18-MONTH OUTLOOK

From September 2012 to February 2014

ieso
Power to Ontario. On Demand.

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

Executive Summary

Ontario will continue to have an adequate supply of electricity to meet consumers' needs over the next 18 months. During that period, there will be almost 3,000 megawatts (MW) of capacity added to the grid, comprising 1,500 MW of nuclear generation and about 1,500 MW of grid-connected renewable generation. According to Bruce Power, nuclear unit G1 is expected to begin commissioning by the end of the third quarter of 2012 and nuclear unit G2 will be operational by the end of the fourth quarter of 2012. Approximately 215 MW of wind generation will be in service by the end of the third quarter of 2012 and, by February 2014, the total wind and solar generation connected to the transmission and distribution networks in Ontario will reach approximately 4,800 MW.

Stakeholder Engagement (SE) 91 is an open stakeholder process designed to provide the system operator with increased flexibility from available variable generation resources. Through SE 91, the IESO has implemented a new Centralized Forecasting Service that is more accurately predicting the output from wind facilities in Ontario. This service will soon be expanded to predict solar output as well. Additionally, the IESO is continuing its efforts to incorporate these renewable resources into the dispatch process. This will help match generation to demand at times when consumer use quickly ramps up or down.

Energy demand is forecast to increase in 2012 before shrinking slightly in 2013 as a result of several factors. A combination of the state of the global economy, increased embedded generation capacity, conservation initiatives and time-of-use rates will constrain demand increases.

Peak demands will be impacted by the same factors, but to varying degrees. In particular, the significant projected growth in embedded solar capacity will have a different degree of impact on the summer peak compared to the winter peak. This increase in capacity will drive down summer peaks but as the winter peaks occur after sunset, the winter peaks will actually show a slight increase. The following table summarizes the forecasted seasonal peak demand numbers.

Season	Normal Weather Peak (MW)	Extreme Weather Peak (MW)
Winter 2012-13	22,087	23,298
Summer 2013	23,103	25,359
Winter 2013-14	22,129	23,337

New resources and transmission projects have recently been brought into service to support the scheduled removal of coal-fired capacity, and to ensure Ontario can meet its future supply needs. Once the refurbished Bruce nuclear units have been successfully integrated onto the grid and all the new generation and transmission projects have shown reliable operations, Ontario will be in a good position to continue the removal of coal-fired generation from the system.

With the continuing drop in electricity demand and the ongoing addition of baseload generation, surplus baseload generation (SBG) is expected to continue through the outlook period. These factors may contribute to a short-term rise in the frequency and magnitude of SBG which will need to be managed through control actions, such as increased exports, minimum hydro dispatches, and nuclear maneuvers, until the nuclear refurbishment programs begin later in the decade.

Conclusions & Observations

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

Demand Forecast

- Continued weakness in the global economy in general, and the U.S. economy in particular, will hamper Ontario's trade-based economy. Modest Ontario economic growth combined with other factors that reduce the need for grid-supplied electricity mean that overall electricity demand will remain flat.
- The growth in embedded solar capacity will put significant downward pressure on summer peaks. Along with conservation and time-of-use rates, summer peaks are expected to decline and winter peaks are expected to show a slight increase over the 18-month time horizon.
- With the forecasted peak demand levels, supply adequacy will remain robust. Although high peak demands are likely under extreme weather conditions, they are not expected to pose any province-wide reliability concerns.

Resource Adequacy

- Reserve requirements are expected to be met for all weeks in all weather scenarios.
- Bruce unit 1 (750 MW) restart is expected to be commissioning by the end of the third quarter of 2012.
- Bruce unit 2 (750 MW) restart is expected to be operational by end of the fourth quarter of 2012.
- Decisions around the possible Pickering unit retirements and associated transmission upgrades are required within the timeframe of this Outlook to ensure supply adequacy continues beyond 2014, when coal-fired generation has ceased and some nuclear units begin to reach their expected end-of-life.

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

Transmission Adequacy

- With the planned system enhancements and scheduled maintenance outages, the Ontario transmission system is expected to be adequate to supply the demand under the normal and extreme weather conditions forecast for the Outlook period.
- The IESO, OPA and Hydro One are considering long-term options to meet the IESO's load restoration criteria in York Region, Ottawa Area, and in the area supplying Woodbridge TS, Vaughan #3 TS and Kleinburg TS.

- Some area loads experienced modest growth requiring additional investments in local area transmission systems. 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, help relieve loadings of existing transmission stations and provide additional supply capacity for future load growth.
- To manage the special needs of the Northwest, Hydro One, the OPA and the IESO are currently looking at short- and long-term solutions to maintain an acceptable voltage profile.
- To improve the transmission capability into the Guelph area, Hydro One will be proceeding with the Guelph Area Transmission Refurbishment project to reinforce the supply into Guelph-Cedar TS, with an expected completion date in the second quarter of 2016.
- In the Cambridge area, to meet the IESO's load restoration criteria following a contingency, a second 230/115 kV autotransformer is expected to be installed at Preston TS by 2015.
- The OPA and Hydro One are developing cost estimates and implementation schedules for transmission enhancements planned for 2014 to manage long-term load supply in the south-western GTA.
- Analysis is currently underway to determine transmission solutions to address the possible future shutdown of Pickering Nuclear Generating Station.

