18-MONTH OUTLOOK

From June 2014 to November 2015

ieso
Power to Ontario. On Demand.

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

Executive Summary

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

This latest reliability report comes amid ongoing changes in the provincial electricity system.

Ontario burned its last stores of coal when the Thunder Bay Generating Station depleted its reserves in April 2014. Thunder Bay GS will now see one of its two units converted to biomass fuel – accounting for 142 megawatts (MW) of approximately 3,500 MW of new generation capacity forecast to come online over the next 18 months. The new resources comprise wind, hydroelectric, biomass and the province's first grid-connected solar generating units.

Since the last outlook, the IESO has focused considerable effort on coordinating the re-scheduling of nuclear generator outages planned for the spring of 2015. The resulting changes, proposed by affected market participants, have significantly improved reserve margins over that short period. The IESO will continue to review other reliability considerations to determine if further changes are required.

Market participants are encouraged to review their operational needs, like fuel supply, to ensure they are available to support the system during these outages.

Industrial consumption posted a healthy increase over the three-month period studied in this report (February, March, April), with mining, iron and steel production and chemicals leading the way. Nevertheless, demand on the bulk electricity grid is expected to remain flat in 2014, and then decline in 2015, as increased embedded generation and conservation diminish the effects of population and economic growth.

This summer, the bulk electric system will be supported by a range of demand response measures, including Peaksaver Plus, Demand Response 3 (DR3), and dispatchable loads. It will also benefit from the impacts of the Industrial Conservation Initiative and time-of-use prices.

It is expected that DR3 will play an increasing role in reducing summer peaks as the activation of the program is now based on market price. At the same time, a greater number of large power consumers are expected to participate in the Industrial Conservation Initiative, which sees those customers charged the Global Adjustment based on their consumption over the top five peaks.

The IESO continues to improve its tools and processes to help stay ahead of these changes. This reporting period will see the deployment of a new demand forecasting tool. The new tool will replace the 'best similar day' method for forecasting demand with an automated model that builds a forecast from scratch, taking into account the impact of embedded generation and changing demand profiles.

Season	Normal Weather Peak (MW)	Extreme Weather Peak (MW)
Summer 2014	22,949	24,855
Winter 2014-15	22,273	23,219
Summer 2015	22,726	24,567

Conclusions & Observations

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

Demand Forecast

- Ontario's grid supplied energy demand will remain flat in 2014 before showing a small decline in 2015. Growth in embedded solar and wind capacity and on-going conservation initiatives reduce the need for bulk power system electricity.
- The growth in embedded solar and wind capacity also puts downward pressure on peak demands on the bulk electric system. In conjunction with conservation and time-of-use rates, summer peaks are expected to face greater downward pressure than winter peaks.

Resource Adequacy

- Under the planned scenario, reserve requirements are expected to be met for the entire duration of this Outlook during normal weather. This improvement, compared to the previous outlook, is attributed to the outage rescheduling by market participants. However, the planning reserve is below the requirement for five weeks under the extreme weather scenarios largely due to the planned generator outages in 2015.
- For the firm scenario, reserve requirements are expected to be met for the entire duration of this Outlook under normal weather conditions. However, the reserve is below the requirement for eight weeks under extreme weather conditions. The firm scenario excludes any new generating facilities planned to come into service beyond the first three months of the report period. As a result, the shortfall is more pronounced in the firm scenario than in the planned scenario.

	Normal Weather Scenario	**Extreme Weather Scenario**
Planned Scenario	• There are no weeks when reserve is lower than required	• There are five weeks when reserve is lower than required
Firm Scenario	• There are no weeks when reserve is lower than required	• There are eight weeks when reserve is lower than required

- As part of the Lower Mattagami expansion project, a 75 MW third unit at Little Long Generating Station (GS) is in service. A third unit at Harmon GS is expected to go in service within the first month of this Outlook period.
- Thunder Bay coal-fired generating units have ceased operation and one of the units is expected to be converted to a biomass operated unit during this Outlook period.
- More than 3,500 MW of grid-connected generation is expected to be added throughout this outlook period.

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, OPA, 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).
- To help control voltages in northwestern Ontario, new shunt reactors at Dryden TS are scheduled to be in service by the end of 2014.
- 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 is working to improve the transmission capability into the Guelph area. The Guelph Area Transmission Refurbishment project will reinforce the supply into Guelph-Cedar Transformer Station (TS), and is expected to be completed by Q2 2016.
- In the Cambridge area, a second 230/115 kV autotransformer at Preston TS and associated switching and reactive facilities are planned for 2017. This will provide additional capacity to meet forecast demand growth and 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 re-termination of one of the 230 kV connections to Horner TS is complete and will ensure that the load supply capability of the Richview TS to Manby TS corridor will be adequate in the short term. However, a long-term solution is required to ensure that load security can be maintained. The IESO is working with the OPA, Hydro One and Toronto Hydro to develop the Central Toronto Integrated Regional Resource Plan (IRRP), which considers the full range of integrated demand and supply options that are being developed for the area.
- The replacement of the existing Hydro One 115kV switchyard at Hearn Switching Station (SS) is almost complete and the upgrading of 115 kV breakers at Leaside TS is scheduled for completion by Q4 2014. These new facilities will increase the short-circuit interrupting capability of the 115 kV system and allow new generation at the 115 kV and distribution levels to be connected in Manby and Leaside sectors.
- A new station, Copeland TS, is planned to be in service in downtown Toronto in Q3 2015. The new station will facilitate the refurbishment of the facilities at John TS, while also enhancing the load security in the downtown core.

- Following receipt of environmental approval, the development of Clarington TS is scheduled to be complete by fall of 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

- The IESO has implemented a redesigned scheme for triggering the Demand Response 3 (DR3) program. In place of activations that are based on a combination of supply cushion and price-based triggers, DR3 resources will be activated when they represent a competitively-priced energy resource in the pre-dispatch timeframe. This redesign is expected to enhance operability and efficiency, especially during peak demand periods.
- The surplus baseload generation (SBG) assessment for this outlook includes scenarios showing effects of nuclear curtailments and wind dispatch. During this outlook period, conditions for SBG are likely to continue in 2014 and 2015. However, it is expected that SBG will be managed effectively via normal market mechanisms including export 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 June 2014 to November 2015 and supersedes the last Outlook released on February 28, 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:

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- Tel: 905-403-6900
- Fax: 905-403-6921
- 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 February 2014. The demand forecast has been updated to reflect the most recent economic projections. Actual weather and demand data for April 2014 has been included in the tables.

2.2 Updates to Resources

Thunder Bay coal-fired generating units were shutdown in April 2014, ahead of the previous schedule of Q4 2014. As a result, Ontario has completed its plan to eliminate the use of coal as a source of electricity generation within the province. One of the units at Thunder Bay Generating Station is scheduled to be converted to biomass fuel by Q1 of 2015.

A new hydroelectric unit with a capacity of 75 MW was added at Little Long and a 99 MW wind farm, Erieau Wind also became dispatchable since the release of the last Outlook.

Two Non-Utility Generators (NUGs) reached the expiry of their contracts with the Ontario Electricity Financial Corporation and are transitioning to become dispatchable resources.

The 18-month assessment uses planned generator outages submitted by market participants to the IESO's Integrated Outage Management System (IOMS) as of April 15, 2014. 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.

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 15, 2014 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 April 15, 2014.

- 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 June 2014 to November 2015 and supersedes the previous forecast released in February 2014. Tables of supporting information are contained in the 2014 Q2 Outlook Tables spreadsheet.

Electricity demand is being shaped by a number of factors – economic expansion, population growth, conservation initiatives, embedded generation capacity growth, time of use rates and the Industrial Conservation Initiative. How each of these factors impacts electricity consumption varies by season and time.

Grid-supplied energy demand is forecast to remain flat in 2014 and decline in 2015. Even though economic expansion and population growth lead to increased demand for electricity, other factors are working to reduce the need for grid-supplied electricity. Conservation reduces the amount of end-use consumption. Increasing embedded generation output offsets the need for grid-supplied electricity by generating electricity on the distribution system. For 2014 these opposing forces are roughly equal and result in no growth in electricity demand for the year.

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 virtually 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. With the five highest peaks occurring during the summer months the Industrial Conservation Initiative has a significant impact on the summer peak and none to date on the winter peaks. These impacts, combined with other conservation savings, will see the summer peaks decline over the forecast horizon. Winter peaks are largely subject to downward pressure from conservation via gains in lighting efficiency. Embedded generation and price impacts are more muted during the winter as solar production is minimal during peak periods and prices are more moderate.

