18 Month Outlook

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

FROM JULY 2015 TO DECEMBER 2016

Independent Electricity System Operator

Executive Summary

The outlook for the reliability of Ontario's electricity system remains positive for the next 18 months, with adequate generation and transmission to supply Ontario's demand.

About 2,200 MW of new supply – mostly wind and solar generation – will be added to the province's transmission grid over the Outlook period. By the end of the period, the amount of grid-connected wind generation is expected to increase by 1,500 MW to about 4,500 MW. The total distribution connected wind generation over the same period is expected to be about 700 MW. Meanwhile, grid-connected solar generation is expected to increase to 380 MW, complementing the embedded solar generation capacity of about 2,200 MW located within distribution networks by the end of the Outlook.

In May 2015, the IESO signed a 500 MW seasonal firm capacity sharing agreement with Hydro Quebec Energy Marketing further to the November 2014 *Joint Memorandum: Seasonal Exchange of Electricity Capacity between Ontario and Québec*. This agreement takes advantage of the Provinces' complementary seasonal peaks to support reliability and will be in effect for up to ten years, starting from December of 2015, with Ontario supplying 500 MW of capacity to Quebec for the next two winter seasons. The capacity will be shared "like for like" with no monetary exchange, allowing Quebec to import up to 500 MW in winter months, and Ontario to import up to 500 MW in summer months. The energy associated with the capacity agreement will be scheduled through existing market mechanisms.

With typical summer weather, Ontario will return to experiencing annual peaks in the summer. However, the Industrial Conservation Initiative (ICI), growing embedded generation output and the impacts of conservation will continue to put downward pressure on summer peaks mitigating any demand increases from a growing population and an expanding economy.

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	22,888	24,721
Winter 2015 - 2016	22,380	23,172
Summer 2016	22,849	24,706

A number of new opportunities for demand-side participation will be introduced over the next 18 months. In the summer 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 Ontario's existing system needs and how to better integrate these resources into the electricity market. An auction is currently being developed by the IESO to procure DR capacity through a cost-competitive mechanism. The quantity of DR capacity that the auction will seek to procure will be equivalent to the quantity expiring from the transitional Capacity Based Demand Response (CBDR). The combined total of DR capacity in the CBDR program and selected through the DR auction will maintain the approximately 500 MW that was previously procured under DR2 and DR3 contracts.

Ontario will continue to experience Surplus Baseload Generation (SBG) conditions during this Outlook period. The magnitude of SBG is trending higher with the addition of new renewable generation and decline in grid demand due to conservation and embedded generation. The SBG is expected to be effectively managed through existing market mechanisms, which include inter-tie scheduling, nuclear maneuvering or shutdown and the dispatch of grid-connected renewable resources.

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 put downward pressure on peak electricity demands on the bulk system. In conjunction with conservation and time-of-use rates, summer peaks are expected to face greater downward pressure than winter peaks.
- Ontario's energy demand is expected to show a small decline in 2015 before reversing in 2016 due to increased industrial demand and the additional leap year day.

Resource Adequacy

- Under the **planned scenario**, reserve requirements are expected to be met for the entire duration of this Outlook during normal weather. Under extreme weather conditions with planned resources, the reserve is below requirement for five weeks, with the highest shortfall of just over 500 MW.
- For the **firm scenario**, reserve requirements are expected to be met for the entire duration of this Outlook during normal weather conditions. Under extreme weather conditions, the reserve is below the requirement for twelve weeks, with the highest shortfall of just over 1,100 MW. The firm scenario excludes any new generating facilities that haven't reached commercial operation. As a result, the shortfall is more pronounced in the **firm scenario** than in the **planned scenario**.
- About 2,200 MW of grid-connected generation is expected to be added throughout this Outlook period, which includes 1,500 MW of wind, 5 MW of hydroelectric, 300 MW of gas, 340 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 have recently been completed for Central-Downtown Toronto, Greater Ottawa, Kitchener-Waterloo-Cambridge-Guelph, York Region, Northwest GTA, Brant, North of Dryden, and Windsor-Essex. Additional planning activities are currently active throughout the province.

- 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 will improve the transmission capability into the Guelph area by reinforcing the supply into Guelph-Cedar Transformer Station (TS).
- In the Cambridge area, work has been initiated to install in-line switches on the Detweiler to Middleport circuits at Galt Junction to 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. Additional work at Manby TS that is covering bus and insulator replacement is scheduled for completion by Q2 2016.
- 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.

Operability

Conditions for SBG will continue over the Outlook period. However, it is expected that SBG will be managed effectively via existing market mechanisms, which include 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 July 2015 to December 2016 and supersedes the last Outlook released on March 23, 2015.

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:

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- Tel: 905-403-6900
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- E-mail: customer.relations@ieso.ca.

- End of Section -

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 March 2015. The demand forecast has been updated to reflect the most recent economic projections. Actual weather and demand data for April and May 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 May 25, 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.

This report period incorporates a number of nuclear outages, as identified in Table A8 of the 2015 Q2 Outlook Tables, including the commencement of the nuclear refurbishment program identified in the 2013 Long Term Energy Plan.

The following generators completed the market registration process since the release of the last Outlook, as of May 8, 2015:

- Adelaide Wind Power (also known as Landon) – 40 MW
- Nuclear upgrade at the Bruce power plant – 31 MW
- Dufferin Wind Power – 91.3 MW
- Goshen Wind Energy Center – 102 MW
- Grand Renewable Energy Park – 148.8 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 April 24, 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 May 25, 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 July 2015 to December 2016 and supersedes the previous forecast released in March 2015. Tables of supporting information are contained in the 2015 Q2 Outlook Tables.

Electricity demand is shaped by 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). How each of these factors impacts electricity consumption varies by season and time of day.

