18 Month Outlook

An Assessment of the Reliability and Operability of the Ontario Electricity System

FROM APRIL 2015 TO SEPTEMBER 2016

ieso
Independent Electricity System Operator

Executive Summary

With adequate supply and reliable transmission service forecasted, the outlook for the reliability of Ontario's electricity system remains positive for the coming summer and throughout the next 18 months.

The supply situation in the spring of 2015 has improved since the last forecast as several major nuclear outages have been rescheduled. During normal weather conditions, reserve requirements are expected to be met for summer 2015.

The Green Electron gas plant is currently under construction and is expected to come into service in Q3 of 2015, bringing in close to 300 megawatts (MW) of power to Ontario. Additionally, about 2,000 MW of new supply – mostly wind and some large solar projects – will be incorporated into the province's existing generation fleet, for a total of 2,300 MW of new supply over the Outlook period. By the end of the period, the amount of solar generation connected to the transmission grid is expected to grow to 280 MW, complementing the approximately 1,900 MW of embedded solar facilities located within distribution networks. The first storage project of the 34 MW procured last year is expected to come into service before the end of this outlook period.

In addition, a Thunder Bay unit (153 MW) returned to service using advanced biomass fuel and will contribute to the supply in northern Ontario.

Ontario was winter peaking in 2014 for the first time in 10 years due to milder summer weather. With more typical weather, Ontario should be summer peaking in 2015. Embedded solar generation will continue to reduce demand on the transmission system, in particular during summer peaks. For 2015, both the winter and summer peaks will be subject to lower demands due to the Industrial Conservation Initiative (ICI).

There are a number of changes occurring to demand measures over the 18-Month Outlook period. In the spring of 2015, through an RFP process, the IESO will be procuring up to 100 MW of load-following and unit commitment capability from demand-side resources. These pilot projects will help identify opportunities to enhance participation of demand response (DR) in meeting our existing system needs and how to better integrate these resources into the electricity market. A DR auction is currently being developed by the IESO to augment the existing DR capacity and to replace the expiring DR2 and DR3 contracts with a cost-competitive mechanism.

The following table summarizes the forecasted seasonal peak demands over the next 18 months.

Season	Normal Weather Peak (MW)	Extreme Weather Peak (MW)
Summer 2015	22,991	24,814
Winter 2015-16	22,237	23,029
Summer 2016	22,966	24,541

With the addition of significant wind supplies, conditions for surplus baseload generation (SBG) will continue over the outlook period, potentially resulting in nuclear manoeuvring and wind dispatch in real time.

Conclusions & Observations

The following conclusions and observations are based on the results of this assessment.

Demand Forecast

- Ontario’s grid supplied peak demand is expected to decline throughout the period of this Outlook. Growth in embedded solar and wind generation capacity and on-going conservation initiatives reduce the need for energy from the bulk power system, while also putting downward pressure on peak electricity demands. Conservation, time-of-use rates and the ICI will also put downward pressure on peak demands, and in particular summer peaks. Grid supplied energy demand is expected to remain relatively flat over the forecast horizon as Ontario’s economy expands, whereas the ICI and time of use rates put downward pressure on peaks.

Resource Adequacy

- Under the **planned scenario**, reserve requirements are expected to be met for the entire duration of this Outlook during normal weather, except two weeks during summer of 2016. The planning reserve is below the requirement for eleven weeks under the extreme weather scenario. These shortfalls are largely due to the planned generator outages in summer-fall 2015 and summer 2016.
- For the **firm scenario**, reserve is below requirements for three weeks during the Outlook period under normal weather conditions, in summer of 2016. Under extreme weather condition, the reserve is below the requirement for fourteen weeks. The firm scenario excludes any new generating facilities which haven’t reached commercial operation. As a result, the shortfall is more pronounced in the firm scenario than in the planned scenario.
- About 2,300 MW of grid-connected generation is expected to be added throughout this Outlook period, which includes 1,700 MW of wind, 10 MW of hydroelectric, 300 MW of gas, 240 MW of solar and 40 MW of biofuel resources.

Transmission Adequacy

Ontario’s transmission system is expected to be able to reliably supply the demand while experiencing normal contingencies defined by planning documents under both normal and extreme weather conditions forecast for this Outlook period**.**

- Several local area supply improvement projects are underway and will be placed in service during the timeframe of this Outlook. These projects, shown in Appendix B, will help relieve loadings of existing transmission stations and provide additional supply capacity for future load growth. The IESO, Ontario’s transmitters and affected distributors are reviewing system needs and considering solutions in accordance with the Regional Planning Process established by the Ontario Energy Board (OEB). Plans are currently active in the GTA, Greater Ottawa, Southwest Ontario, Northwest Ontario, and Western Ontario regions.

- High voltages in southern Ontario continue to occur, especially during periods of light load. High voltages become more acute during these periods when shunt reactors are unavailable. While the IESO and Hydro One are currently managing this situation with day-to-day operating procedures, planning work for the installation of new voltage control devices has been initiated.
- Hydro One has begun construction on the Guelph Area Transmission Refurbishment project, with an expected completion date of Q2 2016. This project improves the transmission capability into the Guelph area by reinforcing the supply into Guelph-Cedar Transformer Station (TS).
- In the Cambridge area, plans to incorporate a second 230/115 kV autotransformer at Preston TS and associated switching and reactive facilities are being reviewed. Hydro One and the IESO are exploring options that will help meet the IESO's load restoration criteria following a contingency on the main supply line. Studies will continue to assess the need for additional measures to address longer term needs in the area.
- The upgrading of the 115 kV breakers at Leaside TS and Manby TS was completed in Q4 2014. Some bus and insulator replacement work at Manby TS is scheduled for completion by Q2 2016. These new breakers facilities together with the Hearn SS rebuild completed in Dec 2013 has increased the short-circuit withstand capability of the Toronto 115 kV system and will allow new generation to be connected in the Manby and Leaside sectors.
- A new station, Copeland TS, is planned to be in service in downtown Toronto in Q1 2016. The new station will facilitate the refurbishment of the facilities at John TS, while also enhancing the load security in the downtown core.
- Work has started on the construction of Clarington TS and is scheduled to be complete by the fall-2017. This facility will provide additional 500/230 kV transformation capacity to maintain supply reliability following the shut-down of Pickering GS. The 230 kV switching facilities at Clarington TS will also improve reliability to the loads in the Pickering, Ajax, Whitby, Oshawa and Clarington areas.

Operability

- Conditions for SBG will continue over the Outlook period. However, it is expected that SBG will be managed effectively via normal market mechanisms including inter-tie scheduling, nuclear maneuvering or shutdown and the dispatch of grid-connected renewable resources.

Caution and Disclaimer

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1 Introduction

This Outlook covers the 18-month period from April 2015 to September 2016 and supersedes the last Outlook released on November 27, 2014.

The purpose of the 18-Month Outlook is:

- To advise market participants of the resource and transmission reliability of the Ontario electricity system;
- To assess potentially adverse conditions that might be avoided through adjustment or coordination of maintenance plans for generation and transmission equipment; and
- To report on initiatives being put in place to improve reliability within the 18-month timeframe of this Outlook.

The contents of this Outlook focus on the assessment of resource and transmission adequacy. Additional supporting documents are located on the IESO website at http://www.ieso.ca/Pages/Participate/Reliability-Requirements/Forecasts-&-18-Month-Outlooks.aspx

This Outlook presents an assessment of resource and transmission adequacy based on the stated assumptions, using the described methodology. Readers may envision other possible scenarios, recognizing the uncertainties associated with various input assumptions, and are encouraged to use their own judgment in considering possible future scenarios.

Security and Adequacy Assessments are published on the IESO website on a weekly and daily basis, and progressively supersede information presented in this report.

Readers are invited to provide comments on this Outlook report or to give suggestions as to the content of future reports. To do so, please contact us at:

- Toll Free: 1-888-448-7777
- Tel: 905-403-6900
- Fax: 905-403-6921
- E-mail: customer.relations@ieso.ca.

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2 Updates to This Outlook

2.1 Updates to Demand Forecast

The demand forecast is based on actual demand, weather and economic data through to the end of December 2014. The demand forecast has been updated to reflect the most recent economic projections. Actual weather and demand data for January and February 2015 has been included in the tables.

2.2 Updates to Resources

The 18-month assessment uses planned generator outages submitted by market participants to the IESO's Integrated Outage Management System (IOMS) as of February 13, 2015. In addition, updates to available resources include the expected forced outage rates, seasonal generation derates and variable resource contribution as determined by market participants or calculated by the IESO based on actual experience.