Operability

- The IESO is continuing with plans to move to an economic dispatch of variable generation to help manage operability issues. A centralized forecast has been developed for all transmission connected wind resources, with a full implementation set to be complete by Q1 2013. Forecasting for embedded variable resources will be developed in 2013. Additionally, the Renewable Integration Initiative (RII) will facilitate the dispatching of renewable energy, with implementation set for Q4 2013.
- The conditions for surplus baseload generation are likely to continue in 2013 with the expected increased penetration of renewable generation projects and the return of two additional nuclear units, combined with lower off-peak demand for electricity.
- As Ontario's coal-fired generation is shut down over the next two years, its associated operating flexibility will be lost. Therefore, future capacity additions should also possess this flexibility to help facilitate the management of maintenance outages, provide effective ramp capability, and even provide regulation when necessary.

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1 Introduction

This Outlook covers the 18-month period from September 2012 to February 2014 and supersedes the last Outlook released in June 2012.

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/imoweb/monthsYears/monthsAhead.asp

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

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

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

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

- 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 May 2012. The demand forecast has been updated to reflect the most recent economic projections and data. Actual weather and demand data for June and July 2012 have been included in the tables.

2.2 Updates to Resources

The assessment uses planned generator outages as submitted by market participants to the IESO's Integrated Outage Management System (IOMS). This Outlook is based on submitted generation outage plans as of August 2, 2012.

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 Integrated Outage Management System (IOMS) as of July 4, 2012 were used.

2.4 Updates to Operability Outlook

An outlook of surplus baseload generation (SBG) conditions for the next 18 months has been updated with submitted generation outage plans as of August 2, 2012.

- 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 September 2012 to February 2014 and supersedes the previous forecast released in June 2012. Tables of supporting information are contained in the 2012 Q3 Outlook Tables spreadsheet.

Electricity demand will increase slightly in 2012 before declining in 2013. Continuing growth in conservation and embedded generation will offset most of the need for more electricity from an expanding economy and growing population. The global economy continues to influence industrial demand in Ontario.

The impact of increased embedded generation capacity, time-of-use rates, Global Adjustment changes and conservation will put downward pressure on peak demands. Since summer peaks occur during the middle of the day, they will be particularly impacted by the projected 600 MW increase in embedded solar capacity over the next 18 months.

The following table shows 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)
Winter 2012-13	22,087	23,298
Summer 2013	23,103	25,359
Winter 2013-14	22,129	23,337
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 (Forecast)	141.8	0.4%
2013 Energy (Forecast)	141.1	-0.4%

Table 3.2 Weekly Energy and Peak Demand

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)
09-Sep-12	20,506	23,092	1,412	2,608	09-Jun-13	19,568	22,976	1,315	2,556
16-Sep-12	18,974	22,528	1,242	2,539	16-Jun-13	20,587	23,965	1,313	2,627
23-Sep-12	18,971	21,225	768	2,492	23-Jun-13	21,132	24,467	735	2,646
30-Sep-12	18,719	19,983	714	2,512	30-Jun-13	22,507	24,591	871	2,761
07-Oct-12	17,828	18,499	486	2,500	07-Jul-13	22,553	24,284	732	2,648
14-Oct-12	17,508	18,445	550	2,470	14-Jul-13	23,103	25,359	981	2,780
21-Oct-12	17,709	18,259	475	2,526	21-Jul-13	22,897	24,548	863	2,785
28-Oct-12	18,346	18,777	461	2,554	28-Jul-13	22,450	24,328	898	2,729
04-Nov-12	18,270	19,281	704	2,565	04-Aug-13	22,423	24,640	1,029	2,785
11-Nov-12	19,423	19,671	458	2,652	11-Aug-13	22,503	25,109	902	2,796
18-Nov-12	19,701	20,441	460	2,715	18-Aug-13	21,885	24,385	929	2,755
25-Nov-12	20,199	20,820	458	2,773	25-Aug-13	21,763	23,982	782	2,741
02-Dec-12	20,572	21,335	534	2,812	01-Sep-13	21,501	23,842	1,223	2,745
09-Dec-12	21,213	22,181	500	2,890	08-Sep-13	20,509	22,782	1,461	2,577
16-Dec-12	21,259	22,349	600	2,915	15-Sep-13	19,564	22,245	1,229	2,489
23-Dec-12	21,693	22,658	485	2,965	22-Sep-13	19,342	20,981	577	2,514
30-Dec-12	19,707	21,114	407	2,696	29-Sep-13	18,856	19,673	747	2,512
06-Jan-13	21,276	22,891	652	2,901	06-Oct-13	17,876	18,202	462	2,482
13-Jan-13	22,082	23,064	640	3,041	13-Oct-13	17,570	17,834	670	2,470
20-Jan-13	22,087	23,298	616	3,057	20-Oct-13	17,496	17,962	781	2,471
27-Jan-13	21,754	22,849	592	3,024	27-Oct-13	18,370	18,582	514	2,557
03-Feb-13	21,903	22,886	531	3,014	03-Nov-13	18,418	18,628	412	2,563
10-Feb-13	21,813	22,640	456	3,031	10-Nov-13	19,397	19,551	365	2,635
17-Feb-13	21,202	22,390	605	2,982	17-Nov-13	19,492	20,231	459	2,689
24-Feb-13	20,836	22,231	511	2,883	24-Nov-13	20,016	20,637	646	2,756
03-Mar-13	20,611	22,096	459	2,920	01-Dec-13	20,384	21,147	476	2,789
10-Mar-13	20,732	21,597	383	2,898	08-Dec-13	20,777	22,191	609	2,860
17-Mar-13	19,702	20,545	437	2,836	15-Dec-13	21,342	22,284	421	2,900
24-Mar-13	19,435	20,369	557	2,788	22-Dec-13	21,456	22,463	518	2,926
31-Mar-13	18,767	19,653	517	2,635	29-Dec-13	19,379	20,749	764	2,694
07-Apr-13	18,560	19,922	478	2,652	05-Jan-14	20,645	21,494	470	2,841
14-Apr-13	18,024	18,877	449	2,591	12-Jan-14	22,129	23,337	648	3,048
21-Apr-13	17,558	18,571	358	2,524	19-Jan-14	21,587	22,688	624	2,994
28-Apr-13	17,325	18,239	379	2,516	26-Jan-14	21,713	22,689	558	3,007
05-May-13	17,193	19,871	411	2,453	02-Feb-14	21,790	22,617	480	3,038
12-May-13	17,728	20,499	604	2,463	09-Feb-14	21,125	22,317	637	2,980
19-May-13	17,685	20,086	733	2,426	16-Feb-14	20,715	22,118	538	2,896
26-May-13	19,118	22,567	732	2,402	23-Feb-14	20,485	21,976	483	2,861
02-Jun-13	19,168	21,947	1,222	2,478	02-Mar-14	21,047	21,904	404	2,934