Grid-supplied energy demand is forecasted to show a slight decline in 2015. Though economic expansion and population growth lead to increased demand for electricity, the impacts of conservation and embedded generation more than offset these increases in 2015. This is due to the fact that conservation reduces the amount of end-use consumption and increased embedded generation output offsets the need for grid-supplied electricity by generating it on the distribution system. For 2016, the additional leap year day will automatically add 0.3% growth for the year. Additionally, a stronger U.S economy combined with a lower dollar will lead to stronger manufacturing in Ontario, and in turn, higher electricity demand from that sector.

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 (Industrial Conservation Initiative 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. Winter peaks see downward pressure from conservation and lighting efficiency improvements in particular.

Up until this year, the Industrial Conservation Initiative (ICI) had a significant impact on the summer peak and none to date on the winter peaks. Since the summer of 2014 did not have any sustained heat waves, a number of peak days occurred in the 2014 - 2015 winter. However, with more typical summer weather, the five peak days are most likely to return to the summer. The ICI impacts, combined with other conservation savings, will see the summer peaks decline over the forecast horizon. Generally, winter peaks are largely subject to downward pressure from conservation via gains in lighting efficiency more than any other factor.

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 very 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	22,888	24,721
Winter 2015 - 2016	22,380	23,172
Summer 2016	22,849	24,706
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	138.9	-1.1%
2015 Energy (Forecast)	138.2	-0.5%
2016 Energy (Forecast)	139.7	1.1%

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-Jul-15	22,425	23,892	1,016	2,689	03-Apr-16	18,269	19,024	567	2,576
12-Jul-15	22,888	24,721	814	2,765	10-Apr-16	17,502	18,500	471	2,509
19-Jul-15	22,793	23,893	838	2,668	17-Apr-16	16,845	17,324	496	2,449
26-Jul-15	22,318	24,315	1,035	2,778	24-Apr-16	16,612	16,984	531	2,424
02-Aug-15	22,140	24,319	841	2,767	01-May-16	17,480	19,840	721	2,424
09-Aug-15	21,464	24,489	958	2,725	08-May-16	17,634	20,200	849	2,404
16-Aug-15	21,429	24,016	985	2,711	15-May-16	18,564	21,761	845	2,435
23-Aug-15	21,421	23,682	1,362	2,731	22-May-16	18,898	21,841	1,175	2,443
30-Aug-15	20,263	22,886	1,413	2,608	29-May-16	19,375	21,522	1,330	2,381
06-Sep-15	18,470	21,986	1,370	2,495	05-Jun-16	19,635	23,109	1,292	2,573
13-Sep-15	18,210	20,711	680	2,448	12-Jun-16	20,813	23,529	1,055	2,629
20-Sep-15	17,956	20,079	781	2,471	19-Jun-16	21,568	23,967	835	2,666
27-Sep-15	17,086	18,329	420	2,419	26-Jun-16	22,265	23,929	754	2,738
04-Oct-15	17,201	17,566	554	2,461	03-Jul-16	22,474	24,128	1,016	2,720
11-Oct-15	17,320	17,747	786	2,493	10-Jul-16	22,849	24,706	814	2,767
18-Oct-15	17,822	18,228	507	2,453	17-Jul-16	22,746	23,846	838	2,668
25-Oct-15	17,812	18,350	392	2,536	24-Jul-16	22,293	24,293	1,035	2,781
01-Nov-15	18,288	18,739	318	2,572	31-Jul-16	22,069	24,247	841	2,762
08-Nov-15	19,042	19,437	416	2,650	07-Aug-16	21,394	24,418	958	2,725
15-Nov-15	19,354	20,114	601	2,672	14-Aug-16	21,392	23,979	985	2,715
22-Nov-15	19,833	20,668	342	2,754	21-Aug-16	21,400	23,659	1,362	2,735
29-Nov-15	20,290	21,327	607	2,797	28-Aug-16	20,219	22,855	1,413	2,612
06-Dec-15	20,724	21,848	409	2,856	04-Sep-16	18,732	22,255	1,370	2,508
13-Dec-15	21,009	21,934	555	2,897	11-Sep-16	18,165	20,666	680	2,451
20-Dec-15	20,695	21,787	690	2,882	18-Sep-16	17,927	20,046	781	2,476
27-Dec-15	20,405	22,167	362	2,844	25-Sep-16	17,084	18,327	420	2,427
03-Jan-16	20,690	21,638	528	2,797	02-Oct-16	17,196	17,557	554	2,465
10-Jan-16	22,380	23,172	570	3,024	09-Oct-16	17,322	17,749	786	2,496
17-Jan-16	21,641	22,321	547	2,971	16-Oct-16	17,787	18,195	507	2,456
24-Jan-16	21,801	22,360	483	2,974	23-Oct-16	17,775	18,309	392	2,538
31-Jan-16	21,808	22,371	404	3,010	30-Oct-16	18,247	18,707	318	2,573
07-Feb-16	21,001	21,961	734	2,947	06-Nov-16	18,491	18,886	416	2,636
14-Feb-16	20,395	21,796	635	2,864	13-Nov-16	19,290	20,051	601	2,671
21-Feb-16	20,326	21,723	581	2,825	20-Nov-16	19,762	20,598	342	2,754
28-Feb-16	20,282	21,789	501	2,906	27-Nov-16	20,243	21,276	607	2,798
06-Mar-16	19,872	20,679	531	2,813	04-Dec-16	20,453	21,802	409	2,849
13-Mar-16	19,463	20,462	649	2,748	11-Dec-16	20,963	21,893	555	2,900
20-Mar-16	18,280	19,385	611	2,622	18-Dec-16	20,660	21,756	690	2,888
27-Mar-16	18,367	19,277	569	2,581	25-Dec-16	21,036	22,797	362	2,976
					01-Jan-17	18,262	21,577	528	2,684

3.1 Actual Weather and Demand

Since the last forecast, the actual demand and weather data for March, April and May have been recorded.

March

March's temperature was colder than normal, putting the month in the top third of all months of March since 1970. As a result, Ontario's energy demand for the month was 12.0 TWh (11.6 TWh weather corrected). The actuals were lower than last year's March which was unusually cold. However, the weather corrected actuals were the lowest for the month since market opening.