Minimum demand levels are similarly impacted by the forces shaping electricity demand – primarily economic activity and embedded generation. While the recession has led to lower levels of industrial activity, that reduction is generally not consistent across all hours. Factories tend to cut overnight shifts, thereby having a disproportionate impact on minimums. Although most embedded generation is solar, embedded wind generation contributes to lower minimums by supplanting grid-supplied electricity. Over the forecast, a relatively small increase in embedded wind generation and modest economic growth 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 2014	22,949	24,855
Winter 2014-15	22,273	23,219
Summer 2015	22,726	24,567
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 (Forecast)	140.7	0.2%
2015 Energy (Forecast)	139.7	-0.7%

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)
08-Jun-14	19,927	23,347	1,248	2,631	08-Mar-15	19,646	20,439	661	2,810
15-Jun-14	20,888	23,795	996	2,678	15-Mar-15	18,612	19,586	789	2,719
22-Jun-14	21,757	24,066	761	2,758	22-Mar-15	18,054	18,771	728	2,632
29-Jun-14	22,470	24,252	719	2,767	29-Mar-15	18,111	19,230	667	2,635
06-Jul-14	22,586	24,007	1,097	2,674	05-Apr-15	17,916	18,544	580	2,547
13-Jul-14	22,949	24,855	890	2,756	12-Apr-15	17,309	18,212	598	2,515
20-Jul-14	22,789	23,770	938	2,709	19-Apr-15	16,674	17,155	495	2,468
27-Jul-14	22,152	24,107	1,126	2,785	26-Apr-15	16,438	16,797	645	2,438
03-Aug-14	22,078	24,246	988	2,786	03-May-15	17,270	19,694	829	2,425
10-Aug-14	21,403	24,438	1,038	2,689	10-May-15	17,464	20,042	814	2,412
17-Aug-14	21,295	23,849	1,077	2,695	17-May-15	18,399	21,623	753	2,440
24-Aug-14	21,270	23,559	1,456	2,741	24-May-15	18,768	21,808	1,108	2,396
31-Aug-14	20,179	22,851	1,497	2,633	31-May-15	19,285	21,475	1,262	2,450
07-Sep-14	18,933	22,336	1,540	2,462	07-Jun-15	19,643	23,180	1,253	2,621
14-Sep-14	18,779	21,014	785	2,491	14-Jun-15	20,811	23,593	1,017	2,652
21-Sep-14	18,608	19,766	901	2,519	21-Jun-15	21,595	24,041	788	2,696
28-Sep-14	17,756	18,052	519	2,470	28-Jun-15	22,359	24,034	733	2,765
05-Oct-14	17,028	17,496	453	2,483	05-Jul-15	22,398	23,772	1,100	2,701
12-Oct-14	17,307	17,721	648	2,502	12-Jul-15	22,726	24,567	896	2,761
19-Oct-14	17,963	18,319	434	2,468	19-Jul-15	22,529	23,656	943	2,659
26-Oct-14	17,873	18,387	392	2,570	26-Jul-15	22,049	24,028	1,122	2,767
02-Nov-14	18,589	18,971	190	2,615	02-Aug-15	21,912	24,079	1,001	2,755
09-Nov-14	18,791	19,521	384	2,643	09-Aug-15	21,279	24,285	1,080	2,711
16-Nov-14	19,364	19,985	565	2,721	16-Aug-15	21,192	23,783	1,120	2,699
23-Nov-14	19,851	20,654	300	2,762	23-Aug-15	21,139	23,420	1,497	2,725
30-Nov-14	20,336	21,487	591	2,817	30-Aug-15	19,976	22,667	1,535	2,607
07-Dec-14	21,055	22,086	202	2,909	06-Sep-15	18,273	21,776	1,589	2,501
14-Dec-14	20,833	22,076	385	2,905	13-Sep-15	18,026	20,515	676	2,461
21-Dec-14	21,151	22,362	496	2,943	20-Sep-15	17,740	19,872	912	2,494
28-Dec-14	20,254	21,241	202	2,766	27-Sep-15	16,899	18,103	570	2,449
04-Jan-15	20,517	21,350	298	2,835	04-Oct-15	17,012	17,394	810	2,481
11-Jan-15	22,272	23,219	484	3,030	11-Oct-15	17,037	17,432	709	2,502
18-Jan-15	21,615	22,431	466	2,984	18-Oct-15	17,576	17,952	530	2,459
25-Jan-15	21,746	22,431	367	2,986	25-Oct-15	17,544	18,085	367	2,547
01-Feb-15	21,744	22,405	301	3,013	01-Nov-15	18,061	18,481	220	2,581
08-Feb-15	20,926	21,936	729	2,959	08-Nov-15	18,809	19,146	405	2,647
15-Feb-15	20,315	21,750	703	2,879	15-Nov-15	19,078	19,790	551	2,672
22-Feb-15	20,118	21,698	521	2,840	22-Nov-15	19,648	20,440	306	2,752
01-Mar-15	20,671	21,603	474	2,906	29-Nov-15	20,103	21,072	553	2,794

3.1 Actual Weather and Demand

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

February

- February was colder than normal. Overall, Ontario's energy demand for the month was 12.8 TWh (11.7 TWh weather corrected). The actuals were the highest since 2008 (the weather-corrected were just the highest since 2010). The month was very cold due to the number of days where the daily high was quite low. However, the peak day temperature was fairly typical for the coldest day of February. The peak occurred on

February 27th which was part of a cold snap to end the month. The actual peak was 21,905 MW (21,541 MW weather corrected). Both values represented modest increases over the previous two years.

- Wholesale customers' consumption for the month increased by 1.1% over the previous February. Growth was led by the Mining and Iron & Steel sectors which both showed strong growth.

March

- March was colder than normal. It was the coldest March since 1970. The monthly Ontario energy demand was 12.7 TWh (12.0 TWh weather corrected). It was the highest March energy since 2008 (only the highest since 2011 on a weather-corrected basis). The peak occurred on the coldest day, topping out at 21,656 MW (20,654 MW weather corrected). The peak was the highest March peak since 2006. The weather-corrected value was very similar to that experienced in March over the previous two years.
- Wholesale customers' consumption increased by 7.2% over the previous March. Like the previous month, Mining and Iron & Steel showed considerable year-over-year growth. In addition, the Chemical sector also showed considerable growth in March.

April

- The weather for April was fairly typical for the month with the peak demand occurring on the coldest day of the month. Energy demand for April was 10.8 TWh (10.9 TWh weather corrected). Both were slightly lower than the values for April 2013. The actual peak for the month was 18,557 MW (18,476 MW weather corrected). The actual and weather corrected peaks are both just slightly lower than the observations for the previous April.
- Wholesale customers' consumption increased for the eighth consecutive month. Their consumption rose 6.3% compared to the last April. The increases came across a variety of sectors with Petroleum Products and Mining leading the way.

Overall, energy demand for the three months from February to April was up 2.7% compared with the same three months one year prior. Much of the increase was due to the colder than normal weather. After adjusting for the cold weather, demand for the three months showed a more modest 0.4% increase.

For the three months wholesale customers' consumption posted a healthy 4.9% increase over the same months a year prior. Mining, Iron and Steel production and Chemicals were the sectors with the most substantial increase. The increased industrial load helps explain some of the overall growth for this time period.

The 2014 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

Economic Outlook

Ontario's economy continues to show slow improvement. A stronger U.S. economy has helped Ontario's export industries. This trend is expected to continue over the forecast horizon. Although recent economic indicators have been very modest, the majority have been positive. A slightly lower dollar, continued low interest rates and private debt reduction all bode well for the economy and consumer confidence. There nevertheless remains significant downside risk through slowing Chinese growth, debt concerns and geopolitical unrest.

The wholesale customers' electricity consumption has shown consistent gains since August of 2013, indicating a higher level of economic activity. The results vary by sector but are anecdotal confirmation of the broader economic direction.

- The risks aside, Ontario's economy should see improved growth in 2014 and 2015. Table 3.3.4 of the 2014 Q2 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 2014 Q2 Outlook Tables presents the weekly weather data for the forecast period.

Conservation, Demand Management and Pricing

Conservation will continue to grow throughout the forecast period. The demand forecast is decremented for the impacts of conservation and embedded generation.

Other demand measures such as dispatchable loads, demand response programs, and contracted loads are not decremented from the demand forecast but instead are treated as resources in the assessment. Therefore the effects of demand measures are added back into the demand history and the forecast is produced prior to these impacts. That total demand measure capacity is discounted – based on historical and contract data – to reflect the reliably available resource capacity.

The impact of time-of-use rates and the Industrial Conservation Initiative are factored into the demand forecast as they have a negative impact on peak demands.