3.1 Actual Weather and Demand

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

May

- May was warmer than normal with average temperatures for the month the highest since 1998. Demand for the month was 11.1 TWh (11.0 TWh weather-corrected) an increase over the previous May. The monthly peak was 21,106 MW and occurred on May 28, which was not even the hottest day of the month. This peak day was warmer than normal leading to a weather-corrected peak of 19,800 MW.
- Wholesale customers' consumption did increase for the fourth consecutive month with a 6.5% increase over the previous May.

June

- June was warmer than normal with average temperatures the highest since 2007. Energy demand was 11.8 TWh (11.4 weather-corrected). The peak day did occur on the day with the highest temperature. Peak demand was 24,107 MW with a peak day temperature of 34.2 degrees. The peak would have been higher but demand response programs (DR2, DR3 and Peaksaver) reduced the peak by 524 MW. Both peak and energy demand were up compared to the previous June.
- Wholesale customers' consumption showed continued strength posting an excellent 9.4% growth over the previous June. The level still remains 22.7% below the pre-recessionary level of June 2009.

July

- The weather for July was very similar to July 2011 as it was much hotter than usual. For 2012, the average temperature was very similar though the peak temperatures were not as high as the previous year's. Actual energy demand for the month was 13.5 TWh (12.9 TWh weather-corrected) an increase over the previous July. The actual peak for the month was 24,636 MW and occurred on July 17th which was the hottest day of the month and much warmer than normal (weather-corrected peak was 23,745 MW). The peak would have been higher but demand response programs reduced the peak by 438 MW.
- For the fourth consecutive month, wholesale customers' consumption showed strong year over year growth. Consumption was up 8.1% over the previous July.

Thus far in 2012, weather-corrected monthly demand compared to the previous year was up in 3 of the 7 months. February actually showed year over year increase but after adjusting for the extra leap year day demand was down. Despite the strong showing of May through July, the on-going global economic issues will continue to impact Ontario throughout 2012, leading to almost no increase in demand.

The 2012 Q3 Outlook Tables spreadsheet has several tables with historical data. They are:

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

3.2 Forecast Drivers

Economic Outlook

The global economy seems unable to gain any traction on a path of sustainable growth. The ongoing European debt crisis continues to cast a pall over the mood of world markets. Globally, high debt loads, slow economic growth, high unemployment rates and low business and consumer confidence will pose challenges to Ontario's export based economy. These conditions are expected to persist over the forecast period slowing Ontario's economic expansion.

- Table 3.3.4 of the 2012 Q3 Outlook Tables has 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 2012 Q3 Outlook Tables has the weekly weather data for the forecast period.

Conservation and Demand Management

Conservation will continue to grow throughout the forecast. 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 capacity.

- 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 has the authority to reject outages based on their order of precedence. Conversely, an opportunity exists for additional outages when reserves are above required levels. These actions address shortages and may help to reduce surpluses of reserves.

In recognition of the uncertainty that exists regarding the future availability of resources, two resource scenarios are described in this section: the Firm Scenario and the Planned Scenario.

The firm scenario incorporates capacity coming in service in the first 3 months of the outlook period and generation being removed from service during the 18-months. This will include the addition of 215 MW of wind and 1,500 MW of nuclear generation, as well as the removal of 211 MW of coal generation.