Peak day temperatures were also colder than normal landing again in the top third. The peak occurred on the coldest day of the month. The actual peak was 20,827 MW (20,070 MW weather-corrected) which was the lowest March peak since market opening.

Wholesale customers' consumption for the month decreased by 6.0% compared to the previous March.

April

April's weather was fairly normal. This is evidenced by the monthly energy which was 10.4 TWh and 10.6 TWh weather corrected. Both values are lower than the April observations since the recession.

The peak occurred on the second coldest day of the month. The actual peak of 18,462 MW (18,900 MW weather-corrected) are typical of the April experience since the recession.

Wholesale customers' consumption continued to slide on a year-over-year basis with April 2015 loads 3.7% lower than the previous April.

May

The weather for May was warmer than normal. After adjusting for weather, the load was slightly lower at 10.4 TWh (actual of 10.5 TWh). Both figures represent a slight decline from the previous May and are generally consistent with months of May since the recession.

The peak for the month was 19,158 MW (18,033 MW weather corrected), which is on the low side compared to the same months over the past 5 years. The peak occurred at the end of the month on the hottest day of the month.

Wholesale customers' consumption growth fell for the eighth consecutive month. Year over year the load fell by 2.4%.

March to May

Overall, energy demand for the three months from March to May was down 3.4% compared with the same three months one year prior. After adjusting for the weather, demand for the three months showed a 3.0% decrease.

For the three months wholesale customers' consumption posted a 4.0% decrease over the same months a year prior.

The 2015 Q2 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

3.2.1 Economic Outlook

Ontario's economy continues to exhibit modest growth. A stronger U.S economy, a lower dollar and lower energy prices all bode well for the Ontario's export-oriented, energy-intensive manufacturing sector. Although industrial demand has been weak over the past six months, it will show more consistent growth once these current developments stabilize. Additionally, Canada still enjoys low borrowing costs, reasonable debt loads and an educated and productive labour force. On the down side, geopolitical tensions and European debt concerns continue to undermine confidence in global markets.

Risks aside, Ontario's economy should see improved growth in 2015 and 2016. Table 3.3.4 of the 2015 Q2 Outlook Tables presents the economic assumptions for the demand forecast.

3.2.2 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 (LFU).

Table 3.3.5 of the 2015 Q2 Outlook Tables presents the weekly weather data for the forecast period.

3.2.3 Pricing, Conservation and Embedded Generation

The demand forecast accounts for pricing, conservation and embedded generation impacts. These impacts are grouped together and termed as load modifiers as they act to reduce the grid supplied demand.

Pricing incentives cause both the reduction in demand and the shifting of demand away from peak periods. Pricing includes Time-of-Use rates (TOU) and the Industrial Conservation Initiative (ICI). TOU rates incent consumers to reduce loads during peak demand periods by either shifting to off-peak periods or reducing consumption altogether. TOU can factor into all weekdays throughout the year and the size of the impact will be determined by the pricing structure. The ICI impacts the five to ten highest peak days of the program year. Prior to 2014, the impact of ICI was just under 900 MW on the five highest peaks. In 2014, the program was expanded to include loads with a peak demand of 3 - 5 MW. This will lead to increased savings over the forecast.

Output from embedded generators directly offsets the need for the same quantity of grid supplied electricity. Embedded generation capacity is expected to grow over the forecast horizon and the impact of increased embedded output is factored into the demand forecast.

Conservation also reduces the need for grid supplied electricity by reducing the end-use consumption. Conservation will continue to grow throughout the forecast period and the demand forecast is decremented for those impacts.

The demand measures, which are dispatchable loads, Peaksaver Plus and Capacity Based Demand Response (CBDR), which was previously Demand Response 3 (DR3) are treated as resources in the assessment and are further discussed in section 4.1.3. 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 effects of these programs.

- 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 May 8, 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	12,978	12,348	5	31	0
Hydroelectric	8,462	5,971	71	0	0
Gas/Oil	9,920	8,236	29	0	0
Wind	2,925	369	25	382	4
Biofuel	455	292	8	0	0
Solar	40	14	2	0	0
Total	**34,780**	**27,229**	**140**	**413**	**4**

Last year, the IESO completed the Phase I RFP procurement for 34 MW of storage projects. The first of these will come into service during this outlook period.

Qualified applicants for the Phase II procurement for 16 MW of storage projects have been selected, and the submission deadline for proposal is July 3, 2015. The IESO is seeking a broad range of technologies that can provide the best long-term benefits.

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 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 May 8, 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	Zone	Fuel Type	Estimated Effective Date	Change	Project Status	Capacity Considered Firm (MW)	Capacity Considered Planned (MW)
Thunder Bay Condensing Turbine Project	Northwest	Biomass			Commercial Operation	40	40
Bornish Wind Energy Centre	Southwest	Wind			Commercial Operation	74	74
Adelaide Wind Energy Centre	Southwest	Wind			Commercial Operation	60	60
Jericho Wind Energy Centre	Southwest	Wind			Commercial Operation	150	150
Grand Renewable Energy Park	Southwest	Solar			Commercial Operation	100	100
Twin Falls	Northeast	Water	2015-Q2		Construction		5
Goulais Wind Farm	Northeast	Wind	2015-Q3		Commissioning		25
Leamington Pollution Control Plant	West	Oil	2015-Q3		Approvals & Permits		2
K2 Wind Project	Southwest	Wind	2015-Q3		Commissioning		270
Northland Power Solar Empire	Northeast	Solar	2015-Q4		Construction		10
Cedar Point Wind Power Project Phase II	Southwest	Wind	2015-Q4		Construction		100
Kingston Solar Project	East	Solar	2015-Q4		Construction		100
Northland Power Solar Abitibi	Northeast	Solar	2015-Q4		Construction		10
Northland Power Solar Martin's Meadows	Northeast	Solar	2015-Q4		Construction		10
Bow Lake Phase 1	Northeast	Wind	2015-Q4		Construction		20
Grand Valley Wind Farms (Phase 3)	Southwest	Wind	2015-Q4		NTP		40
Northland Power Solar Long Lake	Northeast	Solar	2015-Q4		Construction		10
Green Electron Power Project	West	Gas	2015-Q4		Construction		298
Armow Wind Project	Southwest	Wind	2015-Q4		NTP		180
White Pines Wind Farm	East	Wind	2015-Q4		Pre-NTP		60
Niagara Region Wind Farm	Southwest	Wind	2016-Q2		Pre-NTP		230
Grand Bend Wind Farm	Southwest	Wind	2016-Q2		Construction		100
Amherst Island Wind Project	East	Wind	2016-Q4		Pre-NTP		75
Belle River Wind	West	Wind	2016-Q4		Approvals & Permits		100
Bow Lake Phase 2b	Northeast	Wind	2016-Q4		NTP		40
South Gate Solar	Southwest	Solar	2016-Q4		Approvals & Permits		50
Windsor Solar	West	Solar	2016-Q4		Approvals & Permits		50
Total						**424**	**2,208**

