, which includes resources currently in commercial operation, and takes into account deratings, planned outages and an allowance for capability levels below rated installed capacity.

Table 4-1 | Existing Grid-Connected Resource Capacity

Fuel Type	Total Installed Capacity (MW)	Forecast Capability at 2025 Summer Peak [Normal] (MW)	Forecast Capability at 2025 Summer Peak [Extreme] (MW)	Number of Stations	Change in Number of Stations	Change in Installed Capacity
Nuclear	13,214	9,584	9,584	5	0	0
Hydroelectric	8,862	5,335	4,631	76	0	0
Gas/Oil	10,471	9,209	8,793	33	0	0
Wind	4,943	742	742	42	0	0
Biofuel	296	35	35	7	0	0
Solar	478	66	66	10	0	0
Demand Measures	-	1,791	1,791	-	-	-
Firm Imports (+) / Exports (-) (MW)	-	0	0	-	-	-
Total	38,264	26,762	25,641	173	0	0

4.1 Assessment Assumptions

4.1.1 Generation Resources

All generation resources scheduled to come into service, be upgraded or be shut down within the Outlook period are summarized in Table 4-2. This includes generation projects in the IESO's connection assessment and approval (CAA) process, those under construction, and contracted resources. Details regarding the IESO's CAA process and the status of these projects can be found on the Application Status section of the IESO website.

The estimated effective date column in Table 4-2 indicates when the market registration process is expected to be complete for each generation resource, based on information available to the IESO as of September 5, 2024. Two scenarios are used to describe project risks:

- The **planned scenario** assumes that all resources scheduled to come into service are available over the assessment period.
- The **firm scenario** assumes that only resources that have reached commercial operation status and completed commissioning at the time this assessment was completed are available.

Planned shutdowns or permanent[1] retirements of generators that have a high likelihood of occurring are considered for both scenarios.

Table 4-2 | Committed Generation Resources Status

Project Name	Zone	Fuel Type	Estimated Effective Date	Project Status	Firm (MW)	Planned (MW)
Pickering G1	Toronto	Nuclear	2024-Q3	Retirement	-515	-515
Pickering G4	Toronto	Nuclear	2024-Q4	Retirement	-515	-515
Oneida Storage	Southwest	Storage	2025-Q2	Under Development	0	235
Total					-1,030	-795

Notes on Table 4-2:

[1] Given the evolving nature of resource acquisitions and commitments in Ontario, Table 4-2 will be listing new resources as they commission and existing resources that are expected to permanently retire or mothball at the end of their current commitments.

The total may not add up due to rounding and does not include in-service facilities. Project status provides an indication of the project progress, using the following terminology:

- Under Development – projects in approvals and permitting stages (e.g., environmental assessment, municipal approvals, IESO connection assessment approvals) and projects under construction.
- Commissioning – projects undergoing commissioning tests with the IESO.
- Commercial Operation – projects that have achieved commercial operation status under the contract criteria, but have not met all of the IESO's market registration requirements.
- Expiring Contract – contracts that will expire during the Outlook period are included in both scenarios only up to their contract expiry date. Generators (including non-utility generators) that continue to provide forecast output data are also included in the planned scenario for the rest of the 18-month period.
- Retirement – projects scheduled for permanent shutdown.

In addition to the retirement of Pickering A G1 and G4 units shown in Table 4-2, the continued safe operation of Pickering B is assumed, in the planned resource scenario beyond December 2024 to September 2026. This will be updated accordingly pending approval from the Canadian Nuclear Safety Commission.

4.1.2 Generation Capability

Hydroelectric

A monthly forecast of hydroelectric generation output is calculated based on median historical values of hydroelectric production and contribution to operating reserve during weekday peak demand hours. Through this method, routine maintenance and actual forced outages of the generating units are implicitly accounted for in the historical data (see the first row in Table 4-3).

To reflect the impact of hydroelectric outages on the reserve above requirement (RAR) and allow the assessment of hydroelectric outages as per the outage approval criteria, the hydroelectric capability is also calculated, without accounting for historical outages (see the second row of Table 4-3). Table 4-3 uses data from May 2002 to March 2024 which are updated annually to coincide with the release of the Q2 Outlook.

Table 4-3 | Monthly Historical Hydroelectric Median Values for Normal Weather Conditions

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Historical Hydroelectric Median Contribution (MW)	6,098	6,018	5,813	5,864	5,936	5,683	5,544	5,243	5,020	5,366	5,625	6,090
Historical Hydroelectric Median Contribution without Outages (MW)	6,627	6,590	6,391	6,368	6,390	6,206	6,101	5,867	5,927	6,223	6,425	6,610