The following generators completed the market registration process since the release of the last Outlook:

- Liskeard Solar 1, 3 and 4 – 30 MW
- Three new hydraulic units at Smoky Falls – 264 MW
- Bluewater Wind Energy Centre – 60 MW
- Silvercreek Solar Park – 10 MW
- Third hydraulic unit at Kipling Generating Station (GS) – 79 MW
- Thunder Bay unit converted to burn biomass – 153 MW

2.3 Updates to Transmission Outlook

The list of transmission projects, planned transmission outages and actual experience with forced transmission outages have been updated from the previous 18-Month Outlook. For this Outlook, transmission outage plans submitted to the IOMS as of January 20, 2015 were used.

2.4 Updates to Operability Outlook

The Outlook for surplus baseload generation (SBG) conditions over the next 18 months uses the updated planned generator outages. The generator outage plans are submitted by market participants to the IESO's IOMS. This Outlook is based on submitted generation outage plans as of February 13, 2015.

- End of Section -

3 Demand Forecast

The IESO is responsible for forecasting electricity demand on the IESO-controlled grid. This demand forecast covers the period April 2015 to September 2016 and supersedes the previous forecast released in November 2014. Tables of supporting information are contained in the 2015 Q1 Outlook Tables spreadsheet.

Electricity demand is shaped by a several factors which have differing impacts. These factors can be grouped into those that increase demand (population growth and economic expansion), those that reduce demand (conservation and embedded generation) and those that shift demand (time of use rates and the Industrial Conservation Initiative [ICI]). How each of these factors impacts electricity consumption varies by season and time of day.

Grid-supplied energy demand is forecasted to remain virtually flat over the forecast horizon. Growth in 2015 is projected to be small (0.1%) and much of the growth in 2016 (0.5%) will be due to the additional "leap year" day. Economic expansion and population growth will offset much of the reductions stemming from increased embedded generation and conservation savings over the forecast horizon.

Peak demands are subject to the same forces as energy demand, though the impacts vary. This is true not only when comparing energy versus peak demand, but also in comparing the summer and winter peak. Summer peaks are significantly impacted by the growth in embedded generation capacity and pricing impacts (ICI and time-of-use rates). The majority of embedded generation is provided from solar powered facilities that have high output levels during the summer peak period and no output during the winter peak periods. Over the shoulder periods the timing of the peak hour and sunset are moving so the impact of embedded solar will vary.

The ICI will have interesting impacts on winter and summer peaks in 2015 due to the fact that the program does not run on a calendar year but from May to April. The ICI impacts for May 2014 to April 2015 will have generally materialized in January 2015 as the summer of 2014 was so mild. With the return of more typical weather the ICI impacts for May 2015 to April 2016 will most likely be observed in the summer of 2015. As a result, both the winter and summer peaks of 2015 will be subject to ICI reductions.

Minimum demand levels are similarly impacted by these same forces – primarily economic activity and embedded generation. The recession had led to lower levels of industrial activity, particularly overnight and on weekends due to reductions in the number of shifts. Although most embedded generation is solar, embedded wind generation contributes to lower minimums by supplanting grid-supplied electricity. However, offsetting some of this downward pressure on minimums there is a significant price incentive to shift load to overnight hours. Over the forecast, a relatively small increase in embedded wind generation and modest economic growth and load shifting will lead to a small increase in minimum demand levels over the forecast.

The following tables show the seasonal peaks and annual energy demand over the forecast horizon of the Outlook.

Table 3.1: Forecast Summary

Season	Normal Weather Peak (MW)	Extreme Weather Peak (MW)
Summer 2015	22,991	24,814
Winter 2015-16	22,237	23,029
Summer 2016	22,966	24,541
Year	**Normal Weather Energy (TWh)**	**% Growth in Energy**
2006 Energy	152.3	-1.9%
2007 Energy	151.6	-0.5%
2008 Energy	148.9	-1.8%
2009 Energy	140.4	-5.7%
2010 Energy	142.1	1.2%
2011 Energy	141.2	-0.6%
2012 Energy	141.3	0.1%
2013 Energy	140.5	-0.6%
2014 Energy	139.3	-0.8%
2015 Energy (Forecast)	139.4	0.1%
2016 Energy (Forecast)	140.1	0.5%

Table 3.2: Weekly Energy and Peak Demand Forecast

Week Ending	Normal Peak (MW)	Extreme Peak (MW)	Load Forecast Uncertainty (MW)	Normal Energy Demand (GWh)	Week Ending	Normal Peak (MW)	Extreme Peak (MW)	Load Forecast Uncertainty (MW)	Normal Energy Demand (GWh)
05-Apr-15	18,121	18,791	567	2,525	03-Jan-16	20,654	21,603	528	2,780
12-Apr-15	17,449	18,447	471	2,489	10-Jan-16	22,237	23,029	570	2,991
19-Apr-15	16,800	17,280	496	2,442	17-Jan-16	21,504	22,184	547	2,938
26-Apr-15	16,581	16,950	531	2,419	24-Jan-16	21,661	22,220	483	2,941
03-May-15	17,445	19,803	721	2,412	31-Jan-16	21,669	22,233	404	2,976
10-May-15	17,600	20,164	849	2,400	07-Feb-16	20,919	21,883	734	2,931
17-May-15	18,539	21,730	845	2,431	14-Feb-16	20,313	21,712	635	2,848
24-May-15	18,884	21,825	1,175	2,387	21-Feb-16	20,047	21,644	581	2,809
31-May-15	19,370	21,515	1,330	2,435	28-Feb-16	20,696	21,704	501	2,890
07-Jun-15	19,664	23,132	1,292	2,596	06-Mar-16	19,850	20,656	531	2,813
14-Jun-15	20,832	23,545	1,055	2,630	13-Mar-16	19,432	20,430	649	2,749
21-Jun-15	21,603	23,997	835	2,671	20-Mar-16	18,250	19,057	611	2,624
28-Jun-15	22,318	23,981	754	2,742	27-Mar-16	18,331	19,542	569	2,583
05-Jul-15	22,506	23,971	1,016	2,708	03-Apr-16	18,432	18,987	567	2,579
12-Jul-15	22,991	24,814	814	2,786	10-Apr-16	17,502	18,500	471	2,515
19-Jul-15	22,882	23,979	838	2,689	17-Apr-16	16,846	17,325	496	2,455
26-Jul-15	22,396	24,392	1,035	2,798	24-Apr-16	16,616	16,986	531	2,431
02-Aug-15	22,233	24,409	841	2,789	01-May-16	17,481	19,840	721	2,431
09-Aug-15	21,573	24,596	958	2,749	08-May-16	17,650	20,214	849	2,415
16-Aug-15	21,529	24,113	985	2,735	15-May-16	18,580	21,771	845	2,446
23-Aug-15	21,517	23,775	1,362	2,754	22-May-16	18,916	21,855	1,175	2,455
30-Aug-15	20,367	22,982	1,413	2,632	29-May-16	19,395	21,540	1,330	2,393
06-Sep-15	18,568	22,082	1,370	2,519	05-Jun-16	19,659	23,127	1,292	2,584
13-Sep-15	18,313	20,813	680	2,472	12-Jun-16	20,833	23,545	1,055	2,640
20-Sep-15	18,058	20,181	781	2,496	19-Jun-16	21,592	23,987	835	2,678
27-Sep-15	17,184	18,427	420	2,444	26-Jun-16	22,293	23,955	754	2,749
04-Oct-15	17,301	17,668	554	2,475	03-Jul-16	22,494	24,144	1,016	2,737
11-Oct-15	17,298	17,724	786	2,499	10-Jul-16	22,966	24,811	814	2,791
18-Oct-15	17,810	18,217	507	2,460	17-Jul-16	22,848	23,946	838	2,692
25-Oct-15	17,803	18,342	392	2,543	24-Jul-16	22,387	24,383	1,035	2,805
01-Nov-15	18,283	18,731	318	2,580	31-Jul-16	22,176	24,352	841	2,786
08-Nov-15	19,060	19,453	416	2,661	07-Aug-16	21,518	24,541	958	2,753
15-Nov-15	19,367	20,128	601	2,683	14-Aug-16	21,507	24,090	985	2,742
22-Nov-15	19,849	20,685	342	2,765	21-Aug-16	21,508	23,766	1,362	2,761
29-Nov-15	20,304	21,343	607	2,807	28-Aug-16	20,337	22,965	1,413	2,638
06-Dec-15	20,691	21,813	409	2,854	04-Sep-16	18,847	22,367	1,370	2,534
13-Dec-15	20,977	21,900	555	2,893	11-Sep-16	18,278	20,778	680	2,477
20-Dec-15	20,665	21,754	690	2,877	18-Sep-16	18,037	20,158	781	2,502
27-Dec-15	20,361	22,122	362	2,838	25-Sep-16	17,191	18,434	420	2,453

3.1 Actual Weather and Demand

Since the last forecast the actual demand and weather data for November, December, and January have been recorded.