Notes on Table 4.2:

1. The total may not add up due to rounding and 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. The IESO issues NTP when the project proponent provides necessary approvals and permits, the finance 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 market registration requirements of the IESO.

4.1.2 Generation Capability Assumptions

Hydroelectric

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 2015. 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 4.3 shows the historical hydroelectric median values calculated with the data from May 2002 to March 2015. These values are updated annually to coincide with the release of the summer 18-Month Outlook.

Table 4.3: Monthly Historical Hydroelectric Median Values

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Historical Hydroelectric Median Values (MW)	6,069	6,002	5,868	5,792	5,822	5,649	5,651	5,408	5,062	5,411	5,730	6,120

Thermal Generators

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

Non-Utility Generators (NUGs), whose contracts have expired yet 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.

Wind

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 4.4 shows the monthly WCC values (with actual historic wind output up to March 31, 2015). These values are updated annually to coincide with the release of the summer Outlook.

Table 4.4: Monthly Wind Capacity Contribution Values

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WCC (% of Installed Capacity)	37.3%	37.3%	28.9%	28.5%	21.3%	12.6%	12.6%	12.6%	17.3%	28.8%	36.7%	37.3%

Solar

For solar generation, the monthly Solar Capacity Contribution (SCC) values are used at the time of weekday peak. For annual solar energy contribution, 13% 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 4.5 shows the monthly SCC values that are updated annually to coincide with the release of the summer Outlook.

Table 4.5: 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%	0.2%	1.4%	3.2%	33.6%	33.6%	33.6%	7.8%	1.9%	0.0%	0.0%

4.1.3 Demand Measures

Demand measures include dispatchable loads, Peaksaver Plus and CBDR, which was previously DR3. Demand measures are treated as resources in the assessment. The total demand measure capacity is discounted – based on historical and contract data – to reflect the reliably available resource capacity.

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 CBDR program in March 2015, are contracted for multi-year terms, expiring by 2018.

The IESO is developing a DR auction to maintain the existing DR capacity targets and acquire more through a market-based, competitive process. 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.

In addition to the auction specified above, the IESO launched a DR pilot project to help identify opportunities to enhance participation in the DR program and learn how it 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 demand changes in the real-time energy market, and committing to load curtailment day ahead or four hours ahead of real-time in return for a bid price guarantee. 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. The pilot was launched via a competitive Request for Proposal (RFP) on April 1, 2015 with proposals due on June 4, 2015.

4.1.4 Firm Capacity

In May 2015, the IESO signed a 500 MW seasonal firm capacity sharing agreement with Hydro Quebec Energy Marketing further to the November 2014 *Joint Memorandum: Seasonal Exchange of Electricity Capacity between Ontario and Québec*. This agreement takes advantage of the Provinces' complementary seasonal peaks to support reliability and will be in effect for up to ten years, starting from December of 2015. The capacity will be shared "like for like" with no monetary exchange, allowing Quebec to import up to 500 MW in winter months, and Ontario to import up to 500 MW in summer months. The energy associated with the capacity agreement will be scheduled through existing market mechanisms and is not tied to any particular generator.

In accordance with the agreement, Ontario will supply 500 MW for the first two winter months, winter of 2015 - 2016 and 2016 - 2017. Depending on the availability of resource in Ontario, up to 500 MW of capacity will be provided in the subsequent two winter seasons. Ontario has the option to call on up to 500 MW of capacity from Quebec for summer seasons until 2025. No request was made for the summer 2016. Winter commitment is between December and March, and summer commitment is between June and September. The effects of the agreement have been taken into account in this assessment.

4.1.5 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 4.6.

Table 4.6: Summary of Scenario Assumptions for Resources

		Planned Scenario	Firm Scenario
Over the 18-Month Period	Total Existing Installed Resource Capacity (MW)	34,780	
	New Generation and Capacity Changes (MW)	All Projects	Generators reached commercial operation and generator shutdowns and retirements
		2,208	424

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. The generator planned shutdowns or retirements that have high certainty of occurring in the future are also considered for both scenarios. 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.

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)	35,204	35,209	35,204	36,343	35,204	36,673
2	Total Reductions in Resources (MW)	8,289	8,294	5,856	6,463	8,990	9,971
3	Demand Measures (MW)	594	594	532	532	594	671
4	Firm Imports (+) / Exports (-) (MW)	0	0	-500	-500	0	0
5	Available Resources (MW)	27,509	27,509	29,379	29,912	26,808	27,373

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: Represents 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. Firm Imports / Exports: The amount of expected firm imports and exports at the time of summer and winter peaks.
5. Available Resources: Equals Installed Resources (line 1) minus Total Reductions in Resources (line 2) plus Demand Measures (line 3) and Firm Imports / Exports (line 4).