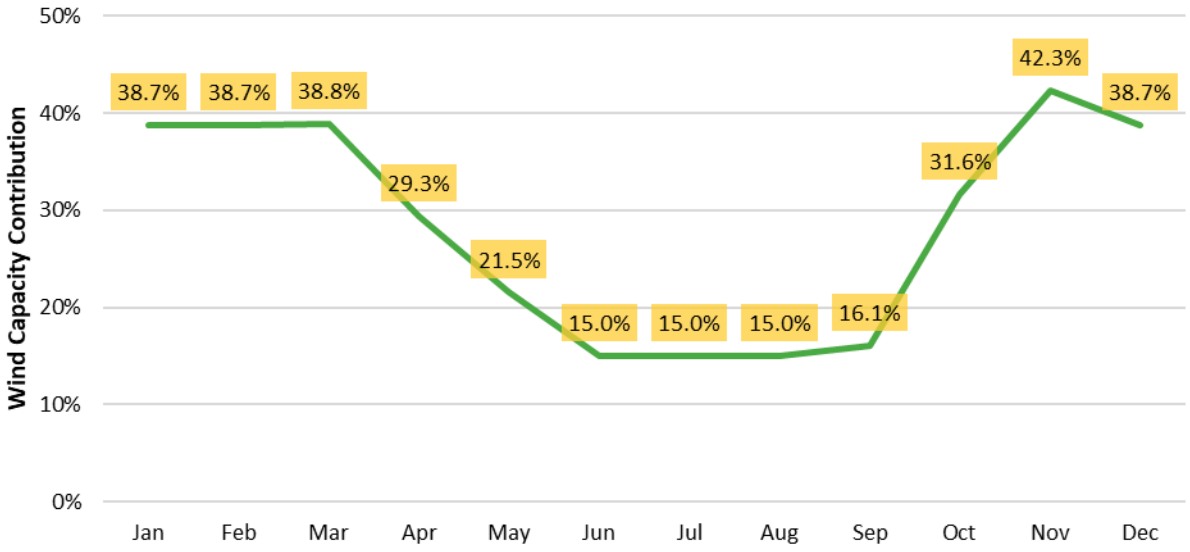
Thermal Generators

Thermal generators' capacity, planned outages and deratings are based on market participant submissions. Forced outage rates on demand are calculated by the IESO based on actual operational data. The IESO will continue to rely on market participant-submitted forced outage rates for comparison purposes.

Wind

For wind generation, monthly wind capacity contribution (WCC) values from the weekday peak hour are used. The process for determining wind contribution can be found in the Methodology to Perform the Reliability Outlook. Figure 4-1 shows the monthly WCC values, which are updated annually with the release of the Q2 Outlook.

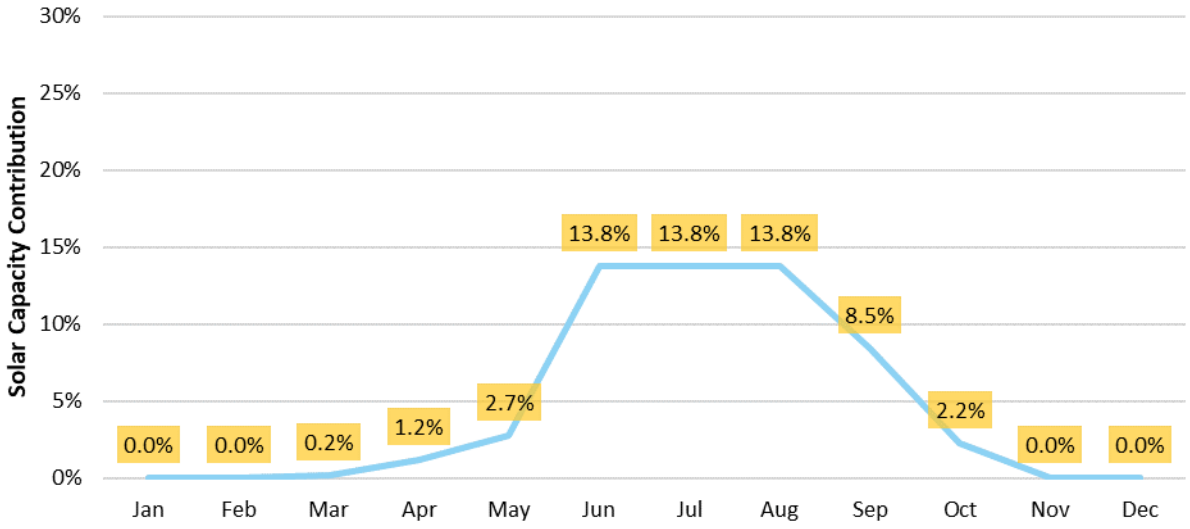
Figure 4-1 | Monthly Wind Capacity Contribution Values



Solar

For solar generation, monthly solar capacity contribution (SCC) values from the weekday peak hour are used. Information on how the solar contribution is calculated can be found in the Methodology to Perform the Reliability Outlook. Figure 4-2 shows the monthly SCC values, which are updated annually for the release of the Q2 Outlook.

Figure 4-2 | Monthly Solar Capacity Contribution Values



4.1.3 Demand Measures

Both demand measures and load modifiers can impact demand, but differ in how they are treated within the Outlook. Demand measures, such as dispatchable loads and demand response procured through the IESO's capacity auction, are not incorporated into the demand forecast and are instead treated as resources. Load modifiers are incorporated into the demand forecast. The impacts of activated demand measures are added back into the demand history prior to forecasting demand for future periods.

4.1.4 Firm Transactions

Capacity-Backed Exports

The IESO allows Ontario resources to compete in the capacity auctions held by certain neighbouring jurisdictions, but only if Ontario has adequate supply. New York Independent System Operator (NYISO)[2] will allow up to 37 MW of capacity-backed exports from Ontario during winter 2024-25.

Capacity Sharing Agreement

A 2015 Capacity Sharing Agreement with Hydro-Québec saw Ontario provide 500 MW of capacity to Québec in the winter of 2015/16. Ontario currently has a commitment from Québec to return 500 MW of firm capacity for four months during a summer of the IESO's choosing.