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 as approximately 1,300 MW of grid-connected renewables added to the system.

Current supply is adequate to meet demand under all scenarios. To ensure adequate supply is maintained beyond the middle of the decade, the IESO expects decisions to be made over the next 18 months regarding future generation, particularly plans for the Pickering Nuclear station.

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 August 6, 2012

Fuel Type	Total Installed Capacity (MW)	Forecast Capability at Winter Peak* (MW)	Number of Stations	Change in Installed Capacity (MW)	Change in Stations
Nuclear	11,446	11,368	5	0	0
Hydroelectric	7,947	6,012	71	0	0
Coal	3,504	3,136	4	0	0
Oil / Gas	9,987	9,387	29	0	0
Wind	1,511	507	12	0	0
Biomass / Landfill Gas	122	44	6	0	0
Total	34,517	30,454	127	0	0

* Actual Capability may be less as a result of transmission constraints

4.1 Committed and Contracted Generation Resources

Table 4.2 summarizes generation that is scheduled to come into service, be upgraded or shut down within the Outlook period. This includes generation projects in the IESO's Connection Assessment and Approval Process (CAA) that are under construction and 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/imoweb/connassess/ca.asp 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. 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)	Planned (MW)
Bruce Unit 1	Bruce	Uranium	2012-Q3		Construction	750	750
Comber Wind Limited Partnership	West	Wind	2012-Q3		Commissioning	166	166
Pointe Aux Roches Wind	West	Wind	2012-Q3		Commissioning	49	49
Bruce Unit 2	Bruce	Uranium	2012-Q4		Construction	750	750
Atikokan shutdown for conversion to biomass	Northwest	Coal	2013-Q1			-211	-211
Thunder Bay Condensing Turbine Project	Northwest	Biomass	2013-Q1		Construction		40
Conestogo Wind Energy Centre 1	Southwest	Wind	2013-Q1		pre-NTP		69
Summerhaven Wind Energy Centre	Southwest	Wind	2013-Q1		NTP		125
Leamington Pollution Control Plant	West	Oil	2013-Q1		Construction		2
McLean's Mountain Wind Farm	Northeast	Wind	2013-Q2		pre-NTP		60
Becker Cogeneration Plant	Northwest	Biomass	2013-Q4		Construction		8
Atikokan conversion to biomass	Northwest	Biomass	2013-Q4				205
Bow Lake Phase 1	Northeast	Wind	2013-Q4		pre-NTP		20
Incremental capacity at Sir Adam Beck with the third Niagara tunnel	Niagara	Water	2014-Q1		Construction		30
Dufferin Wind Farm	Southwest	Wind	2014-Q1		Pre-NTP		100
Nigig Power Corporation	Essa	Wind	2014-Q1		Pre-NTP		300
Amherst Island Wind Project	East	Wind	2014-Q1		Pre-NTP		75
Niagara Region Wind Farm	Niagara	Wind	2014-Q1		Pre-NTP		230
Total						**1,503**	**2,767**

Notes to Table 4.2:

1. Shading indicates a change from the previous Outlook.
2. The total may not add up due to rounding. Total does not include in-service facilities.
3. 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. Feed-in Tariff (FIT) projects are categorized as at Notice to Proceed (NTP) or at 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.

4.2 Summary of Scenario Assumptions

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

Both scenarios' starting point is the existing installed resources shown in Table 4.1. The Planned Scenario assumes that all resources that are scheduled to come into service are available over the study period while the Firm Scenario only assumes those scheduled to come into service over the first three months and generators that have started commissioning. Both scenarios recognize that resources that are in service are not available during times for which the generator has submitted planned outages. Also

considered for both scenarios are generator-planned shutdowns or retirements which have high certainty of happening in the future. The Firm and Planned Scenarios also differ in their assumptions regarding the amount of demand measures.

The generation capability assumptions are as follows:

- The hydroelectric capability (including energy and operating reserve) for the duration of this outlook is typically based on median historical values during weekday peak demand hours from May 2002 to March 2012. 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. Manual adjustments to affected months have been made during this outlook period to account for specific scheduled hydroelectric outages and low water conditions.
- Thermal generators' capacity and energy contributions are based on market participant submissions, including planned outages, expected forced outage rates and seasonal deratings.
- For wind generation the monthly Wind Capacity Contribution (WCC) values, which can be found in the Methodology to Perform Long Term Assessments, are used at the time of weekday peak, while total energy contribution is assumed to be 29% of installed wind capacity.