November

- November's temperature was colder than normal ranking it in the top ten of the past 30 Novembers. As a result, Ontario's energy demand for the month was 11.5 TWh (11.3 TWh weather corrected). The actuals and weather corrected values were the lowest since 1997.

- The November peak occurred on the ninth coldest day of the month as the cold weather generally landed on the weekends. Despite this the peak was 20,102 MW (21,298 MW weather corrected as the peak didn't occur on the coldest day). These peaks are consistent with the levels seen since the recession.
- Wholesale customers' consumption for the month decreased by 1.6% compared to the previous November.

December

- December was milder than normal. Monthly energy demand was 12.2 TWh and bumped up to 12.4 TWh after correcting for weather. Both values are low by historical standards for December.
- The peak occurred on December 2, which was the third coldest day of the month but was preceded by and followed by rather mild days. Therefore, the peak was a rather modest 20,938 MW (21,322 MW weather corrected). This was lower than last December but an increase over 2012. There was a "cold snap" later in the month but it occurred over the holiday period and therefore did not generate high peak demands.
- Wholesale customers' capped off a negative quarter with consumption dropping by 1.4% compared to December 2013.

January

- The weather for January was colder than normal. Energy demand for the month was 13.1 TWh (12.8 TWh weather corrected) which is low by historical standards. The actual was the second lowest and the weather corrected the lowest January since market opening.
- Whereas the month was colder than normal, the peak temperature was just slightly colder than normal. The peak demand for the month was on the coldest day and was 21,814 MW (21,531 MW weather corrected). These are quite low by historical standards for January, but this year was different as the ICI significantly reduced the January peak. This was the first time that the ICI was "in play" during the winter.
- Wholesale customers' consumption continued the weakness of the last quarter of 2014 into 2015. Year over year consumption fell by 3.2%.

February

- The weather for February was significantly colder than normal. Energy demand for the month was 12.3 TWh, the highest February since 2008. However, the weather corrected value was a much more modest 11.5 TWh, which is consistent with the relatively flat levels of demand since the recession.
- The peak for the month was 21,494 MW, which was lower than last year's February peak. However, this year's peak was significantly impacted by the ICI. The weather corrected value of 20,132 MW was low by historical standards, but that was partially due to the ICI impacts. The peak occurred on February 19th,which was the second coldest day of the month and during a course of a "cold snap".

- Wholesale customers' consumption continued to decline, falling 4.7% compared to the previous February. That marked five consecutive months of contraction.

Overall, energy demand for the four months from November to February was down 2.1% compared with the same four months one year prior. After adjusting for the milder weather, demand for the four months showed much larger decline of 2.7%.

For the four months, wholesale customers' consumption posted a 2.7% decrease over the same months a year prior with Pulp & Paper, Iron & Steel and Petroleum Products accounting for most of the reductions.

The 2015 Q1 Outlook Tables spreadsheet contains several tables with historical data. They are:

- Table 3.3.1 Weekly Weather and Demand History Since Market Opening
- Table 3.3.2 Monthly Weather and Demand History Since Market Opening
- Table 3.3.3 Monthly Demand Data by Market Participant Role.

3.2 Forecast Drivers

Economic Outlook

The wild volatility in global markets over the past few months should eventually bode well for Ontario's economy. Lower energy prices and a lower dollar should benefit Ontario's export oriented industrial sectors. Once markets stabilize, Ontario should show stronger growth than in recent years. Look for activity to pick up in the latter half of 2015. Despite a strong period of growth in 2014, the industrial sector ended the year on a weaker note. As energy prices and the dollar stabilize Ontario should be able to capitalize on stronger U.S. growth.

Wholesale customers' electricity consumption had shown consistent growth since August 2013 before tailing off in the final quarter of 2014. As mentioned above, the level of activity should pick up for this sector throughout 2015.

- Ontario's economy should see improved growth in 2014 and 2015. Table 3.3.4 of the 2015 Q1 Outlook Tables presents the economic assumptions for the demand forecast.

Weather Scenarios

The IESO uses weather scenarios to produce demand forecasts. These scenarios include normal and extreme weather, along with a measure of uncertainty in demand due to weather volatility. This measure is called Load Forecast Uncertainty.

- Table 3.3.5 of the 2015 Q1 Outlook Tables presents the weekly weather data for the forecast period.

3.3 Demand Response, Conservation and Embedded Generation

Demand response programs, conservation initiatives and embedded generation can all impact demand over the forecast horizon. Demand response (DR) can be defined as the changing of electricity consumption by end-use customers in response to market prices or market signals. Ontario's 2013 Long-Term Energy Plan assumes that DR will play a more significant role in the future.

Using the definition above, DR is comprised of five programs: peaksaver®, dispatchable loads, Demand Response 3 (DR3), time-of-use (TOU) tariffs and the Industrial Conservation Initiative (ICI). However, for the purposes of the 18-Month Outlook, peaksaver®, dispatchable loads and DR3 are treated differently than TOU or ICI. Demand Measures (DM), which include peaksaver®, dispatchable loads and DR3, are treated as resources that can be dispatched in the same way that generators are. TOU, ICI, conservation impacts and embedded generation output are factored into the demand forecast as load modifiers.

3.3.1 Demand Measures

There are a number of changes occurring to demand measures over the 18-Month Outlook period. Existing DR3 resources, which began the transition into IESO's Capacity Based Demand Response (CBDR) program in March 2015, are contracted for multi-year terms, expiring at the latest, in 2018.

A DR Auction is currently being developed by the IESO to maintain the existing DR Capacity and to replace the existing practice of multi-year contracting with a more cost-competitive mechanism. The first DR Auction is expected to be held in December 2015 with a delivery date of May 2016. Discussions with stakeholders about the development of the DR Auction are underway; details can be found on the DR Auction Stakeholder Engagement page on the IESO's website.

The IESO is interested in learning about how DR can play an expanded role in meeting the needs of Ontario's electricity system. Specifically, the IESO seeks to evaluate the capabilities of DR for both responding to five minute and hourly load changes in the real-time energy market and committing to load curtailment day ahead or three hours ahead of real-time in return for certain guarantees. To support this goal, the IESO will be procuring up to 100 MW of price-responsive consumption capability from demand-side resources to participate in pilot projects. These pilot projects will also help identify opportunities to enhance participation of DR in meeting our existing system needs. The pilot will be launched via a competitive Request for Proposal (RFP) in early 2015.

In terms of the demand forecast, the actual impacts of these programs are added back to the demand and the forecast is based on demand prior to the impact of these programs. The total demand measure capacity is discounted based on historical performance and contract data, to reflect the reliably available resource capacity which is then included in the resource portfolio.

3.3.2 Load Modifiers

Conservation, TOU, ICI and embedded generation are accounted for in the demand forecast. Conservation will continue to grow throughout the forecast period, and the demand forecast is decremented for the impacts of conservation. The impact of TOU rates and ICI are factored into the demand forecast as they have a downward impact on peak demands.

Embedded generation capacity will continue to grow over the forecast horizon. The forecast of grid supplied electricity is directly impacted by the growth of distribution connected generation as it supplants the need for bulk system power. The forecast accounts for the growth in embedded generation production.

- End of Section -

4 Resource Adequacy Assessment

This section provides an assessment of the adequacy of resources to meet the forecast demand. When reserves are below required levels, with potentially adverse effects on the reliability of the grid, the IESO will reject outages based on their order of precedence. Conversely, an opportunity exists for additional outages when reserves are above required levels.

The existing installed generation capacity is summarized in Table 4.1. This includes capacity from new projects that have completed commissioning and the market entry process.

Table 4.1: Existing Generation Capacity as of February 13, 2015

Fuel Type	Total Installed Capacity (MW)	Forecast Capability at Summer Peak (MW)	Number of Stations	Change in Installed Capacity (MW)	Change in Stations
Nuclear	12,947	11,484	5	0	0
Hydroelectric	8,462	5,684	71	343	0
Gas/Oil	9,920	8,707	29	0	0
Wind	2,543	346	21	60	1
Biofuel	455	292	8	153	1
Solar	40	11	2	40	2
Total	**34,367**	**26,525**	**136**	**596**	**4**

During this Outlook period, the IESO is moving forward with the second phase of its energy storage procurement. Qualified applicants will be selected, and a draft RFP will be issued shortly after. The IESO is seeking a broad range of technologies that can provide the best long-term benefits.