[2] http://icap.nyiso.com/ucap/public/rgt_availability_display.do

In August 2023, the IESO and Hydro-Québec entered into a memorandum of understanding (MOU)[3] for the swap of 600 MW of capacity over a period of up to 10 years, expected to start in winter 2024/2025. Under this potential trade agreement, the IESO and Hydro-Québec would carry out an annual capacity swap of 600 MW. The IESO would provide 600 MW to Hydro-Québec in the winter and Hydro-Québec would provide 600 MW to the IESO in the summer. Ontario would have the opportunity to bank any amount of the 600 MW of summer capacity provided each year for use in any future summer period during the agreement up to the 1,250 MW capacity limit of the main intertie with Quebec, allowing Ontario to save capacity until it is required. More information can be found in the 2023 Capacity Sharing Agreement Backgrounder. Please note that this agreement is already considered when determining the 2,000 MW adequacy threshold. The agreement is anticipated to be executed in fall 2024.

4.1.5 Summary of Scenario Assumptions

To assess future resource adequacy, the IESO must make assumptions about the amount of available resources. The Outlook considers two scenarios: a firm scenario and a planned scenario.

The starting point for both scenarios is the existing installed resources shown in Table 4-1. The planned scenario assumes that all resources scheduled to come into service are available over the assessment period. The firm scenario considers only those resources that have reached commercial operation status as of the time of this assessment. Generator-planned shutdowns or retirements that have a high likelihood of occurring are considered for both scenarios. They also both reflect planned outages submitted by generators. Table 4-4 shows the available resources that are forecast over the 18-month Outlook, under both scenarios in normal weather conditions, and at the time of the summer and winter peak demands.

[3] https://news.ontario.ca/en/release/1003444/the-governments-of-ontario-and-quebec-support-new-electricity-trade-agreement

Table 4-4 | Summary of Available Resources under Normal Weather

Notes	Description	Winter Peak 2025 Firm Scenario	Winter Peak 2025 Planned Scenario	Summer Peak 2025 Firm Scenario	Summer Peak 2025 Planned Scenario	Winter Peak 2026 Firm Scenario	Winter Peak 2026 Planned Scenario
1	Installed Resources (MW)	37,749	37,749	37,234	37,469	37,234	37,469
2	Total Reductions in Resources (MW)	11,414	11,169	12,591	12,224	10,513	10,273
3	Demand Measures (MW)	839	839	1,827	1,827	1,135	1,135
4	Firm Imports (+) / Exports (-) (MW)	150	-450	0	0	0	-600
5	**Available Resources (MW)**	**27,324**	**26,969**	**26,470**	**27,072**	**27,856**	**27,731**
6	Bottling	914	914	0	0	474	611
7	**Available Resources without Bottling (MW)**	**28,238**	**27,883**	**26,470**	**27,072**	**28,330**	**28,342**

Notes on Table 4-4:

1. Installed Resources: The total generation capacity assumed to be installed at the time of the summer and winter peaks.
2. Total Reductions in Resources: The sum of deratings, planned outages, limitations due to transmission constraints and allowances for capability levels below rated installed capacity.
3. Demand Measures: The amount of demand reduction expected to be available at the time of peak.
4. Firm Imports/Exports: The amount of expected firm imports and exports at the time of summer and winter peaks.
5. Available Resources: Installed Resources (line 1) minus Total Reductions in Resources (line 2) plus Demand Measures (line 3) plus Firm Imports/Exports (line 4) equate to row (5). This differs from the Forecast Capability at System Peak shown in Table 4-1 due to the impacts of generation bottling (transmission limitations).
6. Bottling: Amount of capacity bottled and not deliverable due to transmission interface limits.

7. Available Resources without Bottling: Available resources after they are reduced due to bottling (i.e., supply that is available at the source but cannot be delivered to the point of use due to restrictions in the transmission system). This is the sum of row (5) and row (6).

4.2 Capacity Adequacy Assessment

The capacity adequacy assessment accounts for zonal transmission constraints resulting from planned transmission outages assessed as of August 13, 2024 The generation planned outages occurring during this Outlook period have been assessed as of September 5, 2024.

4.2.1 Firm Scenario with Normal and Extreme Weather

The firm scenario incorporates all capacity that had achieved commercial operation status as of September 5, 2024.

Figure 4-3 shows Reserve Above Requirement (RAR) levels, which represents the difference between available resources and required resources. The required resources equals forecast demand plus the required reserve.

Capacity secured in the December 2023 Capacity Auction has been included in this assessment. This includes 1,867 megawatts (MW) of supply for summer 2024 and 1,310 MW for winter 2024 -2025[4]. The target capacity of 1,600 MW for the next capacity auction, as announced in the IESO's Annual Planning Outlook, has been included and modelled as demand measures in the firm resource scenario for summer 2025.