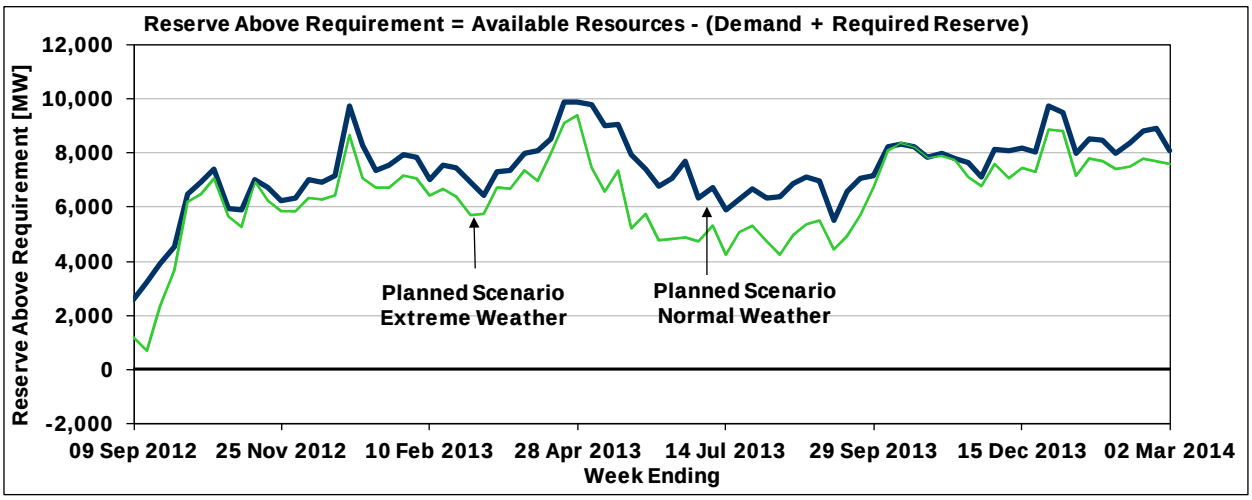
Table 4.3 Summary of Scenario Assumptions

<table>
<tr><th colspan="2">Assumptions</th><th>Planned Scenario</th><th>Firm Scenario</th></tr>
<tr><td rowspan="3">Resources</td><td>Total Existing Installed Resource Capacity (MW)</td><td colspan="2">34,517</td></tr>
<tr><td rowspan="2">New Generation and Capacity Changes (MW)</td><td>All Projects</td><td>Generator shutdowns or retirements, Commissioning Generators and Generators starting in the first 3 months</td></tr>
<tr><td>2,767</td><td>1,503</td></tr>
<tr><td rowspan="6">Demand Forecast</td><td rowspan="2">Conservation</td><td colspan="2">Incremental</td></tr>
<tr><td colspan="2">Incremental growth of 85 MW on summer peak</td></tr>
<tr><td rowspan="2">Embedded Generation</td><td colspan="2">Incremental</td></tr>
<tr><td colspan="2">Incremental growth of 70 MW on summer peak</td></tr>
<tr><td rowspan="2">Demand Measures (MW)</td><td>Exisiting + Incremental</td><td>Existing</td></tr>
<tr><td>1,505</td><td>1,141</td></tr>
</table>

4.3 Planned Scenario with Normal and Extreme Weather

Reserve Above Requirement levels, which represent the difference between Available Resources and Required Resources, are shown in Figure 4.1.

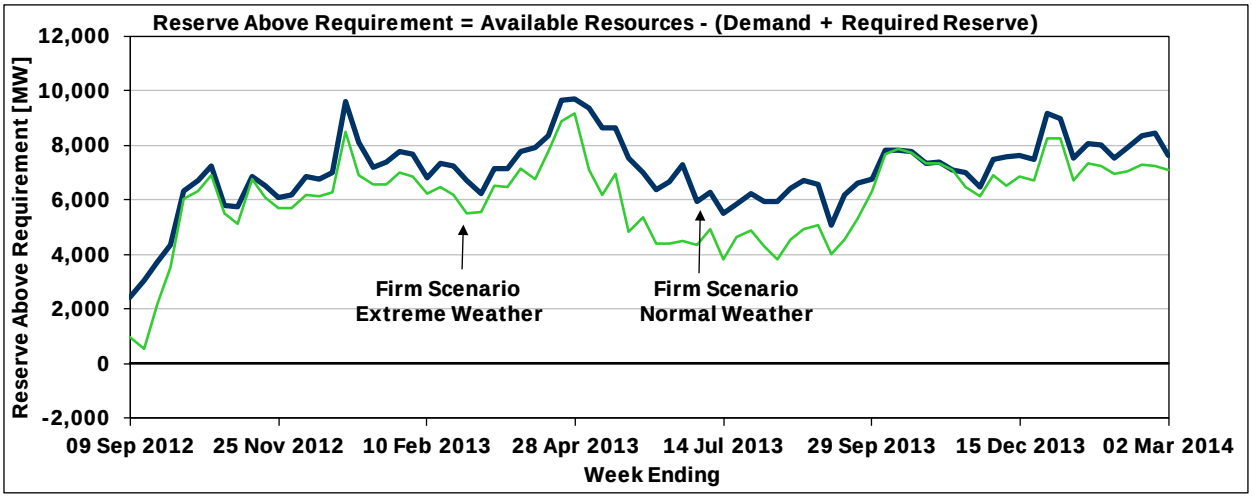
Figure 4.1 Reserve Above Requirement: Planned Scenario with Normal vs. Extreme Weather



4.4 Firm Scenario with Normal and Extreme Weather

Reserve Above Requirement levels, which represent the difference between Available Resources and Required Resources, are shown in Figure 4.2.