The Phase II storage RFP for 16 MW will allow the IESO to build on its previous procurement by expanding its storage portfolio and creating new learning opportunities. In 2014, the IESO completed the Phase I RFP for 34 MW of its current storage procurement. The first of these will come into service during this outlook period.

The IESO initially procured six megawatts of storage—a battery and flywheel to provide regulation service—in 2012. These two projects are now operational.

4.1 Assessments Assumptions

4.1.1 Committed and Contracted Generation Resources

All generation projects that are scheduled to come into service, be upgraded, or be shut down within the Outlook period are summarized in Table 4.2. This includes committed generation projects in the IESO's Connection Assessment and Approval process (CAA), those that are under construction, as well as projects contracted by the IESO. Details regarding the IESO's CAA process and the status of these projects can be found on the IESO's website at http://www.ieso.ca/Pages/Participate/Connection-Assessments/default.aspx under Application Status.

The effects of the seasonal exchange of electricity capacity between Ontario and Quebec as agreed through the Memorandum of Understanding between HQ Energy Marketing Inc. and the IESO and expected to start December 1, 2015 have not been taken into account in this assessment.

The estimated effective date in Table 4.2 indicates the date on which additional capacity is assumed to be available to meet Ontario demand or when existing capacity will be shut down. This data is accurate as of February 13, 2015. For projects that are under contract, the estimated effective date is based on the best information available to the IESO. If a project is delayed, the estimated effective date will be the best estimate of the commercial operation date for the project.

Table 4.2: Committed and Contracted Generation Resources

Project Name	Also Known As	Zone	Fuel Type	Estimated Effective Date	Project Status	Capacity Considered	
						Firm (MW)	Planned (MW)
Thunder Bay Condensing Turbine Project		Northwest	Biomass		Commercial Operation	40	40
Adelaide Wind Energy Centre		Southwest	Wind		Commercial Operation	60	60
Bornish Wind Energy Centre		Southwest	Wind		Commercial Operation	74	74
Grand Renewable Energy Park	Grand Wind	Southwest	Wind		Commercial Operation	149	149
Northland Power Solar Abitibi		Northeast	Solar	2015-Q1	Construction		10
Northland Power Solar Empire		Northeast	Solar	2015-Q1	Construction		10
Northland Power Solar Long Lake		Northeast	Solar	2015-Q1	Construction		10
Northland Power Solar Martin's Meadows		Northeast	Solar	2015-Q1	Construction		10
Twin Falls		Northeast	Water	2015-Q1	Construction		5
Adelaide Wind Power Project	Landon	West	Wind	2015-Q1	Commissioning		40
Goshen Wind Energy Centre		Southwest	Wind	2015-Q1	Commissioning		102
Dufferin Wind Farm	Shannon	Southwest	Wind	2015-Q1	Commissioning		100
Jericho Wind Energy Centre		Southwest	Wind	2015-Q1	Commissioning		150
Goulais Wind Farm		Northeast	Wind	2015-Q2	Construction		25
Grand Renewable Energy Park	Grand Solar	Southwest	Solar	2015-Q2	Commissioning		100
Bow Lake Phase 1		Northeast	Wind	2015-Q2	Commissioning		20
K2 Wind Project		Southwest	Wind	2015-Q2	Construction		270
High Falls Hydropower Development		Northwest	Water	2015-Q2	Pre-NTP		5
Green Electron Power Project		West	Gas	2015-Q3	Construction		298
Leamington Pollution Control Plant		West	Oil	2015-Q3	Approvals & Permits		2
Cedar Point Wind Power Project Phase II		Southwest	Wind	2015-Q4	NTP		100
Kingston Solar Project		East	Solar	2015-Q4	NTP		100
Grand Valley Wind Farms (Phase 3)		Southwest	Wind	2015-Q1	NTP		40
Armow Wind Project		Southwest	Wind	2015-Q4	NTP		180
Grand Bend Wind Farm		Southwest	Wind	2015-Q4	NTP		100
Niagara Region Wind Farm		Southwest	Wind	2015-Q4	NTP		230
White Pines Wind Farm		East	Wind	2015-Q4	Pre-NTP		60
Total						**322**	**2,289**

Notes on Table 4.2:

1. The total may not add up due to rounding. Total does not include in-service facilities.
2. Project status provides an indication of the project progress. The milestones used are:
    a. Connection Assessment - the project is undergoing an IESO system impact assessment.
    b. Approvals & Permits - the proponent is acquiring major approvals and permits required to start construction (e.g. environmental assessment, municipal approvals etc.).
    c. Construction - the project is under construction.
    d. Commissioning - the project is undergoing commissioning tests with the IESO.
    e. Pre-NTP/NTP - Feed-in Tariff (FIT) projects are categorized as Notice to Proceed (NTP) or pre-NTP. IESO issues NTP when the project proponent provides necessary approvals and permits, finance plan, Domestic Content Plan and documentation on impact assessment required by the Transmission System Code or the Distribution System Code.
    f. Commercial Operation – the project has achieved commercial operation under the contract criteria but has not met all the commissioning requirements of the IESO.

4.1.2 Summary of Scenario Assumptions

In order to assess future resource adequacy, the IESO must make assumptions on the amount of available resources. The Outlook considers two scenarios: a Firm Scenario and a Planned Scenario as compared in Table 4.3.

Table 4.3: Summary of Scenario Assumptions for Resources

		Planned Scenario	Firm Scenario
Over the 18-Month Period	Total Existing Installed Resource Capacity (MW)	34,367	
	New Generation and Capacity Changes (MW)	All Projects	Generators reached commercial operation and generator shutdowns and retirements
		2,289	322

Both scenarios' starting point 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 study period. The Firm Scenario only assumes resources that have reached commercial operation. Also considered for both scenarios are generator-planned shutdowns or retirements that have high certainty of occurring in the future. The Firm and Planned scenarios also differ in their assumptions regarding the amount of demand measures. The Firm scenario considers DR programs from existing participants only, while the Planned scenario considers DR programs from future participants too. Both scenarios recognize that resources are not available during times for which the generator has submitted planned outages.

The generation capability assumptions used in this Outlook are described in the following paragraphs.

The hydroelectric capability for the duration of this Outlook is typically based on median historical values (including energy and operating reserve) during weekday peak demand hours from May 2002 to March 2014. Adjustments may be made periodically, when outage or water conditions drive expectations of higher or lower output that varies from median values by more than 500 MW. Table 4.4 shows the historical hydroelectric median values calculated with the data from May 2002 to March 2014. These values are updated annually to coincide with the release of summer 18-Month Outlook.

Table 4.4: Monthly Historical Hydroelectric Median Values

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Historical Hydroelectric Median Values (MW)	6,059	6,025	5,876	5,812	5,841	5,716	5,684	5,414	5,018	5,401	5,730	6,131

- Thermal generators' capacity and energy contributions, planned outages, expected forced outage rates and seasonal deratings are based on market participant submissions or calculated by the IESO based on actual experience.

- Non-utility Generators (NUGs), whose contracts have expired but which continue to operate and provide forecasts are included in both planned and firm scenarios. NUGs whose contracts are expiring during the Outlook period are excluded from the Firm scenario after their contract expiry date. These NUGs are included as part of the Planned scenario if they have provided forecast data. Former NUGs that subsequently reach a contract or register with the IESO as a dispatchable facility are added to both scenarios.
- For wind generation the monthly Wind Capacity Contribution (WCC) values are used at the time of weekday peak, while annual energy contribution is assumed to be 29% of installed wind capacity. Table 4.5 shows the monthly WCC values (with actual historic wind output up to February 28, 2014). These values are updated annually to coincide with the release of summer Outlook.

Table 4.5: Monthly Wind Capacity Contribution Values

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WCC (% of Installed Capacity)	33.1%	33.1%	26.2%	22.4%	23.4%	13.6%	13.6%	13.6%	16.7%	21.6%	28.6%	33.1%

- For solar generation, the monthly Solar Capacity Contribution (SCC) values are used at the time of weekday peak. For annual solar energy contribution, 14% output of installed capacity is assumed. The specifics on wind and solar values can be found in the Methodology to Perform Long Term Assessments. Table 4.6 shows the monthly SCC values. These values are updated annually to coincide with the release of summer Outlook.