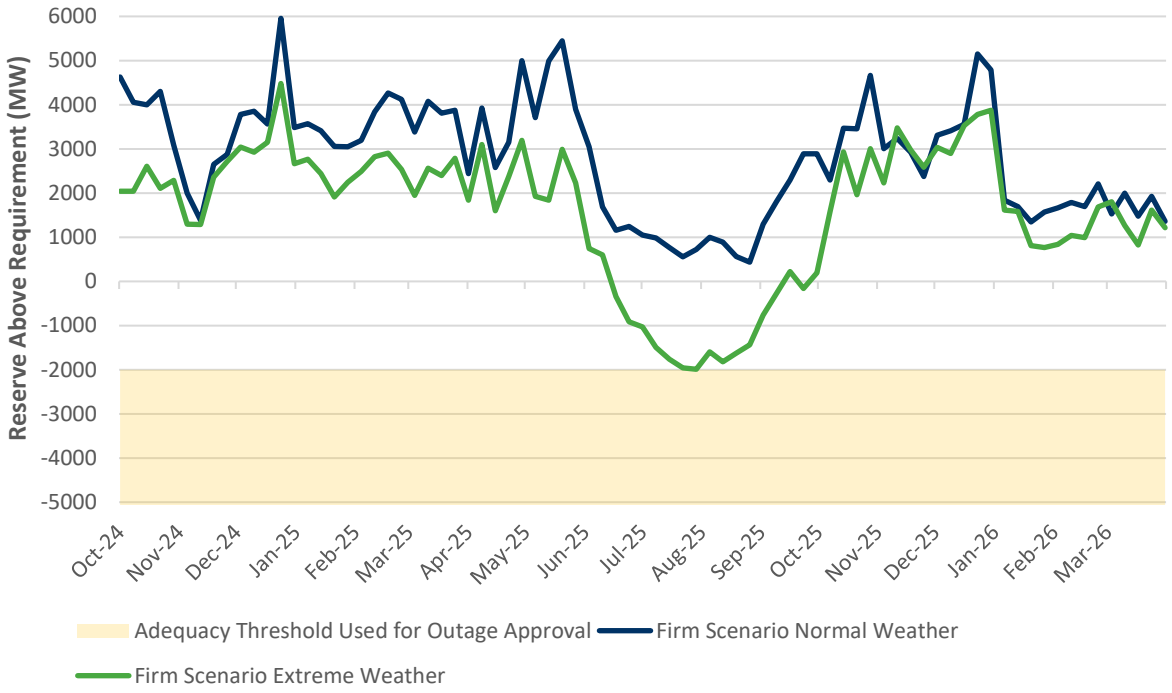
The IESO expects to have sufficient reserves for the summers of 2025, and winters of 2024/25 and 2025/26. In the firm scenario under extreme weather conditions, the reserve drops below 0 MW for 14 weeks in the summer of 2025 but does not cross the adequacy threshold at any time. Notably, the RAR is marginally above the threshold the week ending August 3, 2025.

The IESO has been carefully managing outages with participants to minimize impacts to the RAR adequacy threshold and has successfully navigated the summer of 2024. Moving forward, the IESO will continue to work closely with participants that have planned outages to ensure Ontario maintains adequate reserves. Ontario may have to rely on up to 2,000 MW of supply from other jurisdictions and/or additional operating actions in order to ensure reliability under extreme weather conditions, especially during periods of low reserves.

Under periods of tighter supply conditions, planned generator maintenance outages are difficult to schedule. Generators are advised not to schedule outages during periods when reserves are forecast to be low, and are strongly encouraged to plan ahead and coordinate the timing of outages with IESO staff. Outage requests during periods when reserves fall below the adequacy threshold under extreme weather conditions will be put at risk and may be rejected should those conditions materialize.

[4] Capacity auction results can be found in the post-auction report on the IESO's webpage.

Figure 4-3 | Comparison of Normal and Extreme Weather: Firm Scenario Reserve Above Requirement

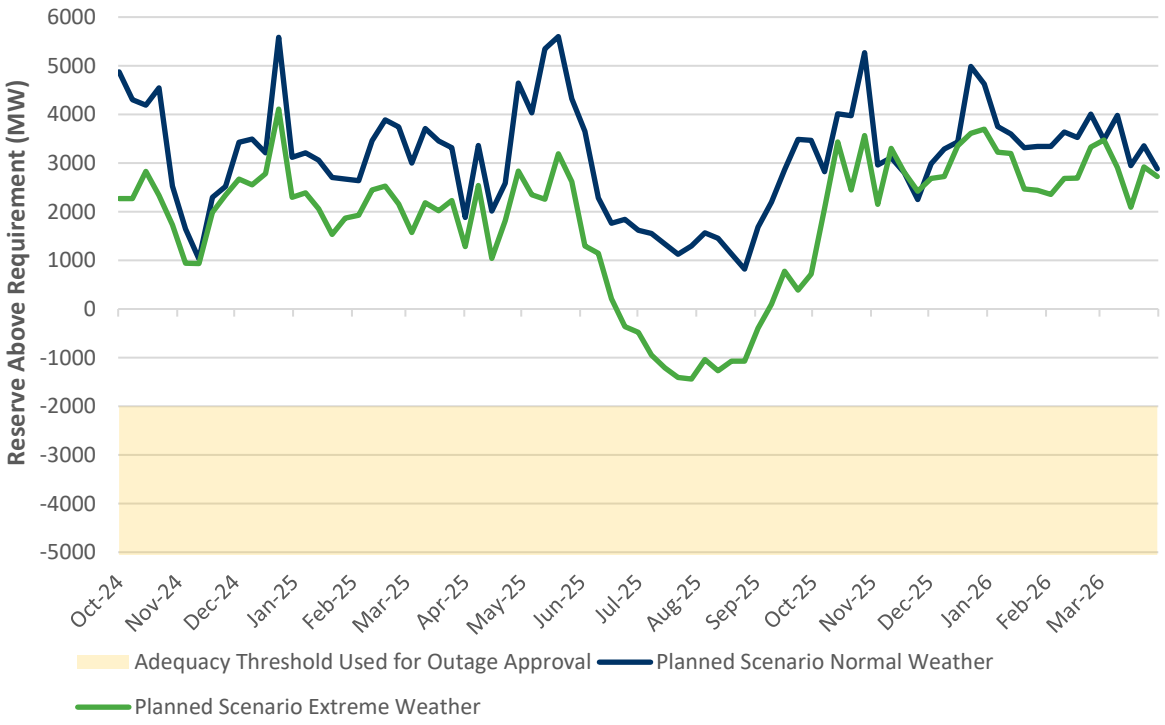


4.2.2 Planned Scenario with Normal and Extreme Weather

The Planned scenario incorporates all existing capacity, as well as all capacity expected to come into service. Approximately 235 MW of new storage capacity is expected to connect to Ontario's grid over this Outlook period, alongside 1,030 MW of generation capacity being retired between Pickering G1 and G4.