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



4.5 Comparison of Resource Scenarios

Table 4.4 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.

The monthly forecast of energy production capability, as provided by market participants, is included in the 2012 Q3 Outlook Tables Appendix A, Table A7.

Table 4.4 Summary of Available Resources

Notes	Description	Winter Peak 2013		Summer Peak 2013		Winter Peak 2014	
		Firm Scenario	Planned Scenario	Firm Scenario	Planned Scenario	Firm Scenario	Planned Scenario
1	Installed Resources (MW)	36,020	36,020	36,020	36,316	36,020	36,549
2	Imports (MW)	0	0	0	0	0	0
3	Total Resources (MW)	36,020	36,020	36,020	36,316	36,020	36,549
4	Total Reductions in Resources (MW)	4,617	4,617	5,544	5,776	4,387	4,808
5	Demand Measures (MW)	1,141	1,315	1,141	1,505	1,141	1,505
6	Available Resources (MW)	32,544	32,719	31,617	32,045	32,774	33,246

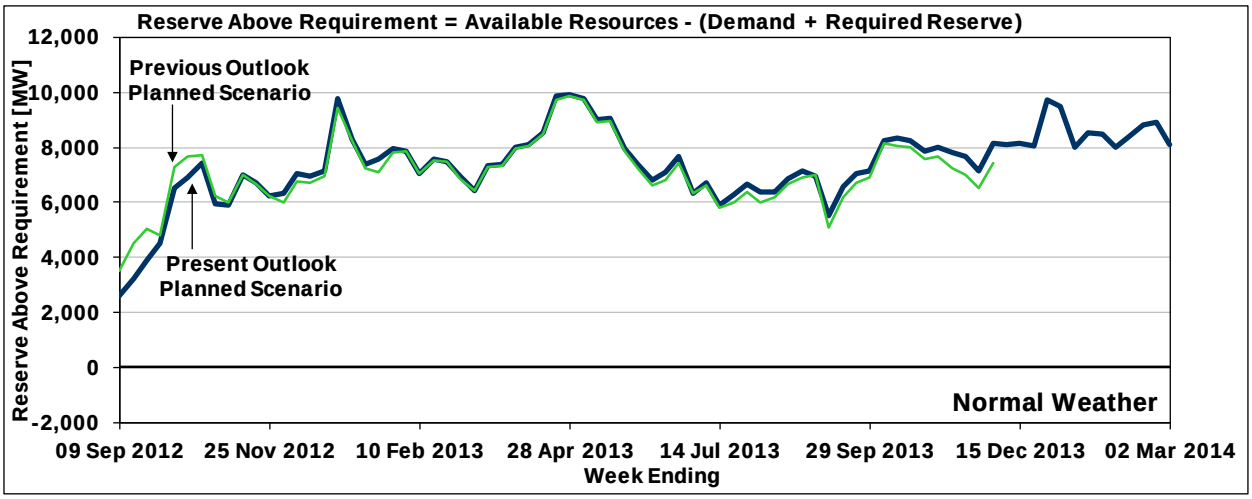
Notes to Table 4.4:

1. Installed Resources: This is the total generation capacity assumed to be installed at the time of the summer and winter peaks.
2. Imports: The amount of external capacity considered to be delivered to Ontario.
3. Total Resources: The sum of Installed Resources (line 1) and Imports (line 2).
4. Total Reductions in Resources: Represent the sum of deratings, planned outages, limitations due to transmission constraints, generation constraints due to transmission outages/limitations and allowance for capability levels below rated installed capacity.
5. Demand Measures: The amount of demand available to be reduced.
6. Available Resources: Equals Total Resources (line 3) minus Total Reductions in Resources (line 4) plus Demand Measures (line 5).

Comparison of the Weekly Adequacy Assessments for the Planned 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 June 22, 2012. 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 risks are discussed in detail in the "Methodology to Perform Long Term Assessments" (IESO_REP_0266).

- End of Section -

5 Transmission Reliability Assessment

This section provides an assessment of the reliability of the Ontario transmission system for the Outlook period. The transmission reliability assessment has three key objectives:

- Identify all major transmission and load supply projects that are planned for completion during the Outlook period and identify their reliability benefits;
- Forecast any reduction in transmission capacity brought about by specific transmission outages. For a major transmission interface or interconnection, the reduction in transmission capacity due to an outage condition can be expressed as a change in its base flow limit;
- Identify equipment outages that could require contingency planning by market participants or by the IESO. Planned transmission outages are reviewed in conjunction with major planned resource outages and the scheduled completion of new generation and transmission projects to identify reliability risks.

5.1 Transmission and Load Supply Projects

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 the 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 modest growth requiring 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 of existing transmission and provide additional supply capacity for future load growth.

5.2 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" (IESO_REP_0266).

This Outlook contains transmission outage plans submitted to the IESO as of July 4, 2012.

5.3 Transmission System Adequacy

The IESO assesses transmission adequacy on the basis of conformance to established criteria, planned system enhancements and known transmission outages. This process is also described in IESO_REP_0266. Zonal assessments are presented in the sections which follow. Overall, the Ontario transmission system is expected to be adequate to supply the demand under the normal weather conditions forecast for the Outlook period.