Table 4.6: Monthly Solar Capacity Contribution Values

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SCC (% of Installed Capacity)	0.0%	0.0%	0.0%	1.0%	37.0%	27.0%	27.0%	27.0%	6.0%	1.0%	0.0%	0.0%

4.2 Capacity Adequacy Assessment

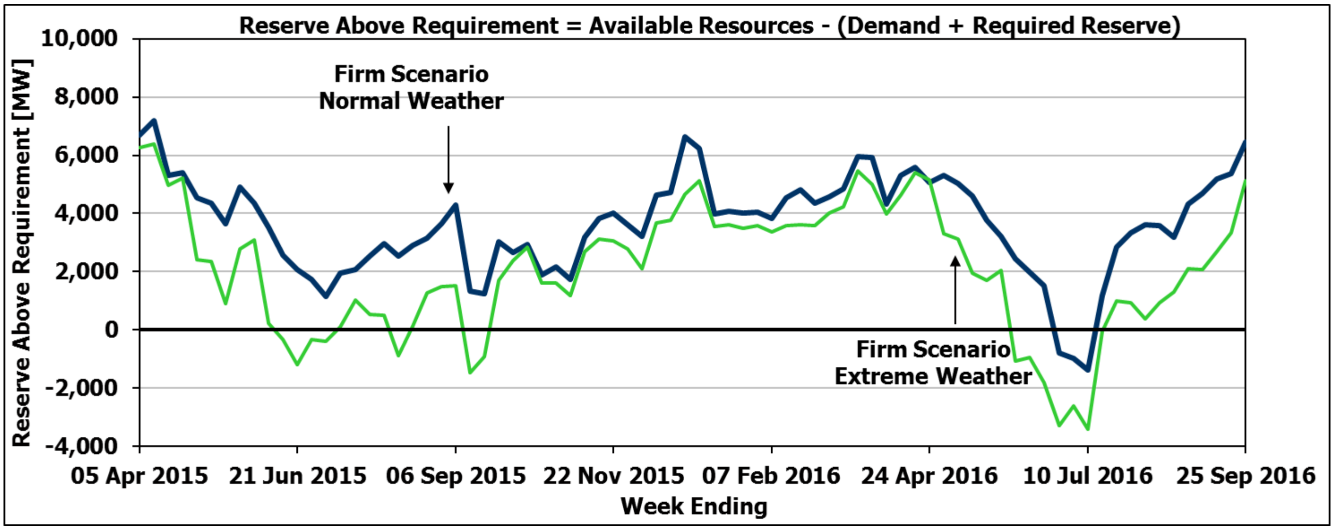
The capacity adequacy assessment accounts for zonal transmission constraints imposed by planned transmission outages. The planned outages occurring during this Outlook period have been assessed as of January 20, 2015.

4.2.1 Firm Scenario with Normal and Extreme Weather

The firm scenario incorporates generation capacity that reached commercial operation. This will include the addition of roughly 280 MW of wind and 40 MW of biofuel capacity.

RAR levels, which represent the difference between Available Resources and Required Resources, are shown in Figure 4.1. As can be seen, the reserve requirement under normal weather conditions is being met throughout the Outlook period except for three weeks in summer of 2016. During extreme weather conditions, the reserve is lower than the requirement for a total of thirteen weeks during the summers of 2015 and 2016. This shortfall is largely attributed to the planned generator outages scheduled during those weeks.

Figure 4.1: Reserve Above Requirement: Firm Scenario with Normal vs. Extreme Weather

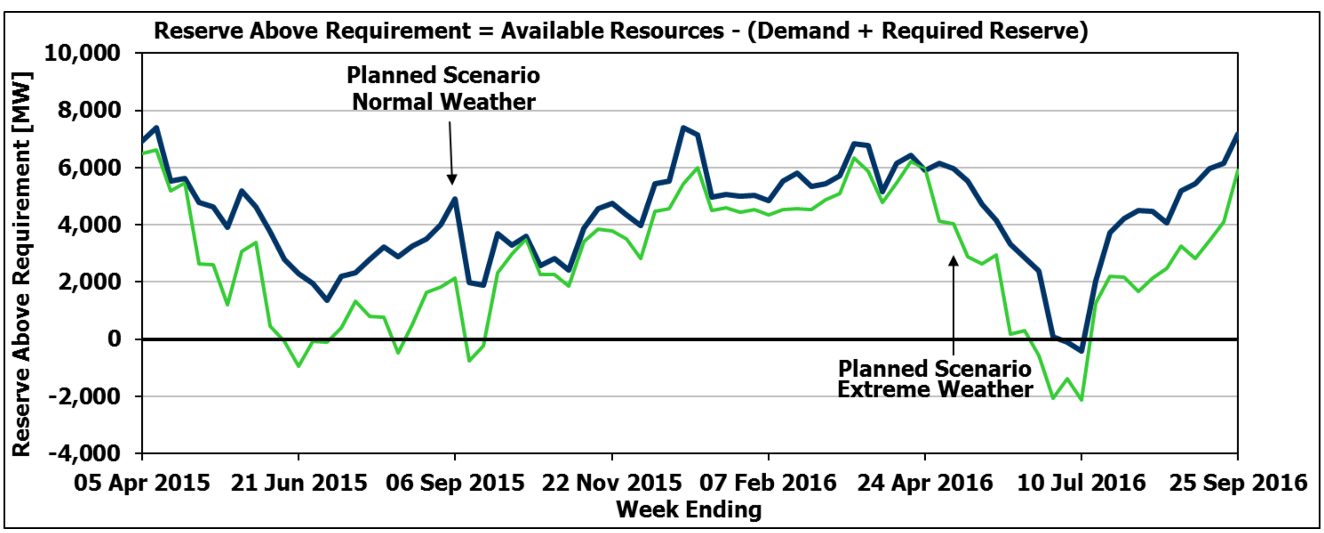


4.2.2 Planned Scenario with Normal and Extreme Weather

The planned scenario incorporates all existing capacity plus all capacity coming in service. Roughly 2,300 MW of generation capacity is expected to connect to Ontario's grid over this Outlook period.

Reserve Above Requirement levels, which represent the difference between Available Resources and Required Resources, are shown in Figure 4.2. As can be seen, the reserve requirement is being met throughout the Outlook period under normal weather conditions, except for two weeks during summer of 2016. The reserve is lower than the requirement for eleven weeks during the summer months of 2015 and summer of 2016 under extreme weather conditions. This shortfall is largely attributed to the planned outages scheduled for those weeks.

Figure 4.2: Reserve Above Requirement: Planned Scenario with Normal vs. Extreme Weather



4.2.3 Comparison of Resource Scenarios

Table 4.7 shows a snapshot of the forecast available resources, under the two scenarios, at the time of the summer and winter peak demands during the Outlook.

Table 4.7: Summary of Available Resources

Notes	Description	Summer Peak 2015		Winter Peak 2016		Summer Peak 2016	
		Firm Scenario	Planned Scenario	Firm Scenario	Planned Scenario	Firm Scenario	Planned Scenario
1	Installed Resources (MW)	34,689	35,547	34,689	36,656	34,689	36,656
2	Total Reductions in Resources (MW)	7,171	7,852	5,805	6,856	10,623	11,766
3	Demand Measures (MW)	511	591	483	563	511	591
4	Available Resources (MW)	28,029	28,286	29,367	30,363	24,577	25,481

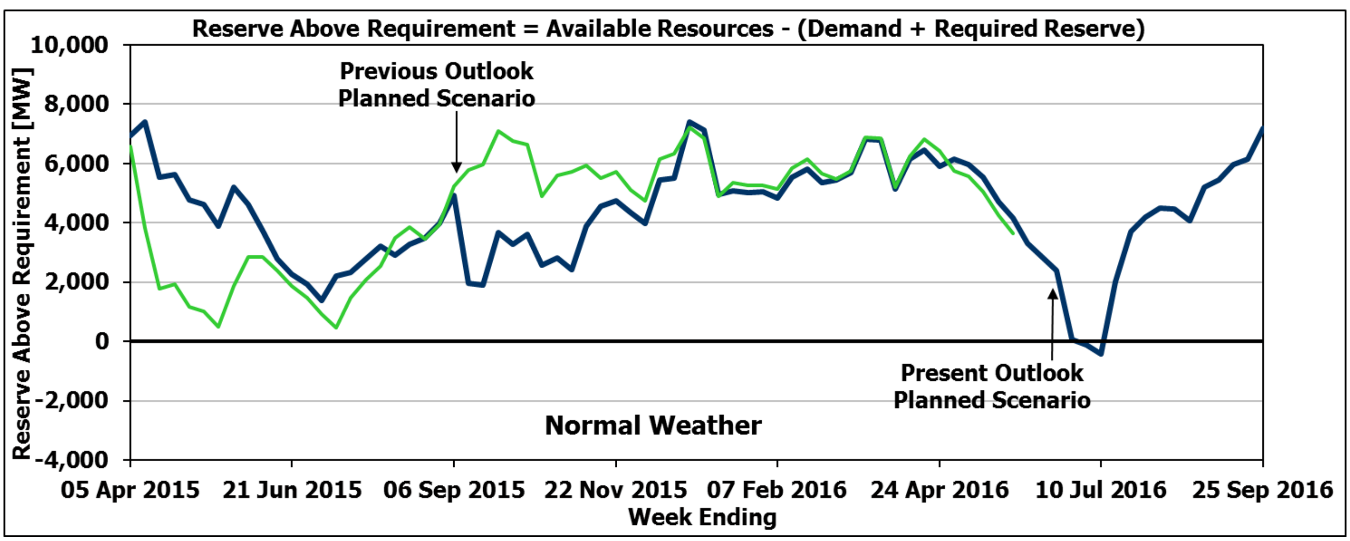
Notes on Table 4.7:

1. Installed Resources: This is the total generation capacity assumed to be installed at the time of the summer and winter peaks.
2. Total Reductions in Resources: Represent the sum of deratings, planned outages, limitations due to transmission constraints and allowance for capability levels below rated installed capacity.
3. Demand Measures: The amount of demand expected to be reduced.
4. Available Resources: Equals Installed Resources (line 1) minus Total Reductions in Resources (line 2) plus Demand Measures (line 3).

Comparison of the Current and Previous Weekly Adequacy Assessments for the Planned Normal Weather Scenario

Figure 4.3 provides a comparison between the forecast RAR values in the present Outlook and the forecast RAR values in the previous Outlook published on November 27, 2014. The difference is mainly due to the changes to outages and changes in the demand forecast. The most significant difference is for spring of 2015 which reflects there will no longer be overlapping nuclear outages during that period.

Figure 4.3: Reserve Above Requirement: Planned Scenario with Present Outlook vs. Previous Outlook



Resource adequacy assumptions and risks are discussed in detail in the [“Methodology to Perform Long Term Assessments”](#).

4.3 Energy Adequacy Assessment

This section provides an assessment of energy adequacy, the purpose of which is to determine whether Ontario has sufficient supply to meet its forecast energy demands and to highlight any potential concerns associated with energy adequacy within the period covered under this 18-Month Outlook.

4.3.1 Summary of Energy Adequacy Assumptions

In order to achieve results consistent with the capacity adequacy assessments, the energy adequacy assessment is performed using the same set of assumptions pertaining to resources expected to be available over the next 18 months. Refer to Table 4.1 for the summary of 'Existing Generation Capacity and Table 4.2 for the list of 'Committed and Contracted Generation Resources' for this information. The monthly forecast of energy production capability, based on information provided by market participants, is included in the 2015 Q1 Outlook Tables Appendix A, Table A7.

For the energy adequacy assessment, only the Planned Scenario as per Table 4.3 with normal weather demand is considered. In addition, in order to reasonably capture the variability and uncertainty associated with wind resources, multiple wind samples (hourly profiles) were considered in the energy adequacy assessment. Generator forced outages were modelled using a convergent Monte Carlo technique which pre-filters statistically unlikely outage patterns. The key assumptions specific to the Energy Adequacy Assessment (EAA) are described in the IESO document titled "Methodology to Perform Long Term Assessments".

4.3.2 Results - Planned Scenario with Normal Weather

Table 4.10 summarizes key energy statistics over the 18-Month period for the Planned Scenario with normal weather demand for Ontario as a whole, and provides a breakdown by each transmission zone.

The results indicate that supply is expected to be adequate over the 18-month timeframe of this Outlook with the analysis showing no occurrences of unserved energy.

Table 4.8: Planned Scenario - Normal Weather: Summary of Zonal Energy

Zone	18 -Month Energy Demand		18-Month Energy Production		Net Inter-Zonal Energy Transfer	Potential Un-served Energy	Zonal Energy Demand on Peak Day of 18-Month Period	Available Energy on Peak Day of 18- Month Period
	TWh	Average MW	TWh	Average MW	TWh	GWh	GWh	GWh
Ontario	**205.5**	**15,681.0**	**205.5**	**15,681.0**	**0.0**	**0.0**	**455.2**	**581.6**
Bruce	0.8	62.0	62.5	4,770.0	61.7	0.0	1.4	126.8
East	12.7	966.0	15.1	1,152.0	2.4	0.0	27.0	80.8
Essa	10.8	825.0	3.1	236.0	-7.7	0.0	23.5	15.5
Niagara	5.5	423.0	19.7	1,502.0	14.2	0.0	13.9	41.4
Northeast	15.8	1,204.0	13.4	1,020.0	-2.4	0.0	25.3	33.7
Northwest	5.9	453.0	6.7	507.0	0.8	0.0	9.9	13.5
Ottawa	13.2	1,011.0	0.7	53.0	-12.5	0.0	30.2	2.2
Southwest	42.7	3,260.0	4.7	361.0	-38.0	0.0	90.5	22.5
Toronto	78.4	5,980.0	69.6	5,314.0	-8.8	0.0	187.6	180.7
West	19.6	1,498.0	10.0	765.0	-9.6	0.0	45.9	64.5

Figures 4.4 to 4.6 show the percentage production by fuel type for each calendar year of the 18-Month period under conditions of zero net exports, while Table 4.11 summarizes these simulated production results by fuel type, for each year.

Figure 4.4: Production by Fuel Type – Apr. 1 to Dec. 31, 2015 (%)

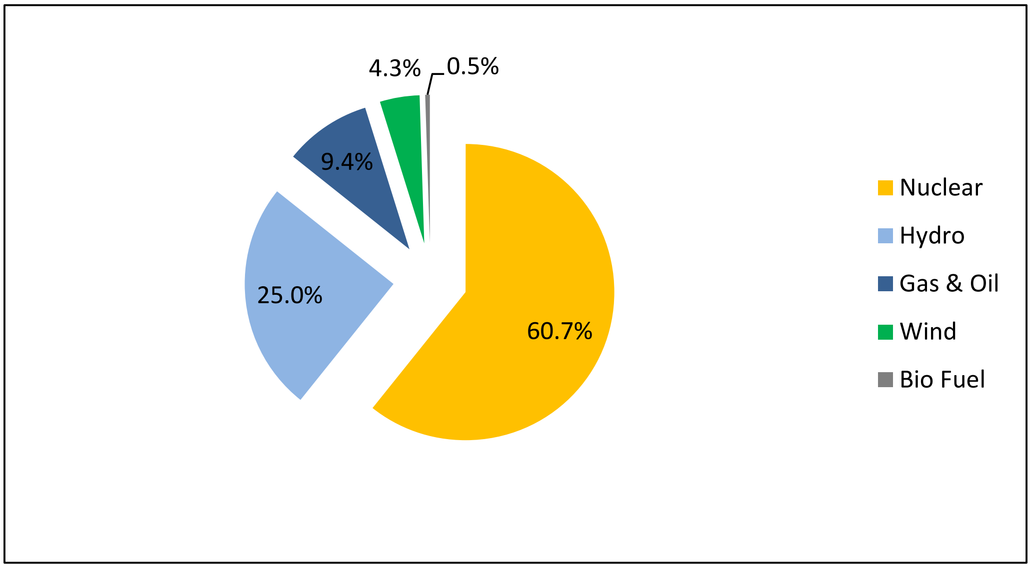


Figure 4.5: Production by Fuel Type – Jan. 1 to Sep. 30, 2016 (%)