Figure 4-4 shows RAR levels under the Planned scenario. Reserves do not fall below the adequacy threshold requirements in this outlook period under normal or extreme weather conditions.

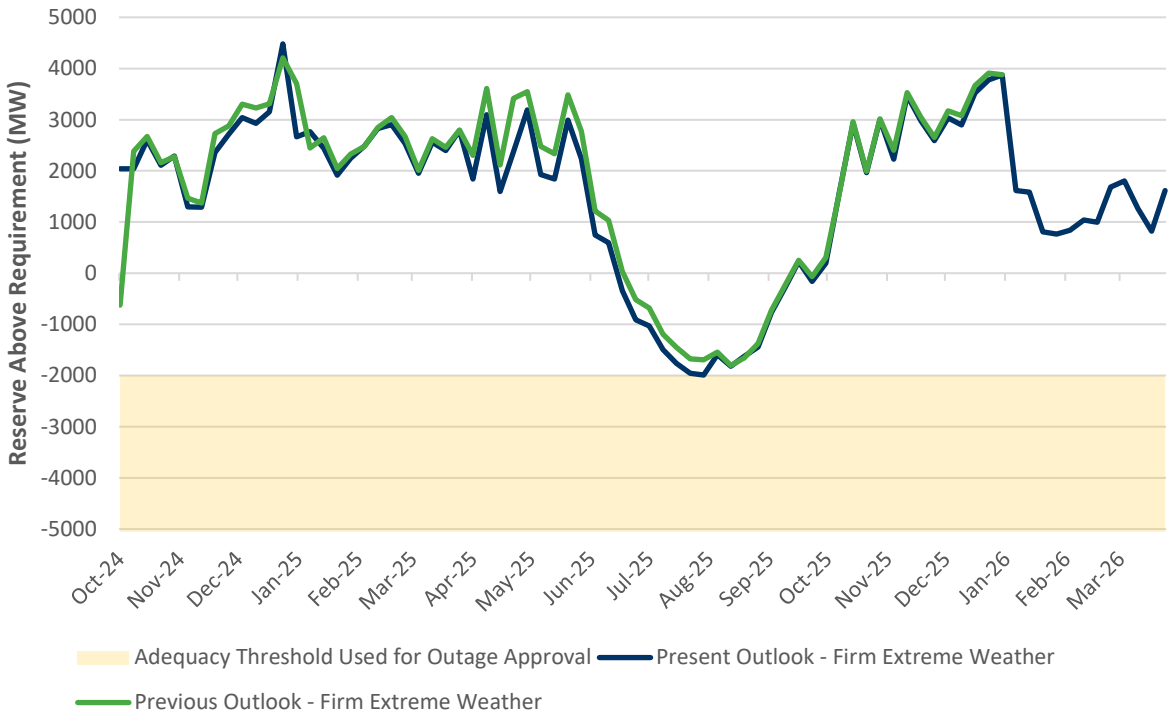
Figure 4-4 | Comparison of Normal and Extreme Weather: Planned Scenario Reserve Above Requirement



4.2.3 Comparison of the Current and Previous Weekly Adequacy Assessments for the Firm Extreme Weather Scenario

Figure 4-5 compares forecast RAR values in the current Outlook with those in the previous Outlook, which was published on June 20, 2024. The difference is primarily the result of changes in planned outages and an updated demand forecast.

Figure 4-5 | Comparison of Current and Previous Outlook: Firm Scenario Extreme Weather Reserve Above Requirement



Resource adequacy assumptions and risks are discussed in detail in the Methodology to Perform the Reliability Outlook.

4.3 Energy Adequacy Assessment

This section assesses energy adequacy to determine whether Ontario has sufficient supply to meet its forecast energy demands, while highlighting potential adequacy concerns during the Outlook time frame. At the same time, the assessment estimates the aggregate production by resource category to meet the projected demand based on assumed resource availability.

4.3.1 Summary of Energy Adequacy Assumptions

The energy adequacy assessment (EAA) uses the same set of assumptions as the capacity assessment outlined in Tables 4-1 and 4-2, which indicate the total capacity of committed resources and when they are expected to be available over the next 18 months. The monthly forecast of energy production capability, based on energy modelling results, is included in the Reliability Outlook Tables.

For the EAA, only the firm scenario in Table 4-5 with normal weather demand is assessed. The key assumptions specific to this assessment are described in the Methodology to Perform the Reliability Outlook.

4.3.2 Results – Firm Scenario with Normal Weather

Table 4-5 summarizes the energy simulation results over the next 18 months for the Firm scenario with normal weather demand both for Ontario and for each transmission zone.