As a result of localized load increases, several parts of the province have been identified as having limited capability of existing transmission infrastructure to meet the IESO's load restoration criteria following a permanent transmission contingency. The IESO, OPA and Hydro One are considering long-term options to address these situations. Areas where activities are underway include York Region, Ottawa Area, and in the area supplying Woodbridge TS, Vaughan #3 TS and Kleinburg TS.

5.3.1 Toronto and Surrounding Area

The Greater Toronto Area (GTA) electricity supply is expected to be adequate to meet the normal weather forecasted demand. The OPA and Hydro One are developing cost estimates and implementation schedules for transmission enhancements planned for 2014 to manage long-term load supply in the south-western GTA. For the short term, day-to-day operating procedures are available to manage the forecasted transmission loading under high loads.

In the eastern portion of the GTA, additional transmission and 500/230 kV transformation at the new Clarington TS are scheduled for spring 2015 to maintain supply reliability beyond Pickering end-of-life. The design and location of these enhancements will also improve the supply to the loads in the Pickering, Ajax, Whitby, Oshawa and Clarington areas, and enhance the system capability to restore supply to these loads in the event of normal planning contingencies.

Hydro One is making progress in replacing 115 kV breakers at Hearn TS, Manby TS and Leaside TS. The new equipment will allow for more flexibility during day-to-day operation.

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

5.3.2 Bruce and Southwest Zones

To prevent low voltage conditions on the 115 kV transmission system in the Woodstock area during summer extreme weather conditions, Hydro One has added a new transformer station and a second supply point by extending the 230 kV transmission lines from Ingersoll to Woodstock, and installing a new 230/115 kV transformer station. These new facilities provide an increased level of supply reliability, and support further load growth in the region. In the Guelph area, the existing 115kV 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 will be proceeding with the Guelph Area Transmission Refurbishment project to reinforce the supply into Guelph-Cedar TS, with an expected completion date in the second quarter of 2016.

As part of a regional supply plan, the second 230/115 kV autotransformer is expected to be installed at Preston TS by 2015 to address the previously identified limited capability of existing transmission infrastructure in the Cambridge area to meet the IESO's load restoration criteria following a contingency.

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

5.3.3 Niagara Zone

The completion date for transmission reinforcements from the Niagara region into the Hamilton-Burlington area continues to be delayed. Completion of this project will increase the transfer capability between the Niagara region to the rest of the Ontario system.

Until the project is in service, the supply needs in Southern Ontario will continue to be met through the existing system. The failed R76 voltage regulator and the BP76 circuit are expected to return to service by the end of 2012. The bypass will remain available for use if required until the R76 voltage regulator returns.

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

5.3.4 East Zone and Ottawa Zone

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

5.3.5 West Zone

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

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

5.3.6 Northeast and Northwest Zones

To further improve the north-south transfer capability Hydro One installed shunt capacitors at Hanmer TS and Porcupine TS. The shunt capacitor at Pinard TS has a planned in-service date during this Outlook period.

Managing grid voltages in the Northwest has always required special attention. With significantly lower demands over the past few years, it has become increasingly difficult to maintain an acceptable voltage profile without compromising the reliability of supply, in particular during times of low east-west transfers.

On several occasions in the Northwest, normal dispatch actions have been exhausted, and exceptional voltage control measures, including the temporary removal of one or more transmission circuits from service, were implemented to maintain grid voltages within acceptable ranges. This reduced the grid's ability to withstand disturbances and impacted customers' supply reliability.

To reduce and eventually eliminate the dependence on the operational measures described above, additional reactive compensation is required for voltage control in this zone. Hydro One is working on the installation of new shunt reactors at Marathon and Dryden by 2014 in an effort to resolve this problem.

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 and the IESO, OPA, Hydro One, local distributors, customers and First Nations are developing a regional planning study that may allow some increase in load-serving capability.

The IESO is also working with Hydro One and OPG to accommodate the upcoming Atikokan coal shutdown and conversion project. Work includes completion of planned maintenance on other critical equipment to support the outage, and ensuring plans to manage high voltage situations are sufficient to cover the duration of the Atikokan outage.

The reduced load in the Northeast has resulted in voltages in the Timmins area which are higher than normally permitted. To help reduce the increasing dependence on the generating facilities in the Northeast to maintain voltages, Hydro One is allowing selected portions of the transmission system to operate at higher voltage levels.