- 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 generating capacity is summarized in Table 4.1. This excludes capacity that is commissioning.

Table 4.1: Existing Generation Resources as of April 15, 2014

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	12,893	5	0	0
Hydroelectric	8,014	5,684	70	75	0
Coal	0	0	0	-306	-1
Oil / Gas	9,920	8,845	29	0	0
Wind	1,824	249	15	99	1
Biomass / Landfill Gas	124	84	7	0	0
Total	32,829	27,755	126	-132	0

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 generation projects in the IESO's Connection Assessment and Approval process (CAA), those that are under construction, as well as projects contracted by the OPA. 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 April 15, 2014. For projects that are under contract, the estimated effective date is the best estimate of the date when the contract requires the additional capacity to be available. If a project is delayed, the estimated effective date will be the best estimate of the commercial in-service 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
East Lake St. Clair Wind	West	Wind			Commercial Operation	99	99
Summerhaven Wind Energy Centre	Southwest	Wind			Commercial Operation	125	125
Port Dover and Nanticoke Wind Project	Southwest	Wind			Commercial Operation	104	104
New Third Unit at Harmon	Northeast	Water	2014-Q2		Commissioning	78	78
Bornish Wind Energy Centre	Southwest	Wind	2014-Q3		Construction	74	74
Silvercreek Solar Park	West	Solar	2014-Q3		NTP	10	10
Adelaide Wind Energy Centre	Southwest	Wind	2014-Q3		Construction	60	60
Atikokan conversion to biomass	Northwest	Biomass	2014-Q3		Commissioning	205	205
White Pines Wind Farm	East	Wind	2014-Q3		Pre-NTP	60	60
Northland Power Solar Abitibi	Northeast	Solar	2014-Q3		NTP		10
Northland Power Solar Empire	Northeast	Solar	2014-Q3		NTP		10
Northland Power Solar Long Lake	Northeast	Solar	2014-Q3		NTP		10
Northland Power Solar Martin's Meadows	Northeast	Solar	2014-Q3		NTP		10
Goshen Wind Energy Centre	Southwest	Wind	2014-Q3		Pre-NTP		102
South Kent Wind Project	West	Wind	2014-Q3		Commissioning	270	270
Haldimand Wind Project	Southwest	Wind	2014-Q4		Construction		149
Jericho Wind Energy Centre	Southwest	Wind	2014-Q4		Pre-NTP		150
Adelaide Wind Power Project	West	Wind	2014-Q4		Pre-NTP		40
Bluewater Wind Energy Centre	Southwest	Wind	2014-Q4		NTP		60
Grand Valley Wind Farms (Phase 3)	Southwest	Wind	2014-Q4		Pre-NTP		40
McLean's Mountain Wind Farm	Northeast	Wind	2014-Q4		Commissioning	60	60
Kingston Solar Project	East	Solar	2014-Q4		NTP		100
Liskeard 1	Northeast	Solar	2014-Q4		NTP		10
Liskeard 3	Northeast	Solar	2014-Q4		NTP		10
Liskeard 4	Northeast	Solar	2014-Q4		NTP		10
Armow Wind Project	Southwest	Wind	2014-Q4		pre-NTP		180
New Unit at Smoky Falls	Northeast	Water	2014-Q4		Construction		89
Twin Falls	Northeast	Water	2014-Q4		Construction		5
Peeshoo Project	Northeast	Water	2015-Q1		Pre-NTP		7
Wahpeestan Project	Northeast	Water	2015-Q1		Pre-NTP		7
Wapoose Project	Northeast	Water	2015-Q1		Pre-NTP		7
Neeskah Project	Northeast	Water	2015-Q1		Pre-NTP		7
Thunder Bay Unit 3 conversion to biomass	Northwest	Biomass	2015-Q1		Construction		142
Leamington Pollution Control Plant	West	Oil	2015-Q1				2
New Third Unit at Kipling	Northeast	Water	2015-Q1		Construction		78
Trout Lake River Hydroelectric Project	Northwest	Water	2015-Q1		Pre-NTP		4
Second New Unit at Smoky Falls	Northeast	Water	2015-Q1		Construction		89
Cedar Point Wind Power Project Phase II	Southwest	Wind	2015-Q1		Pre-NTP		100
Dufferin Wind Farm	Southwest	Wind	2015-Q1		NTP		100
Third New Unit at Smoky Falls	Northeast	Water	2015-Q2		Construction		89
Goulais Wind Farm	Northeast	Wind	2015-Q2		pre-NTP		25
Gitchi Animki Bezhig Generating Station	Northwest	Water	2015-Q2		Construction		9
Gitchi Animki Niizh Generating Station	Northwest	Water	2015-Q2		Construction		10
Niagara Region Wind Farm	Southwest	Wind	2015-Q2		Pre-NTP		230
Decommission the existing Smoky Falls Units	Northeast	Water	2015			-52	-52
Bow Lake Phase 1	Northeast	Wind	2015-Q2		NTP		20
Haldimand Solar Project	Southwest	Solar	2015-Q2		NTP		100
K2 Wind Project	Southwest	Wind	2015-Q2		NTP		270
High Falls Hydropower Development	Northwest	Water	2015-Q2		Pre-NTP		5
Namewaminikan Waterpower Project	Northwest	Water	2015-Q2		NTP		10
Amherst Island Wind Project	East	Wind	2015-Q3		Pre-NTP		75
Total						**1,133**	**3,502**

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. OPA 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 OPA 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 Tables 4.3 and 4.4.

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 scheduled to come into service over the first three months of the report period, as well as generators that have started commissioning or are being removed from service during the outlook period. The Firm and Planned Scenarios also differ in their assumptions regarding the amount of demand measures. Both scenarios recognize that resources are not available during times for which the generator has submitted planned outages. Also considered for both scenarios are generator-planned shutdowns or retirements that have high certainty of occurring in the future.

The generation capability assumptions are as follows:

- 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.
- 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 with the OPA 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. 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 4.3: Summary of Scenario Assumptions for Resources

		Planned Scenario	Firm Scenario
Over the 18-Month Period	Total Existing Installed Resource Capacity (MW)	32,829	
	New Generation and Capacity Changes (MW)	All Projects	Generator shutdowns or retirements, Commissioning Generators and Generators starting in the first 3 months
		3,502	1,133

The Firm and Planned Scenarios also differ in their assumptions regarding the amount of demand measures.

Table 4.4: Summary of Scenario Assumptions for Normal Weather Demand

		2014 Summer Peak	2015 Summer Peak
Seasonal Peak Comparison	Growth in Conservation at Peak (MW)	170	
	Growth in Embedded Generation Capacity at Peak (MW)	270	
	Demand Measures Effective Capacity at Peak (MW)	503	567

Notes on Table 4.4:

1. Conservation and embedded generation impacts are included in the peak demand forecast.
2. Demand Measures capacity is included in the Resource Capacity.

4.2 Capacity Adequacy Assessment

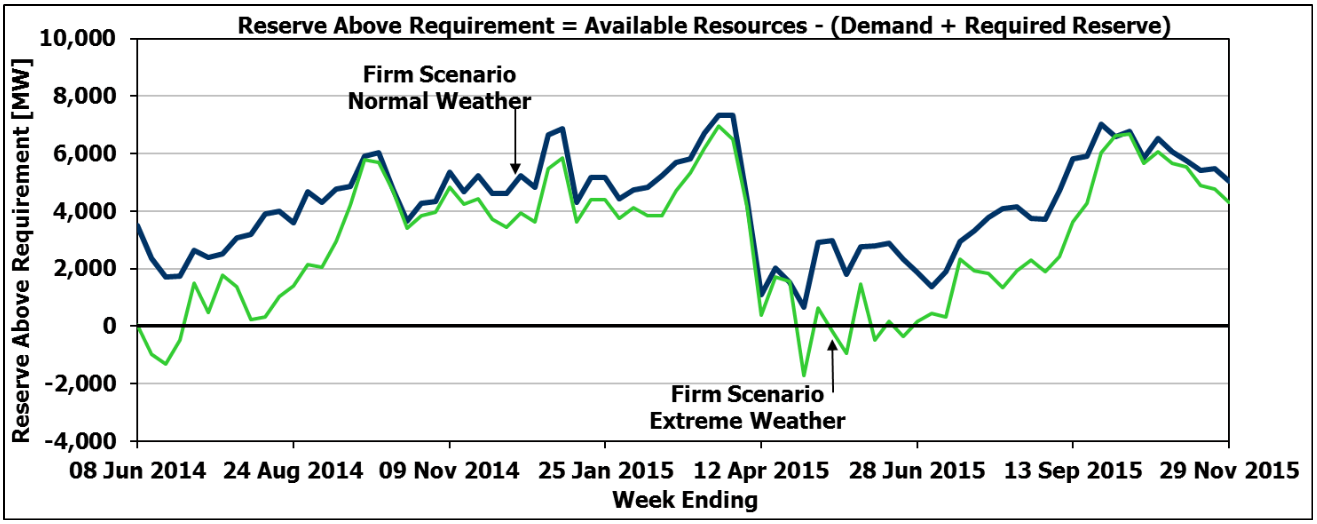
The capacity adequacy assessment accounts for zonal transmission constraints imposed by planned transmission outages. The planned outages occurring during this Outlook period have been assessed as of April 15, 2014. As identified in the previous outlook, planned outages scheduled for spring-2015 were leading to a reserve margin shortfall during normal weather conditions. The market participants, in collaboration with the IESO, were able to reschedule these outages, which has significantly improved the reserve margin outlook for the spring of 2015.

