18-MONTH OUTLOOK

UPDATE

From March 2012 to August 2013

ieso
Power to Ontario. On Demand.

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

Executive Summary

Over the next 18 months, Ontario will continue to have an adequate supply of electricity to meet consumers' needs. During that period, there will be more than 2,600 megawatts (MW) of capacity added to the grid, comprising two refurbished Bruce nuclear units with a capacity of 1,500 MW returning to service, and approximately 400 MW of gas-fired generation and more than 700 MW of grid-connected renewable generation. On the transmission side, construction of the new Bruce to Milton line is progressing well, with completion expected within 2012. The new line, with its associated supporting facilities, will accommodate the full output from all eight generating units at the Bruce complex and the new renewable resources in southwestern Ontario.

By August 2013, the total wind and solar generation connected to the transmission and distribution networks in Ontario will reach approximately 4,000 MW. The Stakeholder Engagement (SE) 91 process is currently underway to address the need to have these renewable resources incorporated into the IESO dispatch process. In addition to mitigating surplus conditions, this will help match generation to demand when consumer use quickly ramps up and down.

At the end of 2011, two more coal-fired generation units at Nanticoke were shut down, reducing Ontario's coal capacity by 980 MW to 3,504 MW. Though energy from coal in 2011 was less than three per cent of total output, at times the flexibility of coal units is beneficial. Maximum flexibility from all resources is imperative to managing operations effectively.

The ongoing weakness of the global economy will continue to impact the Ontario economy over the forecast period. Conservation initiatives and the growth in embedded generation will put downward pressure on both peak demand and energy consumption. Combined, these impacts will limit the growth in energy consumption to a modest 0.4 per cent in 2012.

Those same factors mean that peak demands will decrease over the same period. The following table summarizes the forecasted seasonal peak demand numbers.

Season	Normal Weather Peak (MW)	Extreme Weather Peak (MW)
Summer 2012	23,409	25,842
Winter 2012-13	22,263	23,437
Summer 2013	23,345	25,709

Over the past several years and continuing through this Outlook period, new sources of generation have been brought into service to meet essential future supply needs and replace coal-fired capacity. The early incorporation of this supply, which includes additions of baseload generation from nuclear and renewable sources, coupled with declining demand during off-peak periods, has spawned periods of surplus generation which will need to be

managed until baseload generation begins to decline with nuclear refurbishment programs expected later in the decade. Over the next 18 months, the growing volumes of variable generation, the return of two additional nuclear units, and the introduction of the new Bruce to Milton line are driving expectations of both an increase to the frequency and magnitude of SBG, compared to the last few years.

Decisions are required to address local area needs in Guelph, Cambridge and the southwestern GTA. The Ontario Power Authority (OPA) is currently examining solutions to ensure the Guelph and Cambridge areas will be able to meet the IESO's criteria. In addition, the OPA is examining transmission solutions available to manage load supply in the southwestern GTA. For the short-term, day-to-day operating procedures are available to manage the forecasted transmission loading, but a long-term solution is required to accommodate the future load growth net of conservation initiatives.

Conclusions & Observations

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

Demand Forecast

- A weak global economy contributed to the overall decline in electricity demand in 2011. The key economic issues – high debt and unemployment – will persist into the forecast horizon.
- Continued growth in embedded generation will offset the need for grid-supplied electricity over the 18-month time horizon.
- Conservation and time-of-use rates will have a downward impact on peak demands. The combined impact of domestic economic expansion and population growth will be mitigated to a great degree by the growth in conservation and embedded generation. The net result of these factors will be a small increase in electricity demand for 2012. Additionally, the added impact of time of use rates will act to keep peak demands fairly flat over the forecast.
- 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 scenarios.
- Bruce units 2 and 1 are expected to be complete in Q1 and Q2 of 2012 respectively.
- York Energy Centre is expected to be in service in Q1 of 2012.
- Decisions around the possible Pickering 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 OPA is examining transmission solutions available to manage load supply in the southwestern GTA. For the short-term, day-to-day operating procedures are available to manage the forecasted

transmission loading, but a long-term solution is required to accommodate the future load growth net of conservation initiatives.

- 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.
- In preparation for the planned removal from service of southern Ontario coal-fired units, Hydro One is completing the commissioning of dynamic reactive compensation at Nanticoke TS and Detweiler TS.
- 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 without compromising the reliability of the supply.
- The OPA is currently conducting an assessment of the Kitchener-Waterloo Cambridge Guelph area to recommend a solution to ensure the local area load is served reliably.
- Analysis is currently underway to determine interim and long-term transmission solutions to address the possible future shutdown of Pickering NGS.