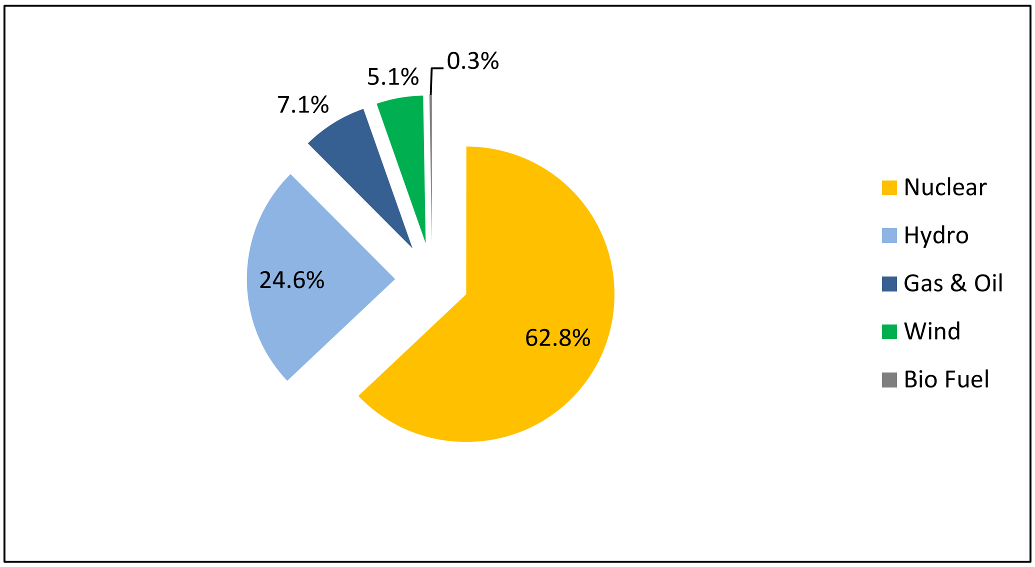


Table 4.9: Planned Scenario - Normal Weather: Ontario Energy Production by Fuel Type

Fuel Type (Grid Connected)	2015 (Apr 1 – Dec 31) (GWh)	2016 (Jan 1 – Sep 30) (GWh)	Total (GWh)
Nuclear	63,964	63,763	127,727
Hydro	25,276	25,725	51,002
Gas & Oil	8,851	8,914	17,765
Wind	4,211	5,596	9,807
Biofuel	511	280	792
Other (Solar & DR)	78	126	205
Total	102,892	104,405	207,297

4.3.3 Findings and Conclusions

The energy adequacy assessment results indicate that Ontario is expected to have sufficient supply to meet its energy forecast during the 18-Month Outlook period for the Planned scenario with normal weather demand. Additional sensitivity modelling runs were conducted to analyze the energy adequacy picture under more onerous demand conditions to capture the impact of load forecast uncertainty. Under these conditions Ontario is again expected to have sufficient supply to meet the forecast demand over the 18-Month Outlook period without reliance on imports or system operator control actions.

- End of Section -

5 Transmission Reliability Assessment

The IESO requires transmitters to provide information on the transmission projects that are planned for completion within the 18-month period. Construction of several transmission reinforcements is expected to be completed during this Outlook period. Major transmission and load supply projects planned to be in service are shown in Appendix B. Projects that are already in service or whose completion is planned beyond the period of this Outlook are not shown. The list includes only the transmission projects that represent major modifications or are considered to significantly improve system reliability. Minor transmission equipment replacements or refurbishments are not shown.

Some area loads have experienced significant load growth to warrant additional investments in new load supply stations and reinforcements of local area transmission. Several local area supply improvement projects are underway and will be placed in service during the timeframe of this Outlook. These projects help relieve loadings on existing transmission infrastructure and provide additional supply capacity for future load growth.

5.1 Transmission Outages

The IESO's assessment of the transmission outage plans is shown in Appendix C, Tables C1 to C10. The methodology used to assess the transmission outage plans is described in the IESO document titled "Methodology to Perform Long Term Assessments". This Outlook contains transmission outage plans submitted to the IESO as of January 14, 2015.

5.2 Transmission System Adequacy

The IESO assesses transmission adequacy using the methodology on the basis of conformance to established criteria, planned system enhancements and known transmission outages. Zonal assessments are presented in the following sections. Overall, the Ontario transmission system is expected to supply the demand under the normal and extreme weather conditions forecast for the Outlook period.

The existing transmission infrastructure in some areas in the province, as described below, have been identified as currently having or anticipated to have some limitations to supply the local needs. Hydro One and the IESO are considering long-term options to address these situations in accordance with local communities under the Regional Planning Process established by the Ontario Energy Board (OEB). Plans are currently active in the GTA, Greater Ottawa, Southwest Ontario, Northwest Ontario, and Western Ontario regions.

5.2.1 Toronto and Surrounding Area

The load supply capability to the GTA is expected to be adequate to meet the forecast demand through to the end of this 18-month period.

The upgrading of the 115 kV breakers at Leaside Transformer Station (TS) and Manby TS was completed in Q4 2014. The remaining work at Manby TS covering bus reinforcement and insulator replacement is scheduled for completion by Q2 2016. These upgrades will allow additional generation to be incorporated into the Toronto 115 kV system and the distribution level by increasing the short-circuit capability of the 115 kV system.

The development of Clarington TS has started with a scheduled in-service date of fall 2017. This will ensure that the additional 500 kV to 230 kV transformation capacity required to maintain supply reliability, will be available before Pickering GS is shutdown. Without this additional capacity there would have been an increased risk of overloading the existing auto-transformers at Cherrywood TS.

The associated 230 kV switching facilities at Clarington TS will also improve the supply reliability to the loads in the Pickering, Ajax, Whitby, Oshawa and Clarington areas by providing a full, alternative source of supply to these loads.

In central Toronto, Copeland TS was originally expected to be in service in Q3 2015 but is now scheduled to be in service in Q1 2016. The new station will allow some load to be transferred from John TS. This will help meet the short and mid-term need for additional supply capacity in the area and will also facilitate the refurbishment of the facilities at John TS.

High voltages in southern Ontario continue to present operational challenges during periods of light load requiring the temporary removal from service of at least one of the 500 kV circuits between Lennox TS and Bowmanville SS during those periods. The situation has become especially acute during those periods when the shunt reactors at Lennox TS have been unavailable due either to repair or maintenance activities. While the IESO and Hydro One are currently managing this situation with day-to-day operating procedures, the situation is expected to become more difficult once Pickering GS is shut down. Planning work for the installation of new voltage control devices has been initiated.

In order to increase the load-meeting capability of the two 230 kV circuits between Claireville TS and Minden TS and allow the proposed Vaughan TS No. 4 to be connected, Hydro One is planning to install two 230 kV in-line breakers at Holland TS, together with a load rejection scheme. These facilities are scheduled to be in service by early 2017. Until these facilities become available, operational measures will be required to avoid possible overloading of these circuits during peak load periods.

Transmission transfer capability in Toronto and surrounding area is expected to be sufficient for the purpose of supplying load in this area with a margin to allow for planned outages.

5.2.2 Bruce and Southwest Zones

In the Guelph area, Hydro One has begun construction on the Guelph Area Transmission Refurbishment project to improve the transmission capability into the Guelph area by reinforcing the supply into Guelph-Cedar TS, with an expected completion date in Q2 2016. As part of this project, circuit switchers are to be installed at Guelph North Junction that will allow the 230 kV system between Detweiler TS and Orangeville TS to be sectionalized. These devices will reduce the restoration times for the loads in the Waterloo, Guelph and Fergus areas following a supply interruption.

Plans for a second 230/115 kV autotransformer at Preston TS, together with the associated switching and reactive facilities, are currently being revisited. Hydro One and the IESO are exploring options that will not only improve the load restoration capability to those customers in the Cambridge area affected by a major transmission outage, but also accommodate the development of the Cambridge No. 2 transformer station on the 115 kV system between Preston TS and Detweiler TS to meet load growth in the area.

Further planning work is required to address the longer-term supply needs of the area beyond 2016 and also to satisfy the IESO's load restoration criteria.

Construction on Evergreen, a new 500 kV switching station, was completed in Q4 2014. Ashfield, another 500 kV switching station, is planned to be in service by the end of Q1 2015. These stations will incorporate close to 700 MW of renewable generation onto the system.

Hydro One is planning to replace the aging infrastructure at the Bruce 230 kV switchyard, with a completion date of June 2018. While this work is being implemented, careful coordination of the transmission and generation outages will be needed.

The transmission transfer capability in the Southwest zone and its vicinity is expected to be sufficient to supply the load in this area with a margin to allow for planned outages.

5.2.3 Niagara Zone

Completion of the transmission reinforcements from the Niagara region into the Hamilton-Burlington area continues to be delayed and the transmission congestion will still restrict connection of new generation in the area. This project, if completed, would increase the transfer capability from the Niagara region to the rest of the Ontario system by approximately 700 MW.

Hydro One completed work to replace existing 115 kV breakers at Allanburg TS in Q4 2014. The new equipment will alleviate the short circuit capability issue which restricted connection of new generation in the area.

Transmission transfer capability in Niagara and its vicinity is expected to be sufficient for the purpose of supplying load in this area with a margin to allow for planned outages.

5.2.4 East Zone and Ottawa Zone

To address load growth in the Ottawa area, a new load supply transformer station, Orleans TS, is expected to come into service by Q2 2015.