Table 4-5 | Summary of Zonal Energy for Firm Scenario Normal Weather

Zone	18-Month Energy Demand TWh	18-Month Energy Demand Average MW	18-Month Energy Production TWh	18-Month Energy Production Average MW	Net Inter-Zonal Energy Transfer TWh	Zonal Energy Demand on Peak Day of 18-Month Period GWh	Available Energy on Peak Day of 18Month Period GWh
Bruce	1.1	87	63.6	4,847	62.5	1.6	119.3
East	12.5	949	20.6	1,568	8.1	25.2	105.5
Essa	14.1	1,072	4.3	326	-9.8	30.1	17.3
Niagara	7.0	536	21.3	1,619	14.3	16.3	48.3
Northeast	17.8	1,355	15.9	1,209	-1.9	29.5	38.9
Northwest	7.1	541	6.8	520	-0.3	12.1	14.5
Ottawa	13.8	1,048	0.7	55	-13.1	30.9	1.6
Southwest	43.1	3,281	9.8	747	-33.3	97.4	27.8

Zone	18-Month Energy Demand TWh	18-Month Energy Demand Average MW	18-Month Energy Production TWh	18-Month Energy Production Average MW	Net Inter-Zonal Energy Transfer TWh	Zonal Energy Demand on Peak Day of 18-Month Period GWh	Available Energy on Peak Day of 18Month Period GWh
Toronto	76.2	5,805	57.5	4,383	-18.7	174.2	146.7
West	25.3	1,923	17.4	1,324	-7.9	57.8	79.3
Ontario	**217.9**	**16,598**	**217.9**	**16,597**	**0.0**	**475.1**	**599.3**

4.3.3 Findings and Conclusions

The EAA indicates that Ontario is expected to have sufficient supply to meet its forecast energy needs throughout the outlook period for the Firm scenario with normal weather demand, without having to rely on support from external jurisdictions.

The figures and tables in this section are based on a simulation of the province's power system, using the assumptions presented within the Outlook to assess whether Ontario will be energy adequate.

Figure 4-6 breaks down projected production by fuel type to meet Ontario's energy demand for the next 18 months, while Figure 4-7 shows the expected production by fuel type for each month. Only the province's firm energy exports and imports are considered in this assessment. Table 4-6 summarizes these simulated production results by fuel type, for each year.