Operability

- The IESO is continuing with plans to move to an economic dispatch of variable generation to help manage general operability issues.
- The risk of surplus conditions is likely to continue with the expected increased penetration of renewable generation projects combined with lower off-peak demand for electricity, as well as the return of two additional nuclear units and the availability of the new Bruce to Milton transmission line.
- The availability of the remaining coal fleet, although running at reduced levels from previous years, provides flexibility which is very beneficial to the reliable operation of the Ontario power system.

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1.0 Introduction

This Outlook covers the 18-month period from March 2012 to August 2013 and supersedes the last Outlook released in November 2011.

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
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- E-mail: customer.relations@ieso.ca.

- End of Section -

2.0 Updates to This Outlook

2.1 Updates to Demand Forecast

The demand forecast was based on actual demand, weather and economic data through to the end of November 2011. The demand forecast has been updated based on the most recent economic projections and data. Actual weather and demand data for December 2011 and January 2012 have been included in the tables.

2.2 Updates to Resources

Nanticoke G1 and G2 units have been shut down and their capacity removed from the installed capacity shown in Table 4.1. Greenwich Wind Farm, with a capacity of 99 MW, came into service since the previous Outlook.

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 January 24, 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 IOMS as of December 14, 2011 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 January 24, 2012. The expected contribution to baseload from variable resources such as hydroelectric and wind generation has also been updated to reflect the most recent information. Furthermore, Figure 6.1 indicates the potential SBG conditions by illustrating the range of weekly minimum demands rather than the absolute minimum weekly demand. The average weekly minimum demand is also included in the figure.

- End of Section -

3.0 Demand Forecast

The IESO is responsible for forecasting electricity demand on the IESO-controlled grid. This demand forecast covers the period March 2012 to August 2013 and supersedes the previous forecast released in November 2011. Tables of supporting information are contained in the 2012 Q1 Outlook Tables spreadsheet.

Electricity demand is expected to show only a modest increase in 2012. Continuing growth in conservation and embedded generation will offset most of the need for more electricity from an expanding economy and growing population. In fact, much of the growth in 2012 energy demand is due to the additional day in the leap year. Demand would be nearly flat without the additional day.

The global economy continues to play a large role in industrial demand within Ontario. High levels of debt and unemployment mean that economic improvement will be slow by historical standards. Industrial electricity demand has a very significant impact on both total energy consumption and minimum demand. As well, the Global Adjustment allocation methodology stimulates reductions in large users' consumption during periods of system peak demand.

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)
Summer 2012	23,409	25,842
Winter 2012-13	22,263	23,437
Summer 2013	23,345	25,859
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%