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

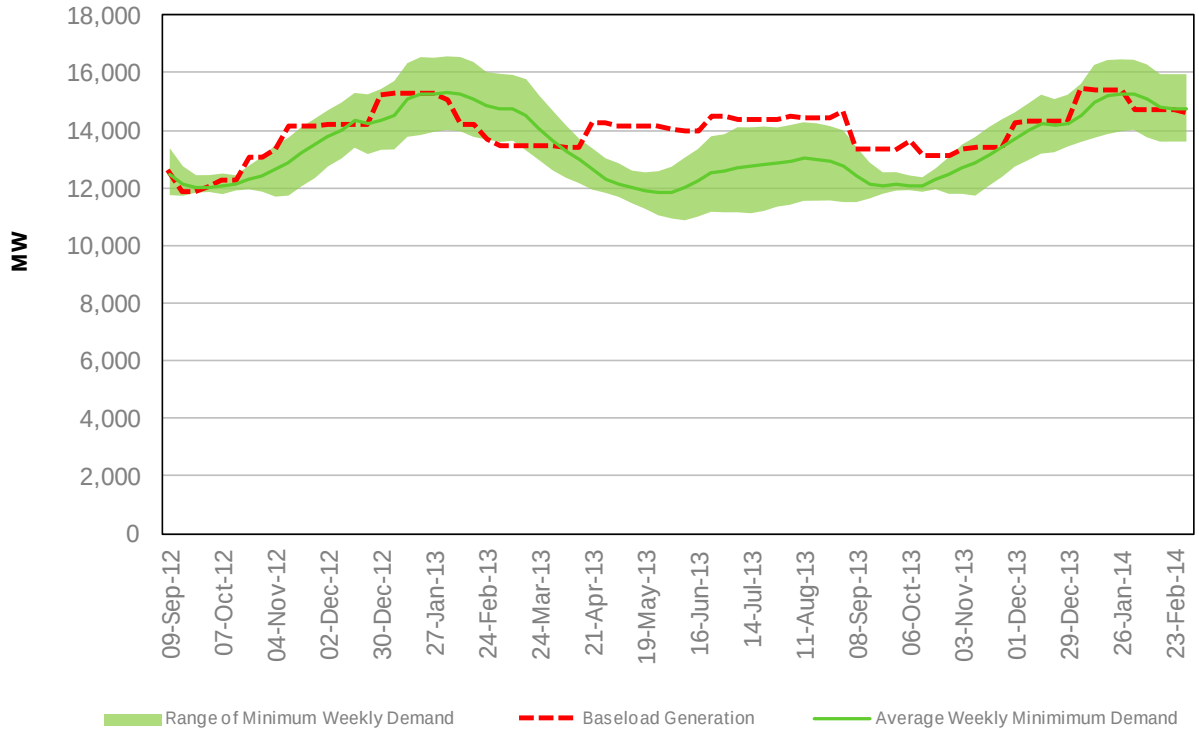
- End of Section -

6 Operability Assessment

The IESO monitors existing and emerging operability issues that could potentially impact system reliability. Over the next 18 months, Ontario expects to have a sufficient supply of electricity to meet its projected needs; however, with the addition of nuclear and variable baseload generation to the grid over the next few years combined with anticipated low off-peak electricity demands, Ontario will likely continue to experience SBG conditions.

A number of factors like low demand, high baseload resources and high winds can combine to result in situations where resources may exceed demand, making balancing generation and load more difficult such that the IESO may need to curtail low-cost dispatchable resources that otherwise would be expected to be running. How effectively the IESO can manage this going forward will depend on making full use of the flexibility of the resources in the supply mix and continued market to market transactions with neighbouring power systems.

Figure 6.1 Minimum Ontario Demand and Baseload Generation (Includes Net Export Assumption)



Baseload generation assumptions include exports[1], the latest planned outage information, market participant-submitted minimum production data, and in-service dates for new or refurbished generation.

[1] An export assumption of 1,500 MW is applied under conditions which allow Ontario's aggregate export capability to be higher than 2,600 MW. A 1,200 MW export assumption will be applied when forecast planned outages are expected to limit Ontario's aggregate export capacity to between 1,400 MW 400MW and 2,600 MW. For forecast planned outages that further limit export capacity to below 1,400 MW, an export assumption value of 700 MW will be used. See Appendix C of the 18-Month Outlook Tables for forecast reduction to major transmission interface limits, including interconnection interfaces.

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.

Since the start of 2012, out-of-market control actions were required approximately seven per cent of the time to mitigate SBG. Going forward, SBG events are expected to return with greater frequency and magnitude in the spring, summer, and fall of 2013. A lack of direct control over a number of factors that contribute to SBG, such as temperature, other weather parameters, consumption, and lack of generation and load response to market prices, poses challenges in handling SBG situations. These events will need to be managed in the short term until baseload generation begins to decline when nuclear refurbishment programs get underway later in the decade. With the forecast increase in SBG, we foresee an increase in out-of-market control actions, such as minimum hydro dispatch and nuclear maneuvers, to be required in order to manage the surplus, extending beyond the typical market action of exports. With wind and solar becoming more prominent resources on the electricity system, the need for maximum flexibility from all resources becomes integral for the reliable and efficient operation of the grid. When variable generation becomes dispatchable, additional flexibility will be available to diminish the frequency of out-of-market control actions for SBG.

The existing coal fleet, though running at vastly reduced levels from previous years, provides the IESO with desirable flexibility, such as quick ramping and operating reserve, under all market conditions. As Ontario's coal-fired generation is shut down over the next two years, its associated flexibility will be lost. Therefore, future capacity additions should also possess this flexibility to help facilitate the management of maintenance outages, provide effective ramp capability, supply of operating reserve and even provide regulation when necessary.

- End of Document -