4.2 Capacity Adequacy Assessment

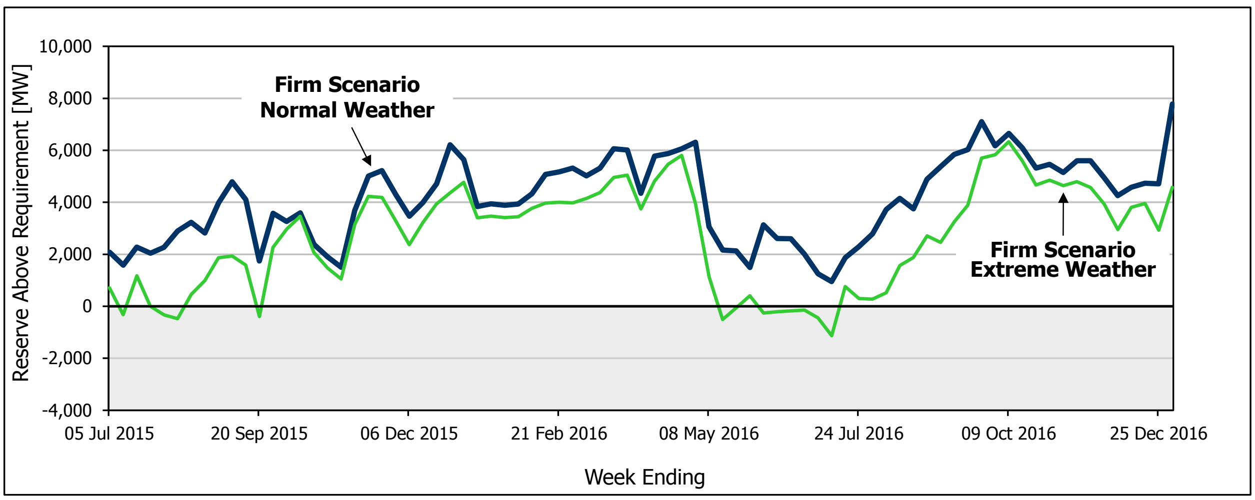
The capacity adequacy assessment accounts for zonal transmission constraints imposed by planned transmission outages. The planned outages occurring during this Outlook period have been assessed as of May 25, 2015.

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, 100 MW of solar and 40 MW of biofuel capacity.

Figure 4.1 shows the Reserve above Requirement (RAR) levels, which represent the difference between Available Resources and Required Resources. The Required Resources equals the Demand plus Required Reserve. As can be seen, the reserve requirement in the **firm scenario** under normal weather conditions is being met throughout the Outlook period. During extreme weather conditions, the reserve is lower than the requirement for a total of twelve 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: Normal vs. Extreme Weather: Firm Scenario RAR

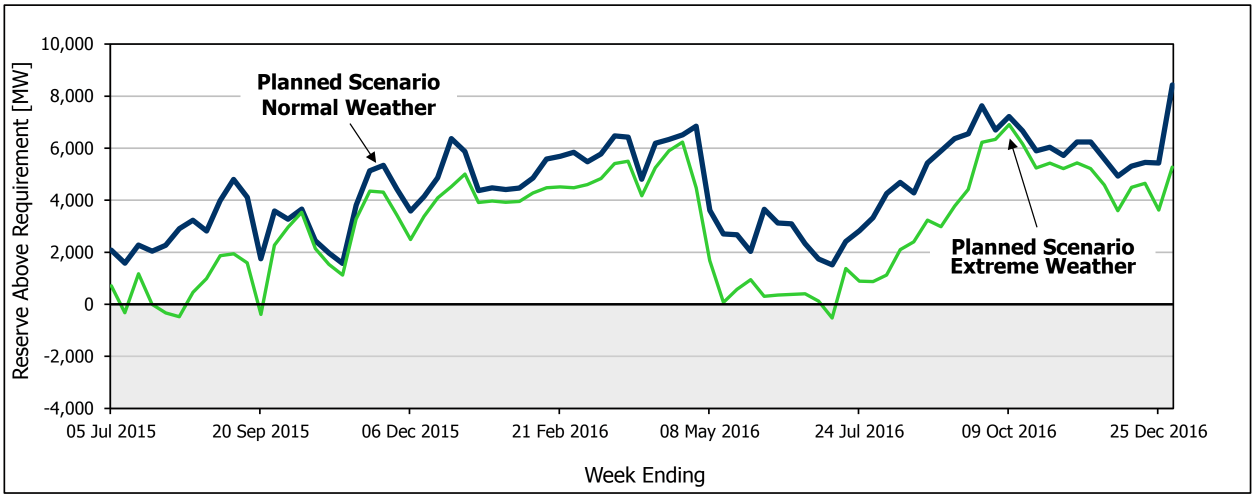


4.2.2 Planned Scenario with Normal and Extreme Weather

The **planned scenario** incorporates all existing capacity plus all capacity coming in service. Roughly 2,200 MW of generation capacity is expected to connect to Ontario's grid over this Outlook period.

Figure 4.2 shows the RAR levels under the **planned scenario**. As observed, the reserve requirement is being met throughout the Outlook period under normal weather conditions. The reserve is lower than the requirement for five 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.