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)
11-Mar-12	20,709	21,551	437	2,864	09-Dec-12	21,541	22,484	494	2,898
18-Mar-12	19,645	20,485	752	2,775	16-Dec-12	21,560	22,602	678	2,919
25-Mar-12	19,291	20,129	714	2,737	23-Dec-12	21,868	22,840	471	2,961
01-Apr-12	18,984	19,911	816	2,641	30-Dec-12	19,967	21,640	433	2,691
08-Apr-12	18,745	19,802	649	2,613	06-Jan-13	21,448	23,084	696	2,869
15-Apr-12	18,150	19,065	378	2,563	13-Jan-13	22,263	23,301	736	3,021
22-Apr-12	17,755	18,759	399	2,500	20-Jan-13	22,143	23,437	635	3,034
29-Apr-12	17,372	18,703	421	2,500	27-Jan-13	22,011	22,983	630	2,995
06-May-12	17,378	20,260	597	2,469	03-Feb-13	21,912	22,977	646	2,989
13-May-12	17,862	20,818	630	2,472	10-Feb-13	22,051	22,798	585	3,013
20-May-12	17,856	20,458	668	2,451	17-Feb-13	21,464	22,673	650	2,969
27-May-12	19,015	22,634	1,080	2,430	24-Feb-13	21,073	22,456	546	2,863
03-Jun-12	19,038	23,403	1,577	2,526	03-Mar-13	20,842	22,367	540	2,903
10-Jun-12	19,777	23,464	1,394	2,598	10-Mar-13	20,984	21,851	461	2,879
17-Jun-12	20,601	24,517	1,592	2,678	17-Mar-13	19,978	20,824	493	2,816
24-Jun-12	22,205	25,017	874	2,688	24-Mar-13	19,669	20,614	655	2,773
01-Jul-12	22,769	24,962	989	2,798	31-Mar-13	19,031	20,109	509	2,620
08-Jul-12	22,709	24,625	875	2,758	07-Apr-13	18,948	20,308	510	2,657
15-Jul-12	23,409	25,842	937	2,837	14-Apr-13	18,390	19,310	477	2,601
22-Jul-12	23,406	25,066	1,045	2,861	21-Apr-13	17,995	18,976	481	2,538
29-Jul-12	23,008	25,230	776	2,742	28-Apr-13	17,611	18,839	535	2,522
05-Aug-12	23,120	25,467	1,172	2,851	05-May-13	17,498	20,406	586	2,469
12-Aug-12	22,533	25,306	1,255	2,794	12-May-13	17,870	21,029	830	2,483
19-Aug-12	22,387	24,534	992	2,799	19-May-13	18,053	20,668	782	2,453
26-Aug-12	21,974	24,636	1,007	2,756	26-May-13	19,419	23,153	883	2,441
02-Sep-12	21,747	24,750	1,253	2,767	02-Jun-13	19,612	22,623	1,508	2,530
09-Sep-12	20,954	23,522	1,609	2,646	09-Jun-13	20,182	23,700	1,502	2,606
16-Sep-12	19,412	22,968	1,508	2,572	16-Jun-13	21,209	24,748	1,507	2,689
23-Sep-12	19,463	21,607	824	2,519	23-Jun-13	21,316	25,249	980	2,702
30-Sep-12	19,131	20,382	535	2,535	30-Jun-13	22,785	25,164	963	2,815
07-Oct-12	18,063	18,725	750	2,506	07-Jul-13	22,732	24,906	1,012	2,712
14-Oct-12	17,731	18,716	718	2,475	14-Jul-13	23,345	25,859	1,061	2,836
21-Oct-12	17,883	18,429	627	2,530	21-Jul-13	23,295	25,122	1,001	2,830
28-Oct-12	18,521	18,958	699	2,556	28-Jul-13	22,809	24,825	959	2,778
04-Nov-12	18,501	19,731	770	2,562	04-Aug-13	22,991	24,999	1,200	2,835
11-Nov-12	19,595	19,985	569	2,651	11-Aug-13	22,652	25,796	1,154	2,844
18-Nov-12	19,904	20,644	432	2,714	18-Aug-13	22,111	24,608	1,097	2,807
25-Nov-12	20,360	20,977	485	2,771	25-Aug-13	21,973	24,550	1,045	2,798
02-Dec-12	20,780	21,519	500	2,815	01-Sep-13	21,773	24,613	1,311	2,797

3.1 Actual Weather and Demand

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

November

- November was a very mild month with temperatures 2 to 4°C higher than normal across the province. Depending on location, it was the warmest November since 2001 or 2009. Weather-corrected energy demand was 11.6 terawatt hours (TWh), or 11.1 TWh actual, which was a slight increase from 2010. The monthly peak was 19,673 MW and occurred on November 29, which was not even the coldest day of the month. This peak day was much milder than normal leading

to a weather-corrected peak of 21,000 MW. Actual energy demand was only marginally higher than the all-time low of November 2009.

- Wholesale customers' consumption continued to drop in November 2011 compared to the previous year. Their consumption was 2.5% lower than the previous November.

December

- December was milder than normal with temperatures the highest since 2006, which was the mildest December experienced. The result was monthly actual demand of 12.1 TWh (12.4 TWh weather-corrected) which was the lowest December numbers since market opening. The peak demand was 20,204 MW (20,749 MW weather-corrected) and occurred on December 20.
- Wholesale customers' consumption ended the year losing 3.1% over the previous December. For the year wholesale customers' consumption was 0.5% lower than in 2010.

January

- January was much milder than normal. For most locations it was the warmest it had been since January 2006 when most recent records were set for the province. Actual energy demand for the month was 12.7 TWh (13.1 TWh weather-corrected), the lowest monthly value since 1995. The actual peak for the month was 21,847 MW and occurred on January 3 which was the coldest day and just slightly warmer than normal (weather-corrected peak was 22,144 MW).
- Wholesale customers' consumption started the year as it ended the last one, on a negative note. Consumption was down 2.1% over the previous January.