4.2.1 Firm Scenario with Normal and Extreme Weather

The firm scenario incorporates capacity coming into service in the first three months of the Outlook period, generation being commissioned and generation being removed from service during the 18 months. This will include the addition of about 851 MW of wind, 245 MW of biomass, 78 MW of hydroelectric and 10 MW of solar capacity.

Reserve Above Requirement (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 is being met throughout the Outlook period under normal weather conditions. During extreme weather conditions, the reserve is lower than the requirement for a total of eight weeks during the summer months of 2014 and spring of 2015. 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

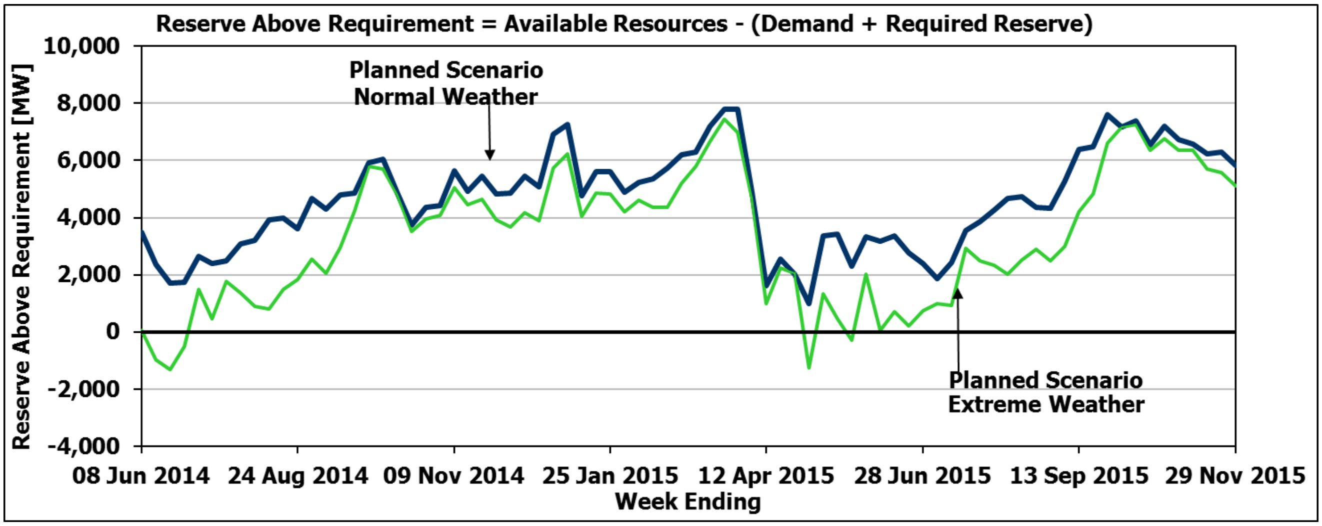


4.2.2 Planned Scenario with Normal and Extreme Weather

The planned scenario incorporates all capacity coming in service and being removed from service over the Outlook period. This will include the capacity changes in the firm scenario as well. More than 3,500 MW of generation capacity is expected to connect to Ontario's grid over this Outlook period. The removal of coal-fired facilities resulted in a considerable but acceptable reduction in resources.

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 is lower than the requirement for five weeks during the summer months of 2014 and spring of 2015 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 4.5 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 4.5: Summary of Available Resources

Notes	Description	Summer Peak 2014		Winter Peak 2015		Summer Peak 2015	
		Firm Scenario	Planned Scenario	Firm Scenario	Planned Scenario	Firm Scenario	Planned Scenario
1	Installed Resources (MW)	33,359	33,359	34,014	34,999	33,962	36,256
2	Total Reductions in Resources (MW)	5,489	5,489	5,099	5,711	6,890	8,723
3	Demand Measures (MW)	503	503	490	555	503	567
4	Available Resources (MW)	28,372	28,372	29,405	29,842	27,574	28,100

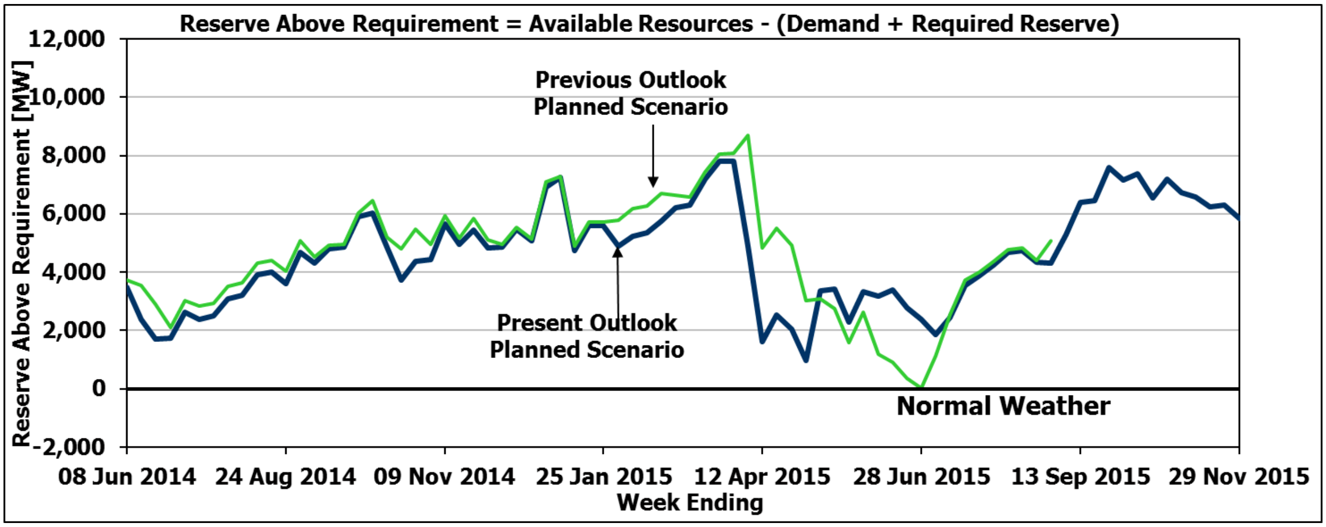
Notes on Table 4.5:

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 Reserve Above Requirement values in the present Outlook and the forecast Reserve Above Requirement values in the previous Outlook published on February 28, 2014. The difference is mainly due to the changes to outages and changes in the demand forecast.

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 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 Resources' and Table 4.2 for the list of 'Committed and Contracted Generation Resources' for this information.

For the energy adequacy assessment, only the Firm 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 and forced outages of generators, multiple wind samples (hourly profiles) and generator forced outage patterns were considered in the energy adequacy assessment. 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 - Firm Scenario with Normal Weather

Table 4.6 summarizes key energy statistics over the 18-month period for the Firm Scenario with normal weather demand for Ontario as a whole, and provides a breakdown for each transmission zone. The results indicate that occurrences of unserved energy are not expected over the 18-month timeframe of this Outlook.

Based on these results it is anticipated that Ontario will be energy adequate for the normal weather scenario for the review period.