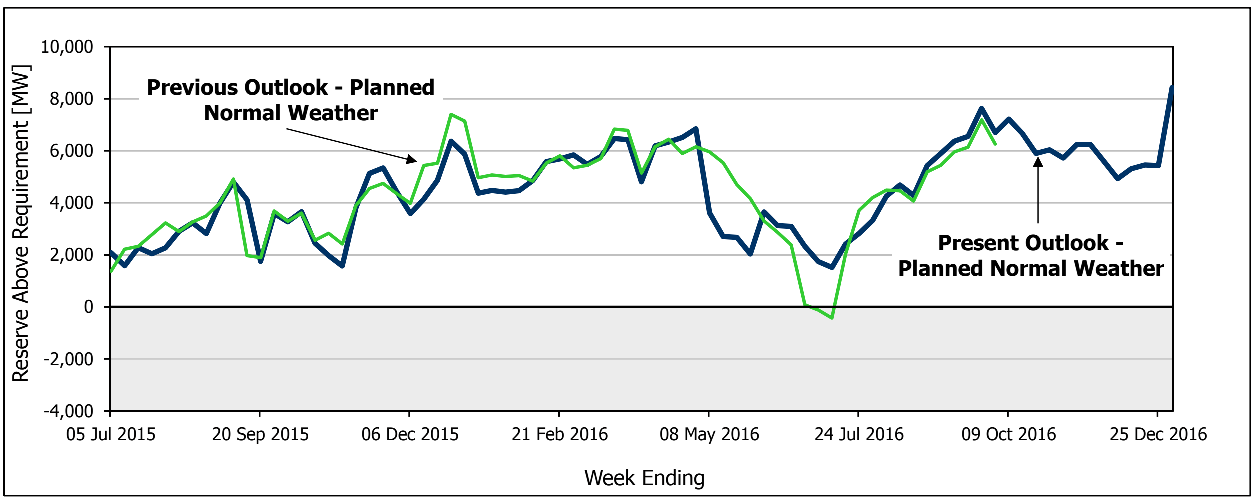
Figure 4.2: Normal vs. Extreme Weather: Planned Scenario RAR



4.2.3 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 March 23, 2015. The difference is mainly due to the changes to outages and changes in the demand forecast.

Figure 4.3: Present Outlook vs. Previous Outlook: Planned Scenario - Normal Weather RAR



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. At the same time, the assessment estimates the aggregate production by each resource category to meet the projected demand based on assumed resource availability.

4.3.1 Summary of Energy Adequacy Assumptions

In order to achieve results consistent with the capacity adequacy assessments, the Energy Adequacy Assessment (EAA) 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 Q2 Outlook Tables Appendix A, Table A7.

For the EAA, only the **planned scenario** as per Table 4.6 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 EAA. The key assumptions specific to this assessment are described in the IESO document titled "Methodology to Perform Long Term Assessments".

4.3.2 Results - Planned Scenario with Normal Weather

Table 4.8 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	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
Ontario	**209.7**	**15,883**	**209.7**	**15,883**	**0.0**	**452.3**	**596.2**
Bruce	1.0	79	67.5	5,113	66.5	1.9	144.8
East	13.2	999	14.7	1,116	1.5	26.8	68.0
Essa	11.9	901	3.0	225	-8.9	24.3	14.9
Niagara	6.0	457	19.7	1,495	13.7	14.7	41.7
Northeast	16.5	1,252	13.9	1,057	-2.6	25.1	31.2
Northwest	5.9	448	6.5	493	0.6	9.0	18.4
Ottawa	13.6	1,030	0.6	47	-13.0	30.2	2.3
Southwest	42.9	3,248	5.0	377	-37.9	88.6	19.1
Toronto	78.8	5,967	68.7	5,208	-10.1	185.7	187.2
West	19.8	1,502	9.9	752	-9.9	45.7	68.6

Figure 4.4 and Figure 4.5 show the percentage production by fuel type for each calendar year of the 18-Month period under conditions of zero net exports, while Table 4.9 summarizes these simulated production results by fuel type, for each year.