For 2011, demand only showed year over year increases in four of the twelve months. On-going global economic issues will continue to impact Ontario throughout 2012, leading to almost no increase in demand.

The 2012 Q1 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

As mentioned earlier the global economy is dogged with excess debt and unemployment. Despite several years of stimulus, those two issues remain. Both debt and unemployment can be brought down but neither will be reduced quickly. Therefore these issues will continue to impact energy consumption throughout the forecast. Canada has generally good economic fundamentals – but consumer confidence has been weak with the overall negative environment. As a trade-based nation, the high Canadian dollar will limit export opportunities and if domestic consumers are being careful with their money, Ontario's growth will be subdued. The biggest and quickest short-term boost to general economic conditions will have to come from domestic consumption and/or business investment. To date, consumers and businesses have been reluctant to spend until the current economic situation improves.

- Table 3.3.4 of the 2012 Q1 Outlook Tables spreadsheet 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 Q1 Outlook Tables spreadsheet 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.

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 -

4.0 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 surpluses of reserves to a large extent.

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

In addition to approximately 700 MW of new renewable supply, the York Region Energy Centre and the Bruce G1 and G2 units are also scheduled to come into service over the Outlook period. These new supply projects are currently at various stages of their construction.

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 January 25, 2012

Fuel Type	Total Installed Capacity (MW)	Forecast Capability at Summer Peak* (MW)	Number of Stations	Change in Installed Capacity (MW)	Change in Stations
Nuclear	11,446	10,558	5	0	0
Hydroelectric	7,947	5,694	71	0	0
Coal	3,504	3,387	4	-980	0
Oil / Gas	9,549	8,556	28	0	0
Wind	1,511	202	12	99	1
Biomass / Landfill Gas	122	41	6	0	0
Total	34,079	28,438	126	-881	1

* 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 2	Bruce	Uranium	2012-Q1		Construction	750	750
Comber Wind Limited Partnership	West	Wind	2012-Q1		Commissioning	166	166
Pointe Aux Roches Wind	West	Wind	2012-Q1		Commissioning	49	49
York Energy Centre	Toronto	Gas	2012-Q1		Commissioning	393	393
Bruce Unit 1	Bruce	Uranium	2012-Q2		Construction		750
Conestogo Wind Energy Centre 1	Southwest	Wind	2012-Q4		pre-NTP		69
Leamington Pollution Control Plant	West	Oil	2012-Q4		Construction		2
Thunder Bay Condensing Turbine Project	Northwest	Biomass	2013-Q1		Construction		40
Port Dover and Nanticoke Wind Project	Southwest	Wind	2013-Q1		pre-NTP		105
Dufferin Wind Farm (formerly Farm Owned Power Melancthon Ltd)	Essa	Wind	2013-Q1		pre-NTP		100
McLean's Mountain Wind Farm	Northeast	Wind	2013-Q1		pre-NTP		60
Summerhaven Wind Energy Centre	Southwest	Wind	2013-Q1		pre-NTP		125
Total						**1,357**	**2,608**

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 2011. 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.

- 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%.

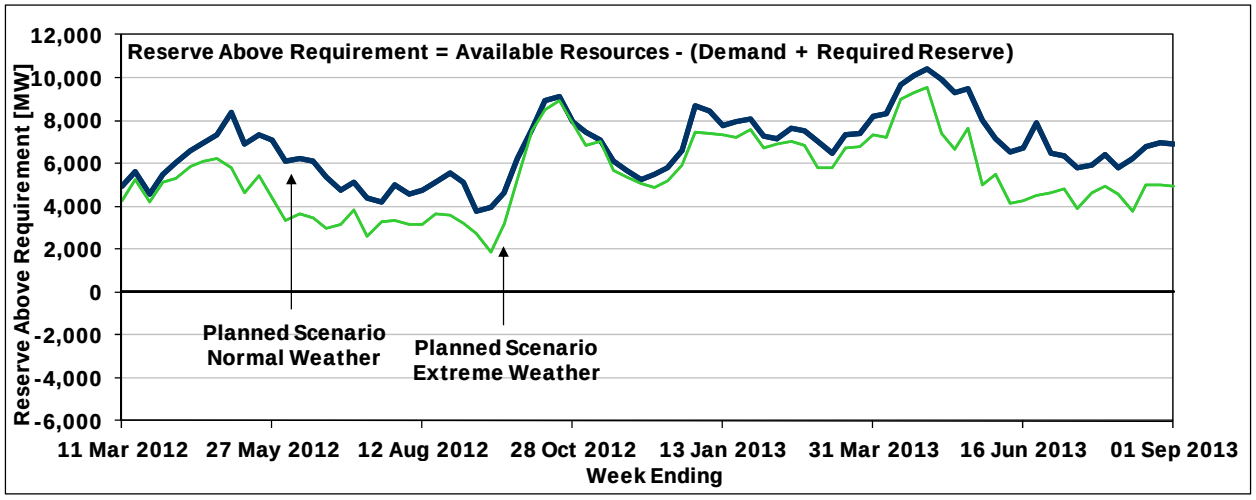
Table 4.3 Summary of Scenario Assumptions