Table 4.6: Firm Scenario - Normal Weather: Summary of Zonal Energy Statistics for the Outlook Period

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	**207.9**	**15,868.0**	**207.9**	**15,868.0**	**0.0**	**0.0**	**457.6**	**599.9**
Bruce	1.2	92.0	56.9	4,340.0	55.7	0.0	2.2	143.8
East	12.1	923.0	16.0	1,218.0	3.9	0.0	25.2	73.8
Essa	10.3	786.0	2.9	219.0	-7.4	0.0	21.7	14.4
Niagara	6.1	465.0	20.3	1,547.0	14.2	0.0	14.4	40.6
Northeast	15.7	1,195.0	15.3	1,166.0	-0.4	0.0	25.3	35.1
Northwest	5.9	448.0	7.0	534.0	1.1	0.0	9.7	14.2
Ottawa	15.6	1,193.0	0.7	55.0	-14.9	0.0	34.4	2.2
Southwest	42.7	3,259.0	4.6	353.0	-38.1	0.0	92.1	21.6
Toronto	78.3	5,973.0	74.8	5,706.0	-3.5	0.0	186.4	183.7
West	20.1	1,533.0	9.6	730.0	-10.5	0.0	46.3	70.5

The monthly forecast of energy production capability, based on information provided by market participants, is included in the 2014 Q2 Outlook Tables Appendix A, Table A7.

Figures 4.4 and 4.5 show the percentage contribution from each resource type for each calendar year of the 18-month period under conditions of zero net exports, while Table 4.7 summarizes these simulated production results by resource type, for each year.

Figure 4.4: Production by Fuel Type – June 2 to Dec. 31, 2014 (%)

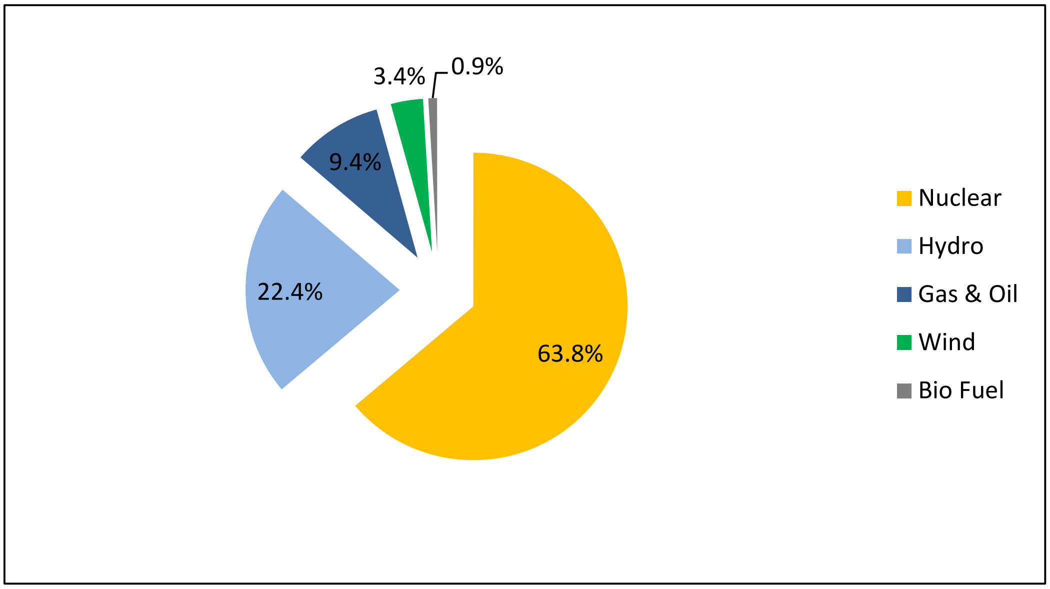


Figure 4.5: Production by Fuel Type – Jan. to Nov. 2015 (%)

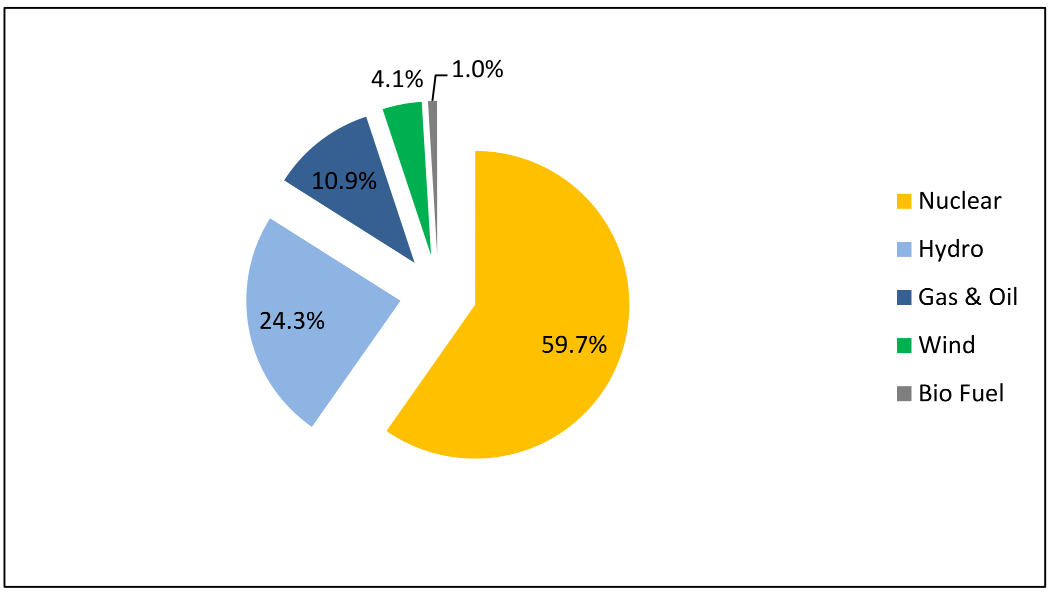


Table 4.7: Firm Scenario - Normal Weather: Ontario Energy Production by Fuel Type for 2014 and 2015

Grid-Connected Resource Type	2014 (Jun – Dec) (GWh)	2015 (Jan – Nov) (GWh)
Nuclear	52,027	75,527
Hydro	18,295	30,672
Gas & Oil	7,665	13,829
Wind	2,745	5,203
Bio Fuel	756	1,212
Other (Solar & DR)	5	10
Total	81,494	126,453

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 this 18-Month Outlook period for the Firm 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 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 April 15, 2014.

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, the IESO and the OPA are considering long-term options to address these situations in accordance with local communities under the Regional Planning Process established by the OEB.

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 re-termination of one of the 230 kV connections to Horner TS is complete and will improve the load supply capability of the Richview TS to Manby TS corridor. However, a long term solution is required to ensure load security can be maintained. The IESO is working with the OPA, Hydro One and Toronto Hydro to develop the Central Toronto IRRP, where solutions that consider the full range of integrated demand / supply options are being developed for this corridor.

The replacement of the entire 115 kV switchyard at Hearn SS is almost complete and Hydro One is continuing with the replacement of the 115 kV breakers at Manby TS and Leaside TS. Once this work is complete at the end of 2014, it will allow additional generation to be incorporated into the Toronto 115 kV system and the distribution level.

Following receipt of environmental approvals, the development of Clarington TS is proceeding 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 is expected to be in service in Q2 2015. 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. 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 therefore 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.

5.2.2 Bruce and Southwest Zones

In the Guelph area, the existing 115 kV transmission facilities are operating close to capacity and have limited margin to accommodate additional load. To improve the transmission capability into the Guelph area, Hydro One is proceeding with the Guelph Area Transmission Refurbishment project to reinforce 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.

In association with the Guelph Area Transmission Refurbishment project, a second 230/115 kV autotransformer at Preston TS, together with the associated switching and reactive facilities, is planned to be in-service by 2017. This incremental investment is required not only to improve the load restoration capability to those customers in the Cambridge area affected by a major transmission outage, but also to 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.

Beyond 2016, further facilities will be required to address the longer-term supply needs of the area and also to satisfy the IESO's load restoration criteria.

Two new 500 kV switching stations, Evergreen and Ashfield, are planned to be in service by the end of 2014 Q2 and 2014 Q4 respectively to accommodate new wind farms rated at 384 MW and 270 MW, respectively.

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. This project will increase the transfer capability from the Niagara region to the rest of the Ontario system.

Hydro One is working to replace existing 115 kV breakers at Allanburg TS. The new equipment is expected to be in service by the end of 2014 and will allow for the incorporation of additional generation in the area.

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

5.2.4 East Zone and Ottawa Zone

Hydro One is working to replace the existing 115 kV breakers at Hawthorne TS. The new equipment is expected to be in service by the end of Q2-2014 and will improve the reliability of the 115 kV transmission system supplying the Ottawa area, while enabling the incorporation of new generation in the Ottawa area. 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.

A joint regional planning group representing the IESO, OPA, Hydro One and the affected distributors is currently assessing the supply and reliability needs in the Ottawa area and examining potential alternatives to address these needs.