Figure 4.4: Production by Fuel Type – Jul 1 to Dec 31, 2015

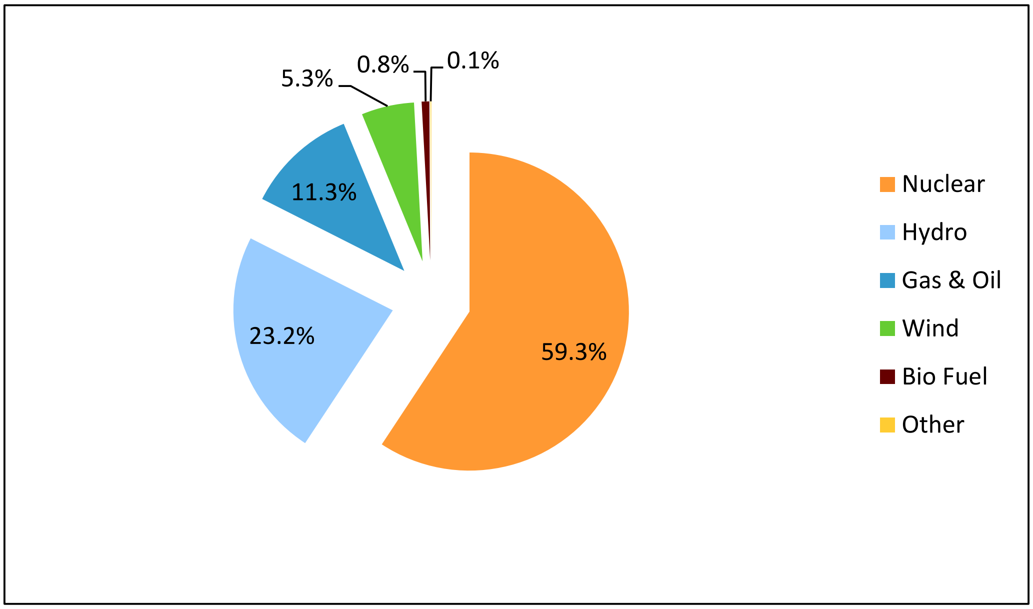


Figure 4.5: Production by Fuel Type – Jan 1 to Dec 31, 2016

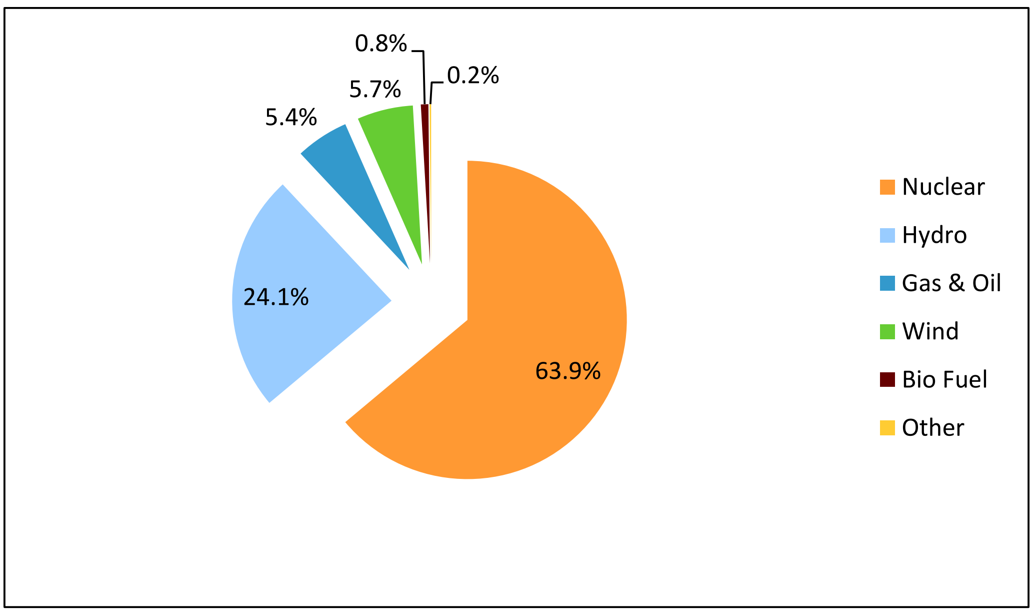


Table 4.9: Planned Scenario - Normal Weather: Ontario Energy Production by Fuel Type

Fuel Type (Grid Connected)	2015 (July 1 – Dec 31)	2016 (Jan 1 – Dec 31)	Total
	(GWh)	(GWh)	(GWh)
Nuclear	41,448	89,288	130,735
Hydro	16,226	33,724	49,950
Gas & Oil	7,918	7,509	15,426
Wind	3,736	7,924	11,661
Biofuel	547	1,063	1,610
Other (Solar & DR)	53	220	273
Total	**69,928**	**139,728**	**209,655**

4.3.3 Findings and Conclusions

The EAA 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.

- 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 areas have experienced 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 April 24, 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. 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 have recently been completed for Central-Downtown Toronto, Greater Ottawa, Kitchener-Waterloo-Cambridge-Guelph, York Region, Northwest GTA, Brant, North of Dryden, and Windsor-Essex. Additional planning activities are currently active throughout the province. For links to completed plans and information on active plans, please visit the IESO Regional Planning webpage: http://www.ieso.ca/Pages/Participate/Regional-Planning/.

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 TS and Manby TS was completed in Q4 2014. Additional work at Manby TS that's covering bus and insulator replacement is scheduled for completion by Q2 2016.

In central Toronto, Copeland TS is 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 to identify mitigation measures including the installation of 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, 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.

Work has been initiated to install in-line switches on the Detweiler to Middleport circuits at Galt Junction. This work will improve the load restoration capability to customers in the Cambridge area following outages on transmission circuits, and will 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 and Ashfield, two new 500 kV switching stations, was completed in Q4 2014 and Q1 2015 respectively. These stations will incorporate close to 700 MW of renewable generation onto the system.

Hydro One is working 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.

Hydro One is also working on a new Bruce Special Protection System (SPS) which is scheduled to be complete by December 2016. This new SPS will replace the existing one while having increased functionality to detect and operate for a greater number of contingencies.

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 continues to restrict the connection of new generation. This project, if completed, would increase the transfer capability from the Niagara region to the rest of the Ontario system by approximately 700 MW.

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 Quebec 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

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.

Following the expansion of the Mattagami River plants, increased transfers are being experienced from the 230 kV system to the 115 kV system at Kapuskasing TS. Because of these higher transfers, combined with the output from the 30 MW of new hydroelectric and solar projects in the Kapuskasing area, the thermal capability of the 115 kV transmission facility between Hunta and Kapuskasing is expected to be exceeded. To ensure that the existing level of supply reliability is maintained, it is therefore expected that some of the generating facilities in the Kapuskasing area will need to be constrained-off whenever these high transfers occur.

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.

Transmission constraints may restrict resources in northwestern Ontario. This is evident in the constrained generation amounts shown for the Northwest zone in Tables A3 and A6. Transmission transfer capability in the Northeast and Northwest zones is expected to be sufficient to supply the existing 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

For the major nuclear outages scheduled for fall 2015 and spring 2016, the IESO will be 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)

Baseload generation is made up of nuclear, run-of-the-river hydroelectric and variable generation such as wind and solar. When the baseload supply is expected to exceed Ontario demand, the system is balanced via market mechanisms which include export scheduling, nuclear manoeuvering or shutdown and wind curtailment. In addition, out of market mechanisms such as import cuts could also be utilized to alleviate SBG conditions.

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 nuclear, wind and import curtailments from April 2014 to the end of March, 2015. The lower demands in September and October of 2014 coupled with the entire nuclear fleet being in service over this period drove further nuclear, wind and import curtailments compared to the rest of the 12-month timeframe.