Figure 4-6 | Forecast Energy Production by Fuel Type

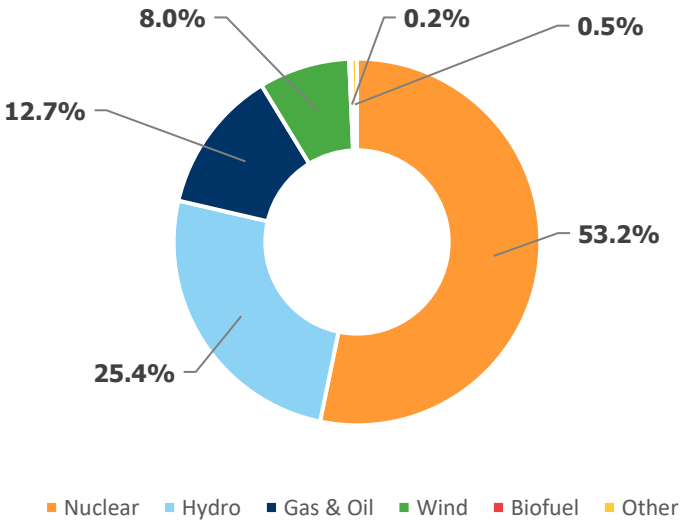


Figure 4-7 | Forecast Monthly Energy Production by Fuel Type

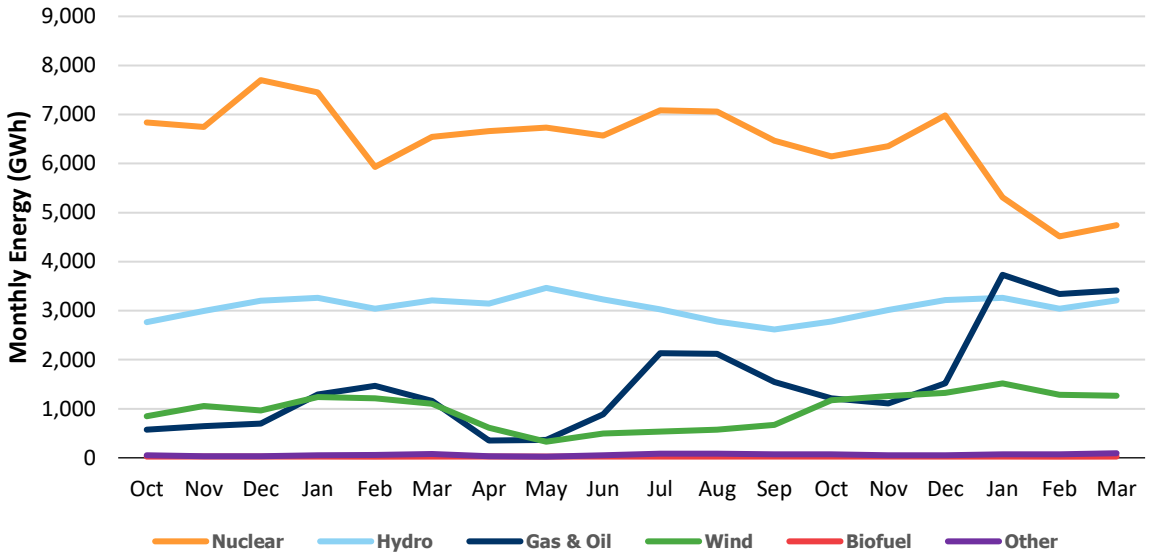


Table 4-6 | Energy Production by Fuel Type for the Firm Scenario Normal Weather

Fuel Type (Grid-Connected)	2024 (Oct 1 – Dec 31) (GWh)	2025 (Jan 1 – Dec 31) (GWh)	2026 (Jan 1 – Mar 31) (GWh)	Total (GWh)
Nuclear	21,280	79,984	14,572	115,836
Hydro	8,966	36,773	9,515	55,255
Gas & Oil	1,917	15,157	10,482	27,556
Wind	2,869	10,521	4,073	17,463
Biofuel	74	294	73	441
Other (Solar & DR)	121	704	235	1,060
Total	**35,227**	**143,433**	**38,950**	**217,610**

5. Transmission Reliability Assessment

Ontario's transmission system is expected to continue to reliably supply province-wide demand for the next 18 months, even while experiencing normal contingencies defined by planning criteria. However, some combinations of transmission and/or generation outages could create operating challenges. For this reason, it is – and will continue to be – increasingly difficult to schedule certain outages to avoid reliability concerns. The volume of outage requests and the limited time periods available to complete the work will make outage scheduling a challenge for the foreseeable future.

The IESO assesses transmission adequacy using a methodology based on conformance to established criteria, including the Ontario Resource and Transmission Assessment Criteria (ORTAC), NERC transmission planning standard TPL 001-4 and NPCC Directory #1 as applicable. Planned system enhancements and projects and known transmission outages are also considered in the studies.

5.1 Transmission Projects

This section considers the information transmitters have provided with respect to transmission projects that are planned for completion within the next 18 months. The list of transmission projects can be found in Appendix B1. Note that the planned in-service dates in this table and throughout this document are as of June 2024. Any changes will be communicated through subsequent Reliability Outlooks.

5.2 Transmission Outages

The IESO's assessment of transmission outage plans is shown in Appendix C, Tables C1 to C11. The methodology used to assess the transmission outage plans is described in the Methodology to Perform the Reliability Outlook. This Outlook reflects transmission outage plans submitted to the IESO as of September 3, 2024.

5.3 Transmission Considerations

The purpose of this section of the report is to highlight projects and outages that may affect reliability and/or the scheduling of other outages, and to consolidate these considerations by zone. For more information about the IESO's transmission zones and interfaces, please see the Transfer Capability Assessment Methodology.

Bruce, Southwest, and West Zones

Multiple new transmission lines are under development in the region that will increase available supply starting mid-decade. Specifically, the second of two new 230-kV circuits from Chatham SS to Lakeshore SS is expected to be in service by end of the summer of this year to support continued load growth. Outages at Chatham and Lakeshore stations are required in order to integrate the new circuits, and will temporarily reduce system resiliency during this time.

The Bruce B 500 kV switchyard is being rebuilt and expected to be in-service by 2025 Q2. The existing circuits are being cut-over to the new switchyard, among other outages that are required.

The following outages will impact the flow out of the Bruce zone:

- A planned two-week outage starting December 3, 2024, on circuit B502M, and another planned thirteen-week outage starting April 27, 2025
- A planned three-week outage starting February 25, 2026, on circuit B560V

Toronto, East, and Ottawa Zones

To address high voltages in eastern Ontario and the Greater Toronto Area, which is expected to worsen with the scheduled retirement of the Pickering units, two 500 kV line connected shunt reactors have now been installed and are in-service at Lennox TS. There continues to be a need to remove from service certain 500 kV circuits for voltage control during specific prevailing conditions.

There are upcoming nuclear refurbishments of multiple units at Darlington with overlapping timelines, along with the staged shutdown of the Pickering NGS. As a result, it will be increasingly challenging for market participants to take outages impacting the Flow East Towards Toronto (FETT) interface. Future planned outages will necessitate enhanced coordination between transmitters and generators. Planned outages for certain windows may need to be rescheduled or rejected to ensure reliability. Of note, the FETT Capacity Upgrade (i.e., Richview-Trafalgar Reinforcement) project to address future needs is underway; the project is expected to be in-service by Q1 2026.

The following outages will impact the flow into Ottawa:

- A planned eleven-week outage starting October 7, 2024, on circuit T32H
- A planned three-week outage starting October 15, 2024, on circuit X522A

Northwest, Northeast, and Essa Zones

The East-West Tie Expansion project consists of a new 230 kV transmission line roughly paralleling the existing East-West Tie Line between Wawa and Thunder Bay. The new line will increase the electricity transfer capability into Northwest Ontario and will improve the flexibility and efficiency of the Northwest electricity system. As part of this project, upgrades were planned for the Lakehead, Marathon and Wawa transformer stations to accommodate the new line. The project was placed in-service at the end of Q1 2022. However, the full benefit of the project will be realized by the end of the year, once all ongoing and upcoming outages as a result of work in the Northwest are completed. In order to improve transmission system capacity, the Ansonville to Kirkland Lake A8K/A9K transmission circuits were refurbished and came in-service Q2 2023. Furthermore, in December 2023, a new RAS, which enables load rejection and eliminates the need for pre-contingency load curtailment, was placed in service in the Kirkland Lake area. Additional transmission refurbishments on Kirkland Lake to Matachewan are expected to be in-service by Q4 2024.