Assumptions		Planned Scenario	Firm Scenario
Resource	Existing Installed Resources	Total Capacity	Total Capacity
		34,079	34,079
	New Generation and Capacity Changes	All	Generator shutdowns or retirements, Commissioning Generators and Generators starting in the first 3 months
		2,608	1,357
Demand Forecast	Conservation	Incremental	
		Incremental growth of 85 MW on summer peak	
	Embedded Generation	Incremental	
		Incremental growth of 70 MW on summer peak	
	Demand Measures	Incremental	Existing
		1,330	1,168

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.

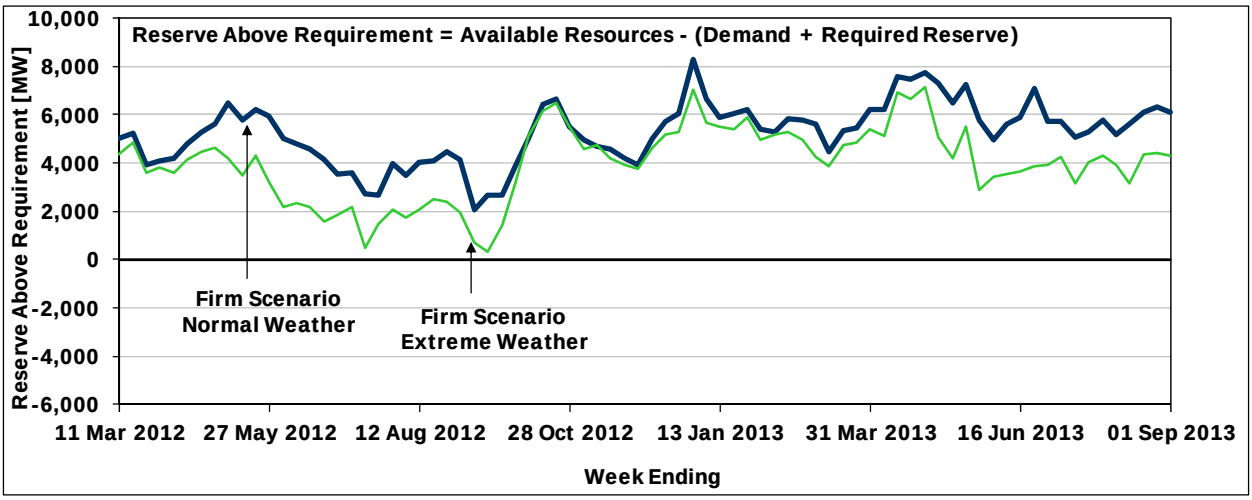
Figure 4.1 Reserve Above Requirement: Planned Scenario with Normal vs. Extreme Weather



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 Q1 Outlook Tables Appendix A, Table A7.

Table 4.4 Summary of Available Resources

Notes	Description	Summer Peak 2012		Winter Peak 2013		Summer Peak 2013	
		Firm Scenario	Planned Scenario	Firm Scenario	Planned Scenario	Firm Scenario	Planned Scenario
1	Installed Resources (MW)	35,436	36,186	35,436	36,257	35,436	36,687
2	Imports (MW)	0	0	0	0	0	0
3	Total Resources (MW)	35,436	36,186	35,436	36,257	35,436	36,687
4	Total Reductions in Resources (MW)	7,454	6,568	5,228	4,339	4,958	5,622
5	Demand Measures (MW)	1,163	1,326	1,163	1,326	1,163	1,326
6	Available Resources (MW)	29,145	30,944	31,371	33,243	31,641	32,390