Figure 6.1: MWh Curtailments versus Ontario Demand

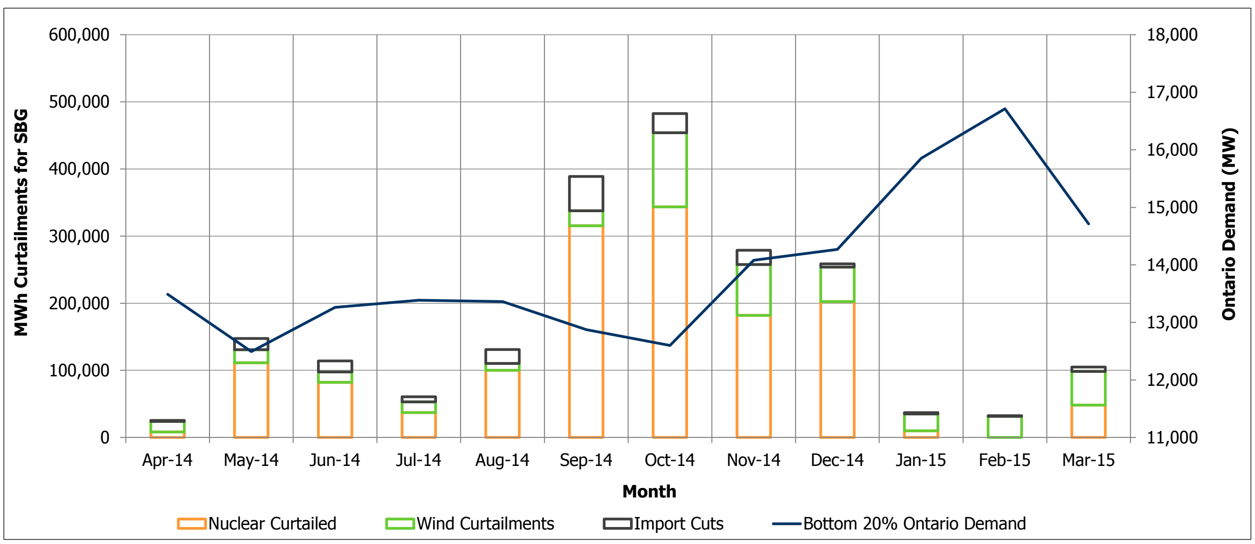
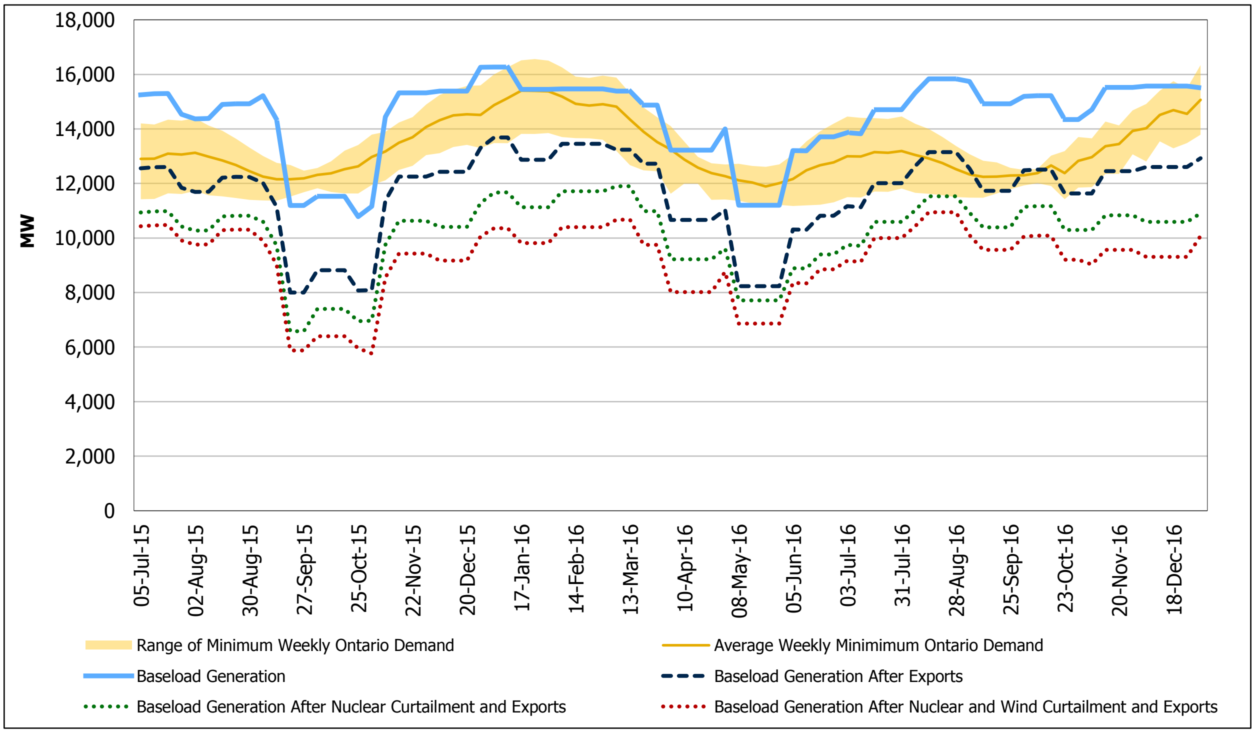


Figure 6.2 shows the forecast SBG for the next 18 months and the flexibility from nuclear and variable generation.

Figure 6.2: Minimum Ontario Demand and Baseload Generation



Ontario will continue to experience SBG conditions during this Outlook period. The magnitude of SBG is trending higher with the addition of new renewable generation and decline in grid demand due to conservation and embedded generation. The SBG can be managed through existing market mechanisms.

The steep decline in SBG in the fall of 2015 and spring of 2016 is attributed to planned generation outages.

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 March 31, 2015). These values are updated annually to coincide with the release of the 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)	33.5%	33.5%	31.5%	34.2%	24.1%	15.4%	15.4%	15.4%	21.6%	28.4%	33.1%	33.5%

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. There is currently a stakeholder engagement initiative (Gas-Electric Coordination Enhancements) underway to communicate and stakeholder the Market Rule changes required to facilitate information sharing. The IESO expects to have these Market Rule changes and any required technical interface changes in place prior to the winter of 2015 - 2016. In addition to this initiative, to prepare for the peak seasons, the 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 Gas-Electric Interface Study conducted by the Eastern Interconnection Planning Collaborative (EIPC) to evaluate the interaction between the natural gas and electric systems is near completion, with the final draft reports available on the EIPC's website. 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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