In the Sault Ste. Marie area, there will be an increase in load because of Algoma Steel converting their coke-fired furnaces to electric-arc furnaces over the next couple of years. The fluctuating nature of electric-arc furnace operation in an electrical area with limited transmission will require special attention to manage voltage and power fluctuations, particularly prior to the completion of the system reinforcements recommended in the Northeast Bulk System plan.

The following outages will reduce the transfer capability of the North-South tie:

- A two-week outage on circuit X503E starting October 10, 2024

To meet growing electricity need in the Northwest, mainly driven by economic development and electrification of mining activities, the Waasigan Transmission Line is currently under development. Phase 1 of the project, which consists of new double-circuit 230 kV transmission line between Lakehead TS and MacKenzie TS on common towers with existing circuits, is expected in-service by Q4 2025. Outages of the parallel circuits, as well as at Lakehead TS and MacKenzie TS will be required in order to integrate the new circuits, and will temporarily reduce system resiliency during this time. Phase 2 of the project, which consists of a new 230 kV transmission line between MacKenzie TS and Dryden TS, is recommended to be in-service by 2027.

6. Operability

Ontario's power system is operating within a period of tighter supply conditions requiring careful consideration of outage management. The IESO will continue to assess other aspects of operability and report on them in future Outlooks where appropriate. This section highlights existing or emerging operability issues that could impact the reliability of Ontario's power system.

Operability refers to the IESO's ability to manage a variety of conditions on the power system as they occur in real-time. The IESO works to ensure that the power system is reliable under changing system conditions, variability of supply and fluctuations in load, while respecting thermal, voltage and transient stability limits on the system. Operability is assessed in advance to ensure that the power system is adequately prepared for expected real-time conditions, while also having the ability to absorb and adapt to unexpected changes.

6.1 Outage Management Considerations

Ontario continues to experience a period during which generation and transmission outages will be difficult to accommodate, and the IESO is working with market participants to manage this. In addition to meeting global Ontario adequacy needs, transmission adequacy and security must be safeguarded.

There are a significant number of major generation and transmission projects either currently underway or expected to begin in the near future. As the timing of many of these projects overlap with each other and can require multiple equipment outages, reliability assessments are increasingly complex. An example mentioned earlier describes major projects that are related to the Flow East Towards Toronto (FETT) interface.

A key factor impacting outage management is the amount of extended forced transmission outages. With more overlapping and urgent outage requests, as well as major transmission projects in different development stages targeting in-service dates, operating the power system is becoming increasingly complex. Prioritizing the timely repair of a forced outage is necessary to reduce the impact on the delivery of other ongoing capital projects, and to enable other necessary maintenance outages to proceed.

With consideration of equipment failure, tighter supply conditions and other factors such as supply chain delays, some outages may need to be rejected and rescheduled. Transmitters and generators are strongly encouraged to plan ahead, coordinate with one another, submit outage requests early, and coordinate with the IESO; scheduling outages at desired times may still be difficult due to the significant number of major projects that are planned for the same time.

Furthermore, outages are not guaranteed as unanticipated equipment failures may change reliability assessments.

One important aspect of grid equipment outages is recall time. Recall times indicate how long it takes for equipment on outage to return to service. Minimizing recall times increases the likelihood of outages being approved. If many outages are non-recallable, it can be difficult to accommodate additional outages as there needs to be a reliable plan to reposture the system after an equipment failure occurs on the grid. If multiple equipment failures occur, there may be instances where outage management alone will not address the concern. Under such circumstances the IESO may need to rely on additional non-firm imports or emergency operating procedures in order to ensure reliability. More information on actions the IESO can take to ensure reliability can be found in Market Manual 7.1: IESO-Controlled Grid Operating Procedures.

7. Resources Referenced in This Report

The table below lists additional resources in the order they appear in the report.

Table 7-1 | Additional Resources

Resource	Location in this Report
Reliability Outlook Webpage	Introduction
Security and Adequacy Assessments	Introduction
2024 Q3 Outlook Tables	Throughout
Connection Assessments and Approval Process	Assessment Assumptions
Methodology to Perform the Reliability Outlook	Throughout
Capacity Auction	Demand Measures
Enabling Capacity Exports	Firm Transactions
Ontario Resource and Transmission Assessment Criteria	Transmission Considerations
NERC Transmission Planning Standard TPL-001-4	Transmission Considerations
NPCC Directory #1	Transmission Considerations
Market Manual 4 Part 4.2	Surplus Baseload Generation
Market Manual 7.1	Operability
Annual Planning Outlook	Resource Adequacy

8. List of Acronyms

Acronym	Definition
CAA	Connection Assessment and Approval
DR	Demand Response
EAA	Energy Adequacy Assessment
FETT	Flow East Toward Toronto
GS	Generating Station
GTA	Greater Toronto Area
ICI	Industrial Conservation Initiative
IESO	Independent Electricity System Operator
IRRP	Integrated Regional Resource Plan
kV	Kilovolt
LDC	Local Distribution Company
MW	Megawatt(s)
NERC	North American Electric Reliability Corporation
NPCC	Northeast Power Coordinating Council
NYISO	New York Independent System Operator
ORTAC	Ontario Resource and Transmission Criteria
PAR	Phase Angle Regulator
RAR	Reserve Above Requirement
RAS	Remedial Action Scheme
SBG	Surplus Baseload Generation
SCC	Solar Capacity Contribution
TS	Transmission/Transformer Station
TWh	Terawatt-hour(s)
WCC	Wind Capacity Contribution

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