Notes to Table 4.4:

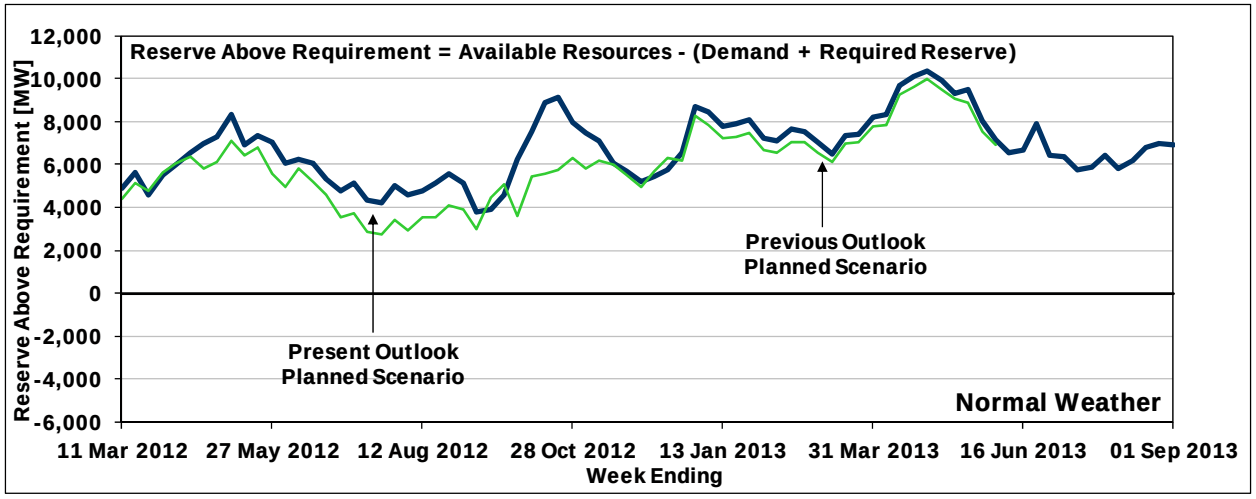
1. Installed Resources: This is the total generation capacity assumed to be installed at the time of the summer and winter peaks.
2. Imports: The amount of external capacity considered to be delivered to Ontario.
3. Total Resources: The sum of Installed Resources (line 1) and Imports (line 2).
4. Total 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 November 24, 2011. The difference is mainly due to the changes to outages, and the change 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 -

5.0 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 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 December 14, 2011.

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.

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 is examining transmission solutions available to manage load supply in the southwestern GTA, where the IESO's planning criteria are currently just being met. For the short-term,

day-to-day operating procedures are available to manage the forecasted transmission loading under high loads, but a long-term solution is required to accommodate the future load growth net of conservation initiatives.

In York Region, the York Energy Centre is scheduled to come into service in the first quarter of 2012 and will enhance supply to the area. To provide for future load growth in the area, the OPA is working with affected stakeholders to re-assess the long-term needs and to develop a regional supply plan.

In the eastern portion of the GTA, additional transformation capacity will be required to maintain supply reliability beyond Pickering end-of-life. The design and location of these enhancements must also improve the supply to the loads in the Pickering, Ajax, Whitby, Oshawa and Clarington areas, and enhance the system capacity to restore supply to these loads in the event of normal planning contingencies.

Planned outages in Toronto and vicinity may result in some transfer capability reductions of the transmission circuits, but are not expected to have any impact on the load supply in this area.

5.3.2 Bruce and Southwest Zones

Planned refurbishments at the Bruce A generating station and new wind power resources in southwestern Ontario will increase generation capacity in the Bruce and Southwest zones. The interim transmission reinforcements required to accommodate the extra generation are on schedule, with the installation of dynamic voltage control facilities at Nanticoke and Detweiler and modifications to the existing Bruce special protection system anticipated to be completed during this Outlook period.

Additionally, the planned 500 kV line from Bruce to Milton, expected in service in 2012, will provide the required transmission capability to deliver the full benefits of the Bruce refurbishment project and the development of new renewable resources in southwestern Ontario. The work will continue during this Outlook period with some outages having the potential to temporarily reduce the transfer capability out of the Bruce zone. Hydro One and the affected parties are implementing an outage plan designed to minimize the overall impact of these outages.