With further increases in the amount of load supplied from the 230kV system in the Merivale area and with a minimum threshold of 400MW on the level to which the transfers from Hydro Quebec can be automatically reduced following the loss of one of the 230kV Hawthorne-to-Merivale circuits, there is an increased possibility that imports may need to be restricted during peak load periods. The situation will 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.

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.

Hydro One is upgrading the thermal rating of two 230 kV circuits from Lambton TS to Longwood TS. This upgrade is expected to be in service by the end of 2014 and will increase the transfer capability into the London area.

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 Q2-2014.

Managing grid voltages in the Northwest has always required special attention. With significantly lower demand in the past few years, it has become increasingly difficult to maintain an acceptable voltage profile without compromising the reliability of supply, particularly during times with low westbound power transfers into the zone.

To reduce and eventually eliminate the dependence on operational measures for voltage control in northwest Ontario, additional reactive compensation is required. New shunt reactors at Dryden that will be in service by the end of 2014 will to help resolve this problem. Atikokan generating station, which is being converted to biomass and is slated to come into service during Q3 of 2014, will further improve the voltage management capability in this 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 OPA has issued a draft IRRP, with assistance from the IESO, Hydro One, local distributors, customers and First Nations in the area to resolve these issues. This regional planning study accounts for recent expansion plans of customers in the area.

In addition to the conversion of Atikokan GS from coal to biomass, one of the Thunder Bay units will also be converted to advanced biomass operation. To accommodate the outages required to complete the conversion of these units, the planned maintenance of other critical equipment has been advanced, and plans have been developed to manage the high voltage situations.

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.

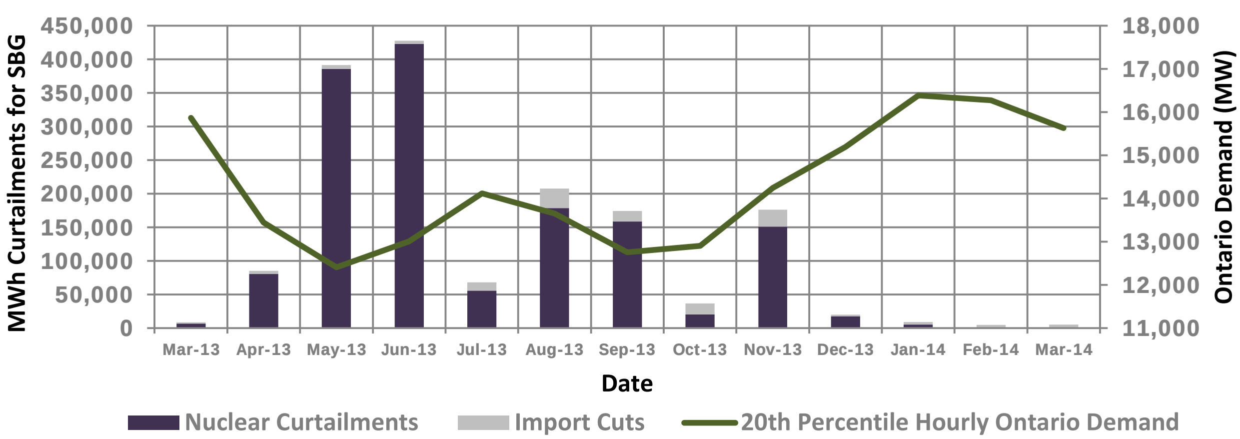
6.1 Surplus Baseload Generation (SBG)

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.

Maneuvering capability by eight units at Bruce Power and dispatchable variable generation have provided additional flexibility to manage SBG, while also mitigating the need for manual control actions. These actions usually occur in the spring and fall, when the Ontario demand is lowest.

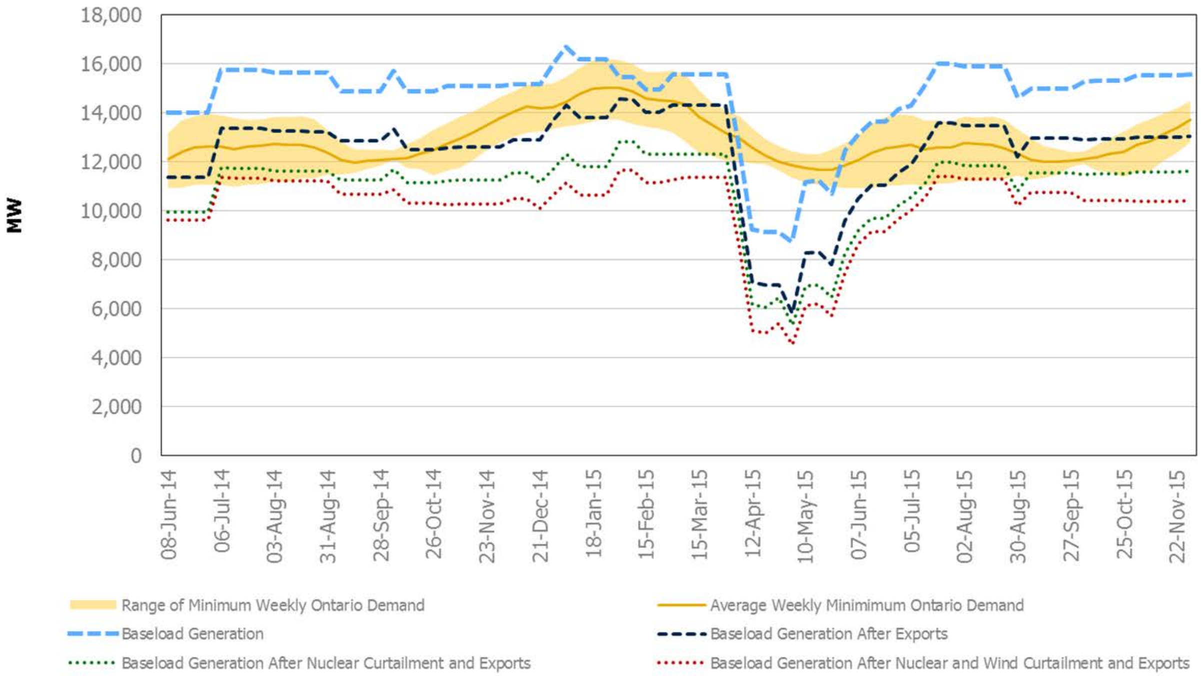
Figure 6.1 shows the volume of nuclear and import curtailments due to surplus baseload conditions versus the bottom 20% hourly Ontario demand from March 2013 to March 2014. The amount of nuclear and import curtailments for SBG in Q1 of 2014 was only slightly more than Q1 of 2013 by 4,500 MWh.

Figure 6.1: MWh Curtailments for SBG versus Ontario Demand



The forecast SBG for the next 18 months can be seen in Figure 6.2. In response to feedback from market participants, Figure 6.2 now shows additional information to reflect the flexibility from nuclear and variable generation. 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.

Figure 6.2: Minimum Ontario Demand and Baseload Generation



Ontario will continue to experience SBG conditions even though the minimum demand levels show a slight increase over the previous forecast outlook. The steep decline in SBG in the spring 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.

6.2 Report on Initiatives

At the beginning of June 2014, the IESO implemented a redesigned mechanism for triggering of the Demand Response 3 program. The new initiative utilizes the modeling of DR3 settlement accounts as aggregated resources within IESO market and system tools. In place of activations that are based on a combination of supply cushion and price-based triggers, DR3 resources are now activated when they represent a competitively-priced energy resource in the pre-dispatch timeframe.

A new demand forecast tool was developed as part of the Demand Forecast System Refresh project. This tool includes automation of manual processes and server based processing to achieve higher efficiency. A redesigned outage management protocol is also under development, which aims to give additional flexibility and certainty to market participants while scheduling outages.

- End of Section -

7 Historical Review

This section provides a review of past power system operation, including the most recent months of operation.

7.1 Weather and Demand Historic Review

Since the last Ontario Demand Forecast document was published, actual demand and weather data have been reported for the six months of November through April.

Overall, energy demand for the six months was up 3.5% compared with the same six months one year prior. However, much of that increase was due to the cold 2013-14 winter. After correcting for weather the increase is a more modest 0.6%. Over the same time, wholesale consumers' consumption had shown an increase of 3.7%.

7.2 Resource Contributions at Time of Peak

The figures from 7.1 to 7.4 show the contributions made by wind generators, hydroelectric generators, imports, and net interchange into Ontario at the time of peak. The period analyzed is from April 2013 to March 2014. Holiday and weekend data were not considered in the analysis since hydroelectric peaking generation and interchange transactions during this timeframe are not typical of time periods when Ontario's supply adequacy may be challenged.