With further increases in the amount of load supplied from the 230 kV system in the Merivale area and with a minimum threshold of 400 MW on the level to which the transfers from Hydro Québec can be automatically reduced following the loss of one of the 230 kV Hawthorne-to-Merivale circuits, there is an increased possibility that imports may need to be restricted during peak load periods. The situation may be especially challenging during periods of low hydroelectric output from the plants on the Ottawa and Madawaska Rivers, which is not uncommon during summer peak periods.

Transmission transfer capability in East Zone and Ottawa Zone is expected to be sufficient for the purpose of supplying load in this area with a margin to allow for planned outages.

5.2.5 West Zone

Transmission constraints in this zone may restrict resources in southwestern Ontario. This is evident in the constrained generation amounts shown for the Bruce and West zones in Tables A3 and A6.

Transmission transfer capability into the West zone is expected to be sufficient to supply load in this area with a margin to allow for planned outages.

5.2.6 Northeast and Northwest Zones

In northeast Ontario, Hydro One is expected to finish the transmission work required to accommodate the increased output from the Lower Mattagami generation expansion project by the end of Q4 2015. Currently, Hydro One is reviewing changes to the existing line-connected reactors at Hanmer TS to allow post-contingency switching of these reactors to occur, thereby increasing the transfer capability of the Flow South Interface.

The limited reactive absorption facilities that are available in the Timmins area are proving to be a major obstacle to the restoration of the system in the northeast following an outage involving either of the 500 kV circuits. Maintaining the voltage below the agreed maximum of 550 kV during the restoration process, before the system can be loaded, has been challenging, particularly with the reduction that has occurred to the loads in the Timmins area.

Some loads in the north of Dryden to Pickle Lake area experienced significant growth over the last few years and recently indicated their intention to expand operations. The transmission circuits in the area are currently operating close to their capability. The IESO has issued an Integrated Regional Resource Plan (IRRP) which recommends the following:

- Building a new single circuit 230 kV transmission line from Dryden/Ignace area to Pickle Lake (for the Pickle Lake subsystem), installing a new 230/115 kV autotransformer, related switching facilities, and the necessary voltage control devices at Pickle Lake, and transferring the existing load on the line between Ear Falls to Red Lake (E1C) to be supplied by this new line;
- Upgrading the existing 115 kV from Dryden to Ear Falls (E4D) and from Ear Falls to Red Lake (E2R) (for the Red Lake subsystem) and install the necessary voltage control devices; and
- Having the IESO initiate discussions with Ontario Power Generation for new reactive power services provided by Manitou Falls GS if it is confirmed to be beneficial to the ratepayer.

Transmission transfer capability in the Northeast and Northwest zones is expected to be sufficient to supply load in this area with a margin to allow for planned outages.

- End of Section -

6 Operability Assessment

This section highlights any existing or emerging operability issues that could potentially impact system reliability of Ontario's power system.

6.1 Operation during Nuclear Outages

Voltage control will be challenging during major scheduled outages, especially during off-peak periods. Studies to determine the best ways of controlling voltages have been completed and plans to manage grid security are already in place.

For the major nuclear outages scheduled for spring and fall 2015, the IESO has been actively working with transmitters, generators, natural gas pipelines and our interconnected neighbours to ensure reliable operation during this period.

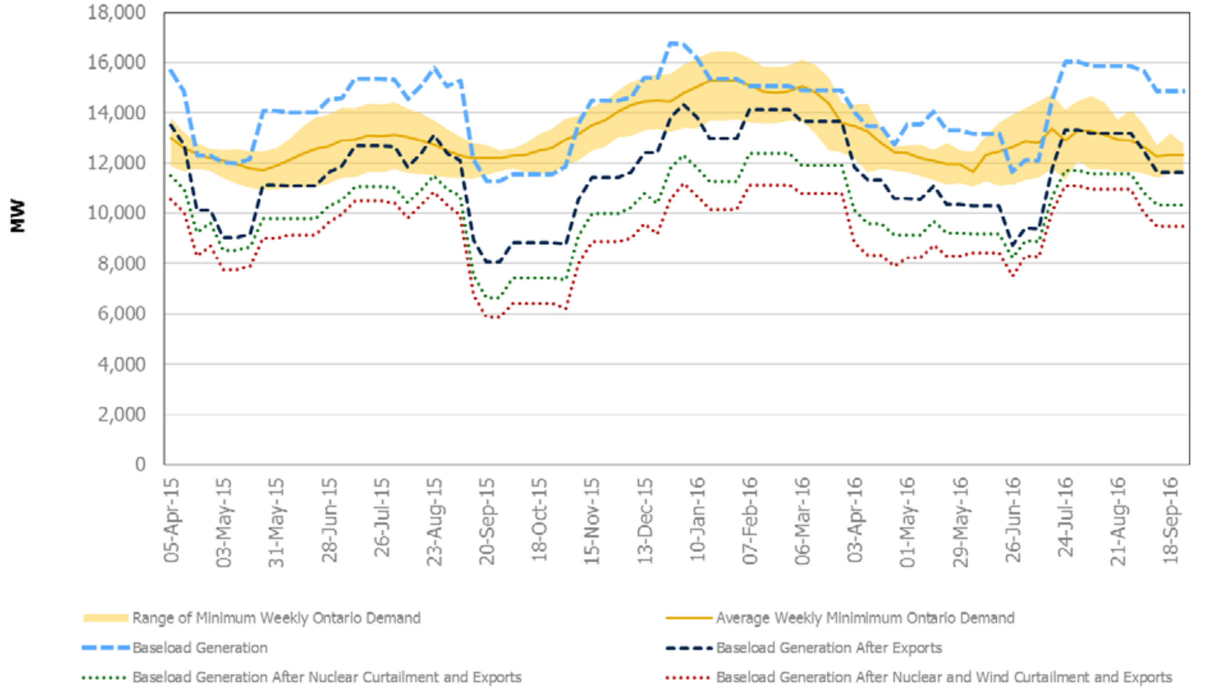
6.2 Surplus Baseload Generation (SBG) Forecast

Baseload generation is made up of nuclear, run-of-the-river hydroelectric and variable generation such as wind and solar. SBG conditions occur when the amount of baseload generation exceeds Ontario demand. However, when the baseload supply is expected to exceed Ontario demand plus scheduled exports, the IESO typically balances the system via export scheduling, nuclear curtailments and wind dispatch scheduled through the IESO-administered markets.

Nuclear maneuvering capability and dispatchable variable generation has provided additional flexibility to manage SBG, while also mitigating the need for manual control actions. These actions usually, but not always occur when Ontario demand is at its lowest.

Figure 6.1 shows the forecast SBG for the next 18 months and the flexibility from nuclear and variable generation.

Figure 6.1: Minimum Ontario Demand and Baseload Generation



Ontario will continue to experience SBG conditions during this Outlook period. The steep decline in SBG in the spring and fall of 2015 is attributed to planned generation outages, as previously discussed in section 4.2 of this report. The vast majority of SBG can be managed through normal market mechanisms including export scheduling and nuclear maneuvering. IESO's variable generation dispatch tools have provided additional flexibility to alleviate most SBG events.

The baseload generation assumptions include market participant-submitted minimum production data, the latest planned outage information, in-service dates for new or refurbished generation, and reliable export capability. The expected contribution from self-scheduling and intermittent generation has also been updated to reflect the latest data. Output from commissioning units is explicitly excluded from this analysis due to uncertainty and the highly variable nature of commissioning schedules. Table 6.1 shows the monthly Off-Peak WCC values (with simulated wind output and actual historic wind output up to February 28, 2014). These values are updated annually to coincide with the release of summer 18-Month Outlook.

Table 6.1: Monthly Off-Peak Wind Capacity Contribution Values

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Off-Peak WCC (% of Installed Capacity)	33.1%	33.1%	30.0%	33.0%	24.1%	15.2%	15.2%	15.2%	21.6%	28.4%	31.8%	33.1%

6.3 Gas-Electric Interdependency

The IESO continues to work on enhancing our existing communication protocols with gas pipeline and distribution system operators to facilitate information sharing, especially under tight supply conditions in either sector (gas or electric). This initiative may require Market Rule changes as well as technical interface changes. In addition to this, to prepare for the peak seasons, IESO meets with gas pipeline operators every six months (in April and October) to discuss gas supply and planned maintenance on the gas and electric systems.

The IESO continues to be involved in the Eastern Interconnection Planning Collaborative (EIPC) study work to evaluate the effects of gas infrastructure contingencies on the electrical system and vice-versa.

Full details pertaining to the EIPC effort, including study results and future activity plans can be found via the following link:
http://www.eipconline.com/Gas-Electric_Documents.html

- End of Document -

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