To prevent low voltage conditions in the 115 kV transmission system in the Woodstock area during summer extreme weather conditions, Hydro One is planning to add a new transformer station and a second supply point by extending the 230 kV transmission lines from Ingersoll to the Woodstock area and installing a new 230/115 kV transformer station. These plans, scheduled to be completed in 2012, will provide an increased level of supply reliability, and support further load growth in the area.

Planned outages in the Southwest zone may result in some transfer capability reductions of the transmission circuits but are not expected to have any impact on the load supply in this area.

In the Guelph area, the existing 115kV transmission facilities are operating close to capacity and have limited margin to accommodate additional load. A combined effort by the OPA, Hydro One, the affected distributors and the IESO is expected to determine the preferred solution for enhancing the overall supply capability to this area.

As part of a regional supply plan, the OPA, Hydro One and the IESO are examining solutions to address the previously identified inability of existing transmission infrastructure in the Cambridge area to meet the IESO's load restoration criteria following a contingency.

5.3.3 Niagara Zone

The completion date for transmission reinforcements from the Niagara region into the Hamilton-Burlington area continues to be delayed. Upon completion, the project will increase the capability of the grid so that it will operate more efficiently by avoiding constraints. There are system benefits from the project and it will be needed in the future, as the supply mix changes. Until the project is in service, the supply needs in Southern Ontario will continue to be met through the existing system.

The planned outages in the Niagara zone may result in some transfer capability reductions of the transmission circuits but are not expected to have any impact on the load supply in this area.

The failed R76 voltage regulator and the BP76 circuit are expected to return to service by the end of 2012. The bypass constructed in Q4 of 2010 will remain available for use if required until the R76 voltage regulator returns.

5.3.4 East Zone and Ottawa Zone

The planned outages in the East and Ottawa zones may result in some transfer capability reductions of the transmission interfaces and are not expected to have any impact on the load supply in this area.

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.

The planned outages in the West zone may result in some transfer capability reductions of the transmission interfaces and are not expected to have any impact on the load supply in this area.

Phase angle regulators (PARs) are installed on the Ontario-Michigan interconnection at Lambton TS on the Ontario side and at Bunce Creek TS in Michigan, representing three of the four interconnections with Michigan. These will become operational following final regulatory approval. The operation of these PARs along with the PAR on the Ontario-Michigan interconnection near Windsor will control flows to a limited extent, and assist in the management of system congestion.

5.3.6 Northeast and Northwest Zones

To further improve the north-south transfer capability Hydro One will install static reactive compensation facilities at Hanmer TS, Porcupine TS and Pinard TS with 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 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. The IESO is working with Hydro One, and the OPA, in an effort to examine solutions to this problem.

The reduced load in the Northeast has resulted in higher than acceptable voltages in the Timmins area. While the SVC at Porcupine TS helps, additional facilities may be required to help reduce the increasing

dependence on the generating facilities in the Northeast to maintain voltages. Ongoing discussions between IESO, OPA and Hydro One will address the high voltage condition.

The planned outages in the Northeast and Northwest zones may result in some transfer capability reductions of the transmission interfaces but are not expected to have any impact on the load supply 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 and the IESO, OPA, Hydro One, local distributors and customers are working towards changes that may allow some increase in load-serving capability.

- End of Section -

6.0 Operability Assessment

The IESO monitors existing and emerging operability issues that could potentially impact system reliability. Although instances of surplus baseload generation (SBG) have lessened over this past quarter, SBG remains an ongoing concern for the IESO.

A low demand period with heavy winds, during freshet, with neighbours either unwilling or unable to take our exports, may lead to a nuclear unit shutdown, which in turn would cause that generation to be unavailable for 48 to 72 hours. Should that nuclear capability be required for system adequacy during the period it is unavailable, there would be an adverse impact on reliability. However, a similar low demand period with no wind and a strong ability to export could require no mitigating actions.