Figure 7.1 shows the amount of wind generation compared to the forecast. The forecast methodology takes into account seasonal variances in wind patterns, among other factors. Installed wind capacity is expected to continue to grow with wind generation procured under the FIT programs. On September 11, 2013, as a result of the Renewable Integration Initiative, wind resources became dispatchable. The wind generation amounts before being dispatched are used to derive the values in the chart below.

Figure 7.1: Wind Generation at the Time of Peak

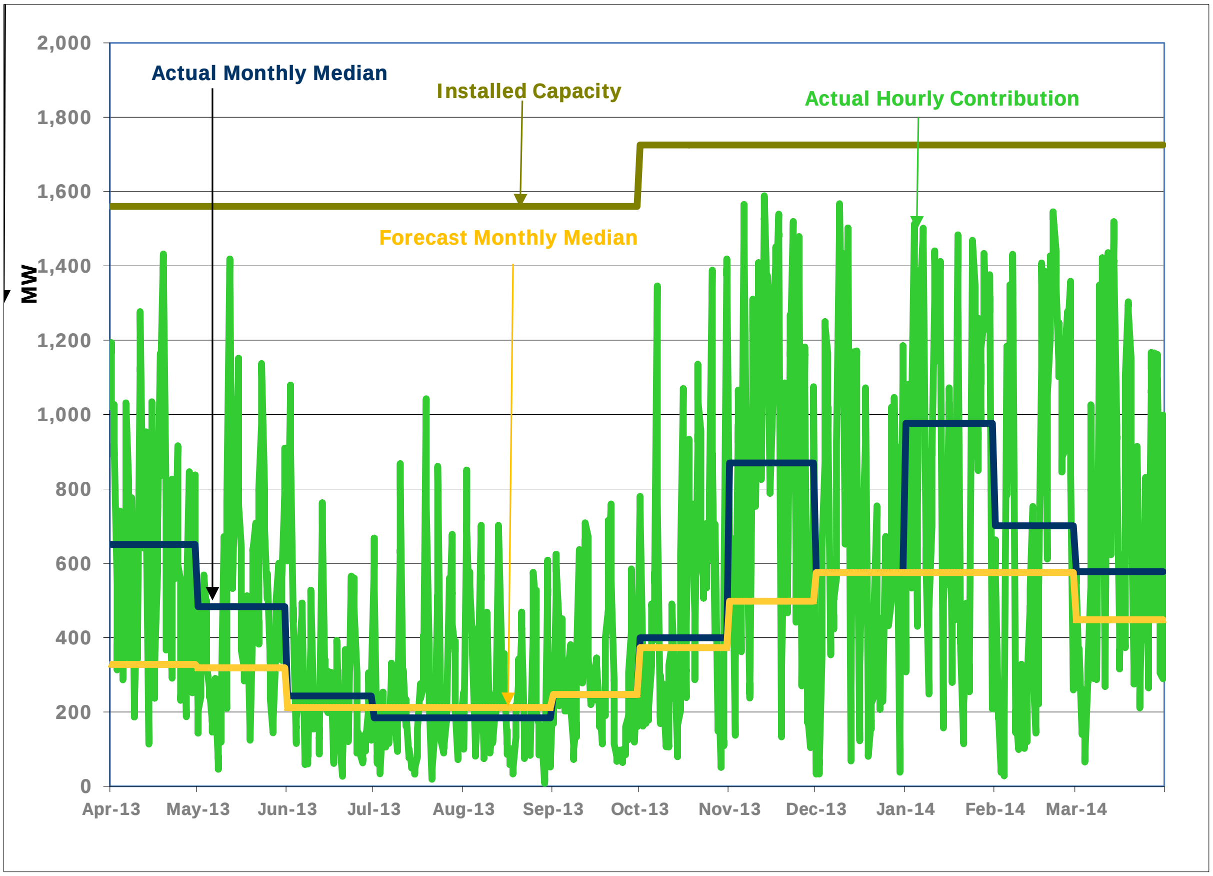


Figure 7.2 indicates the amount of hydroelectric contributions to energy and operating reserve markets at the time of weekday peak, excluding weekends and holidays, compared to the forecasted contributions. The forecasted monthly median is typically the median contribution of hydroelectric energy at the time of weekday peak since 2002. However, if low water persists, the forecast is adjusted accordingly to reflect the observed trend.

Figure 7.2: Hydroelectric Contributions (Energy and Operating Reserve) at the Time of Weekday Peak

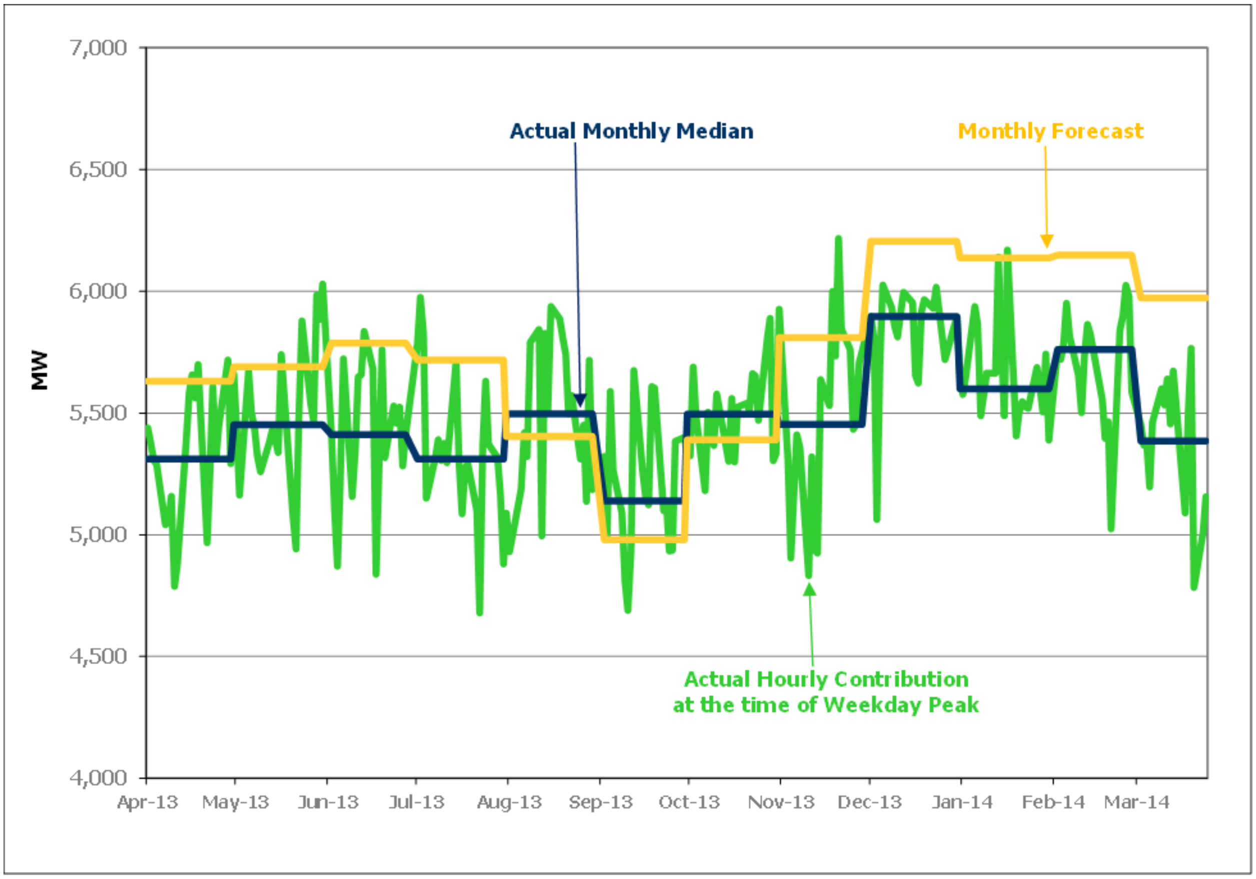


Figure 7.3 shows imports into Ontario at the time of weekday peak. High imports periods correlate to a yearly period with high demands, high prices and consequently an increase in imports.