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

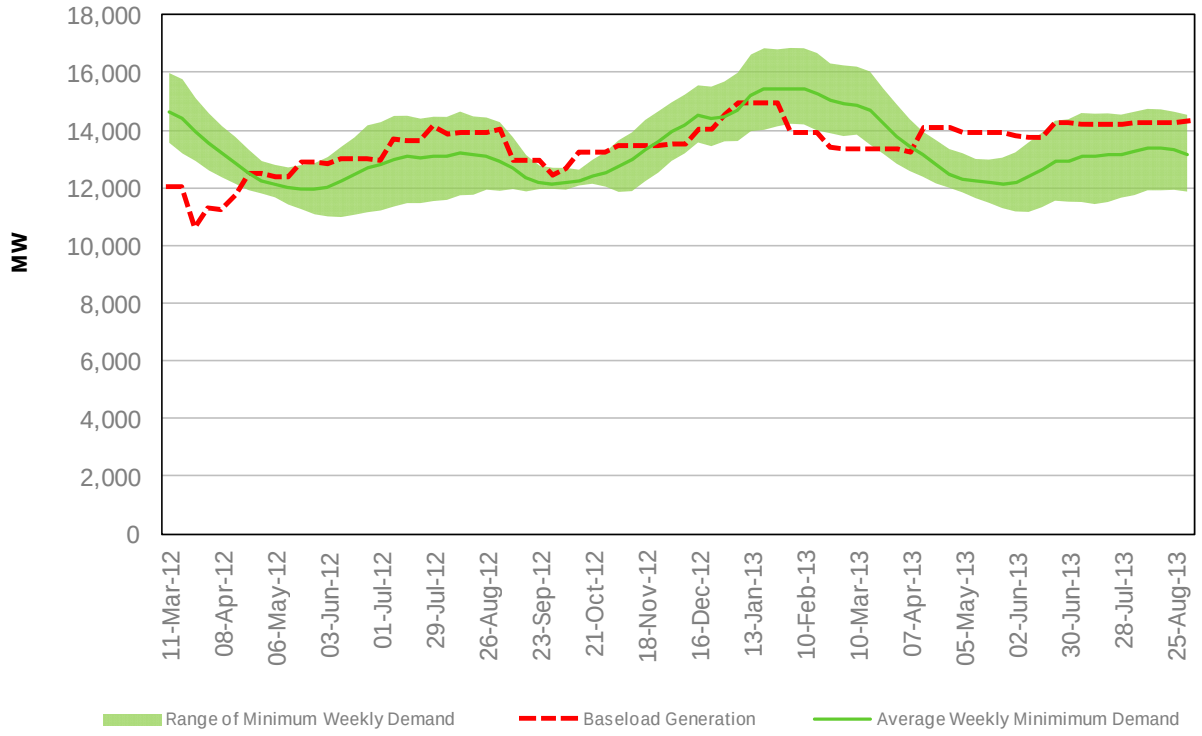


Figure 6.1 Baseload generation assumptions include exports[1], the latest planned outage information, market participant-submitted minimum production data, and in-service dates for new or refurbished generation. The expected contribution from self-scheduling and intermittent generation has also been 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.

[11] 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. The 1,200 MW export assumption will be applied when forecast planned outages are expected to limit Ontario's aggregate export capacity to between 1,400MW 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.

Over 2011, out of market control actions were required approximately 5% of the time to mitigate SBG; additionally, a nuclear unit was removed from service on three instances to alleviate SBG conditions. Additions of baseload generation from nuclear and renewable sources combined with declining off-peak demands are expected to increase the frequency and magnitude of SBG events beginning in the late spring of 2012 and persisting through the summer.

With the forecast increase in SBG, some out of market control actions are expected to be required in order to manage the surplus, extending beyond the typical market actions which include exports, minimum hydro dispatch and nuclear maneuvers.

A lack of direct control over a number of factors that contribute to SBG, such as temperature, other weather parameters, consumption and market behaviour, poses challenges in managing SBG situations. In previous years, surplus conditions have been successfully managed with the actions available to the IESO. With wind and solar becoming more prominent resources on our system, the need for maximum flexibility from all resources becomes integral for the reliable and efficient operation of the grid. The IESO will continue to examine and pursue the ability to dispatch these resources to manage SBG conditions which are not expected to diminish until beyond the middle of the decade.

The retirement of two Nanticoke units during the past quarter not only removed 980 MW of installed capacity from our system but also removed the associated flexibility. The existing coal fleet, though running at vastly reduced levels from previous years, provides the IESO with desirable flexibility, under all operating conditions, from low load SBG to high peak periods. Units with flexible dispatch facilitate the management of maintenance outages, provide effective ramp capability and can even provide regulation, when necessary. These characteristics are important and are desired in new capacity. With the changes to gas-fired generation projects in the GTA, and until the future of the Pickering Nuclear station is determined, decisions must be made over the next 18 months to ensure adequate supply beyond the middle of the decade.

- End of Document -