Figure 7.3: Imports into Ontario at the Time of Weekday Peak

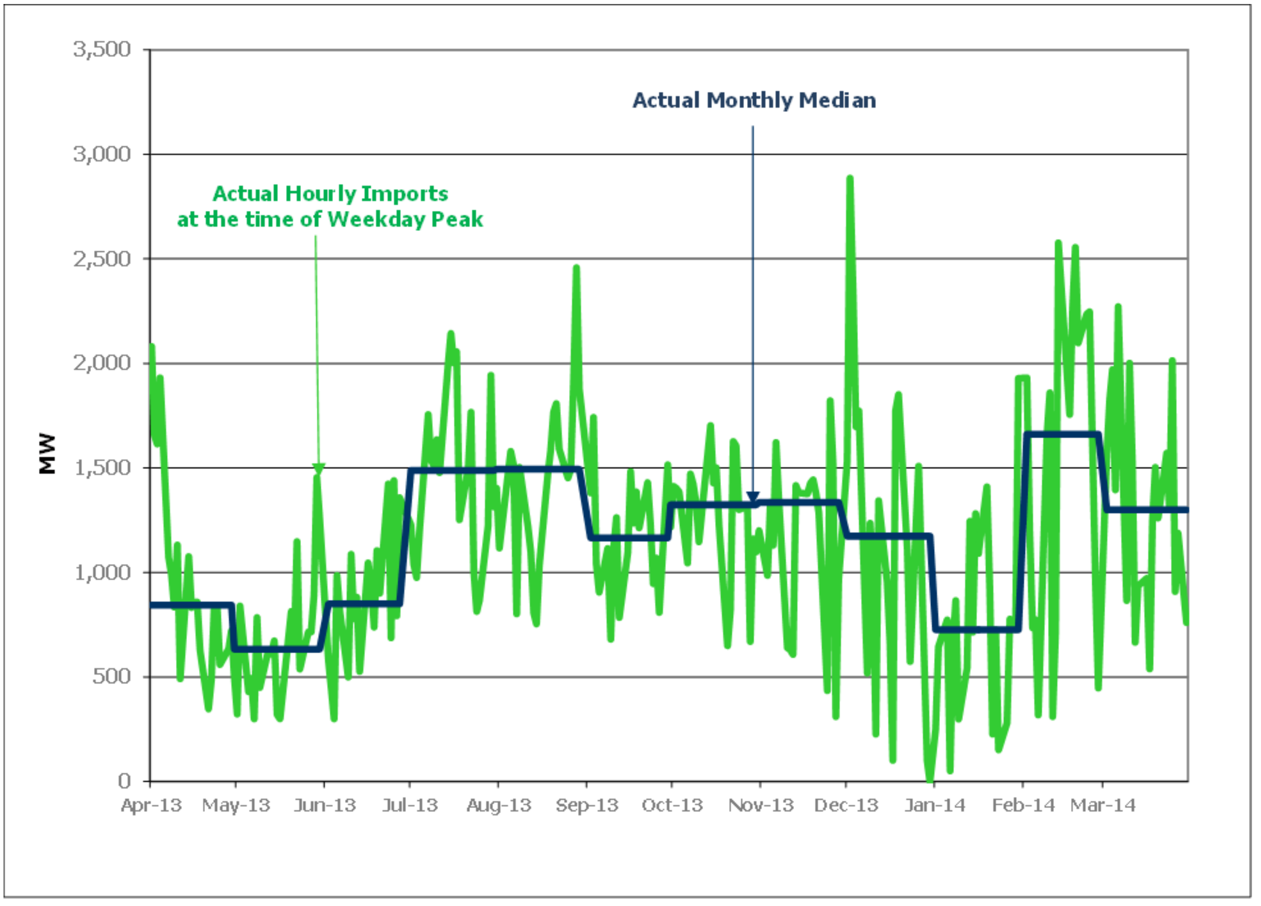
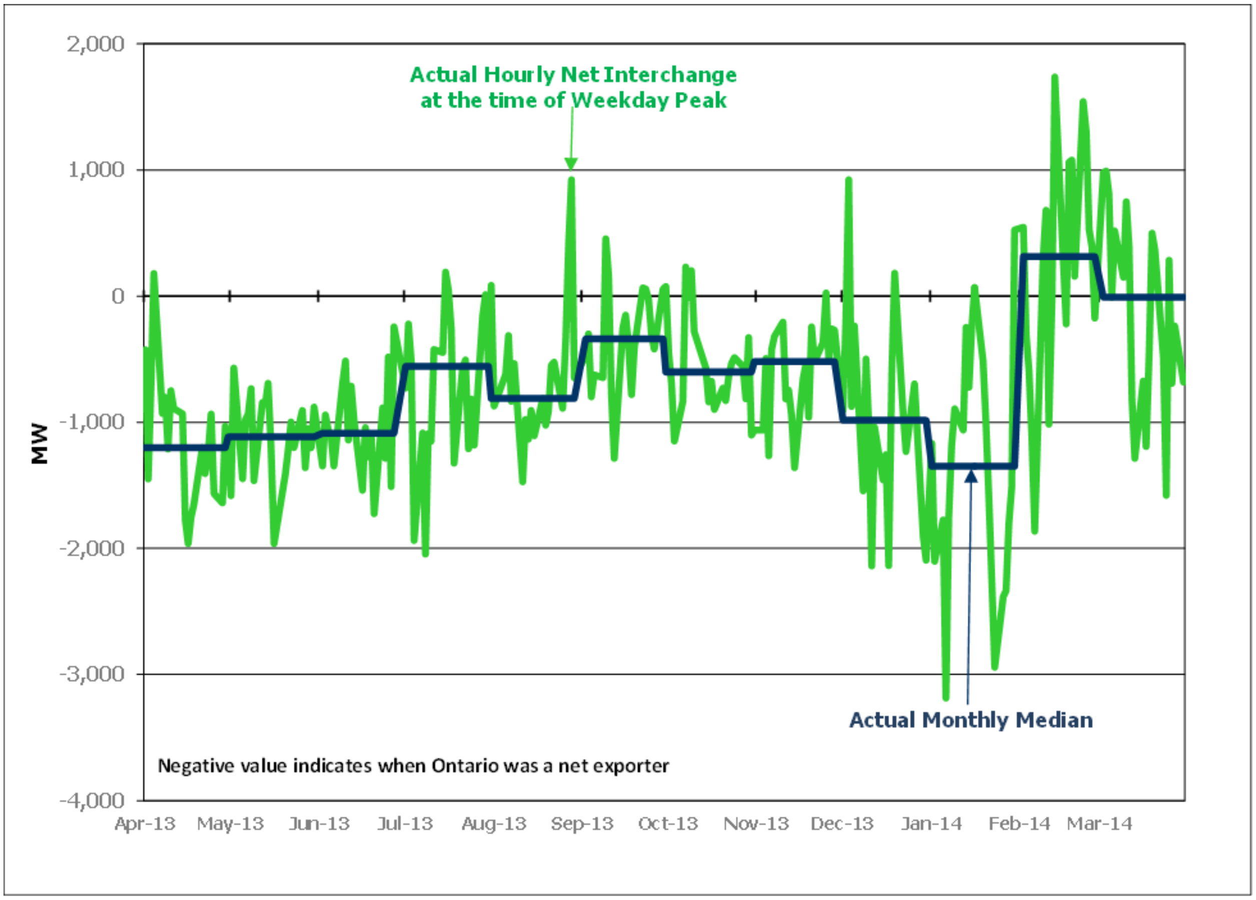


Figure 7.4 shows the amount of net interchange at the time of weekday peak, excluding weekends and holidays. Net Interchange is the difference between total imports into Ontario and total exports out of Ontario. The trend below illustrates the typical economics of spare capacity in Ontario with respect to external jurisdictions.

Figure 7.4: Net Interchange into Ontario at the Time of Weekday Peak



7.3 Report on Generation / Transmisssion Disturbances

The IESO, in co-operation with market participants, successfully managed to serve Ontario's high electricity demand during sustained cold weather conditions past winter. This is attributed to efficient long term forecasting, planning and implementation of appropriate mechanisms to manage the system demand during such conditions.

On December 22, 2013 thousands of customers in Ontario were without power as a result of a severe ice storm, where the majority of them were Toronto Hydro customers. There was minimal impact to IESO operations as the majority of the restoration was required at the distribution level. The IESO did have to manage large periods of SBG which resulted from GTA load outages. This was accomplished via normal market mechanism such as generation dispatch and scheduling exports.

On Thursday February 27, 2014, the combination of high demand, import curtailments, and the loss of a generator greater than 250 MW resulted in all online Ontario resources loaded. As a result, several control actions were taken, including a 5% voltage reduction to avoid a supply shortfall over peak. The last voltage reduction required to manage reliability before this incident occurred in August 2006.

7.4 Variations From the Previous Year

The winter of 2013-14 saw sustained high electricity prices in Ontario. At times, prices exceeded those in neighboring jurisdictions. High natural gas prices and above normal demands for electricity were key factors leading to high electricity prices.

There were three cold snaps in January where the IESO issued extreme condition alerts as a result of polar vortex temperatures which coincided with increased demand attributed to the return to work/school from the holidays.

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