18-MONTH OUTLOOK

UPDATE

From March 2010 to August 2011

ieso
Power to Ontario. On Demand.

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

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Executive Summary

Nearly 2,600 megawatts (MW) of new and refurbished supply is scheduled to come into service over the next 18 months, contributing to a positive outlook for the reliability of Ontario's electricity system.

Comprising a mix of wind, water, nuclear, gas and biomass projects, most of the new supply projects are well under construction or in commissioning stages. When complete, these new projects will supply load centres across the province, and displace more carbon-intensive fuel sources.

The current schedule calls for the return to service of two refurbished nuclear units at the Bruce Power plant in the first and third quarters of 2011. This will increase Ontario's electricity supply options, but some of this supply will be constrained until the Bruce-to-Milton transmission line is completed, along with other transmission enhancements.

The early shutdown of four coal-fired units – two units at Lambton and two units at Nanticoke for a reduction of 2,000 MW of generating capacity – is planned for late 2010. Output from these units has already been subject to constraints related to transmission congestion and emissions restrictions, and their shutdown in late 2010 will have no undue impacts on energy adequacy or reliability in Ontario.

As expected, minimum demand levels have increased over the winter period due to overnight heating load. This has led to fewer instances of surplus baseload generation (SBG) over the past few months. Heading into spring 2010, SBG will continue to be moderated in spite of lower minimum demand as a result of scheduled planned outages to baseload generation. As this generation returns to service to meet the summer peak, surplus conditions are expected to increase and persist into the fall season. In November and December 2010, planned outages to the PA301 and PA302 circuits are being assessed in conjunction with the ongoing forced outage on the BP76 circuit – all of which are on the Ontario – New York interconnection at Niagara. If scheduled, these outages will significantly impact Ontario's ability to export power, and increase the likelihood of nuclear reductions and hydroelectric spill conditions during periods of low demand.

Demand growth over the last decade has resulted in some area loads reaching or exceeding the capability of the local transmission system. Responding to those circumstances, several local load supply improvement projects will come in service over the next 18 months to relieve loadings of existing transmission infrastructure and provide additional capacity for future load growth.

Managing grid voltages in the Northwest has always required special attention, but with the significantly lower demand, it has been increasingly difficult to maintain an acceptable voltage profile. The replacement of the failed synchronous condenser at Lakehead TS with a new static VAR compensator (SVC) has improved local supply reliability, but additional reactive compensation is still required for voltage control elsewhere in the region.

In spring 2010, major planned outages in the GTA area are scheduled to commence during a period of low demand. During these outages the loading of the 500/230 kV autotransformers at Trafalgar, Claireville and Cherrywood is expected to increase.

Overall, electricity demand will continue to be impacted by three main factors: the economy, conservation and embedded generation. The economic recovery has had little effect on demand as both Canadian and U.S. growth remains low and the high dollar hampers Ontario's export prospects. The growth in both conservation and embedded generation are reducing the need for grid-supplied electricity.

Energy demand is expected to show very modest growth in 2010 and 2011 with annual increases of 0.2% and 0.9% respectively. The growth will be driven by increased activity in the manufacturing sector. Industrial demand will not return to pre-recessionary levels over the forecast period but will pick up from the depths of 2009. Peak demands are expected to decline as a result of targeted conservation and the deployment of smart meters and time-of-use rates for residential and small business customers. The following table summarizes the key demand numbers.

Season	Normal Weather Peak (MW)	Extreme Weather Peak (MW)
Summer 2010	23,556	25,756
Winter 2010-11	22,379	23,454
Summer 2011	23,356	25,556

Conclusions & Observations

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

Demand Forecast

- After a sharp decline in 2009, electricity demand is expected to experience slight increases in 2010 and 2011. Growth will be slow as Ontario's energy-intense export-based industries contend with weak demand and a high dollar.
- Unlike energy demands, peak demands are expected to decline throughout the forecast. Conservation programs targeting peak demand, the growth in embedded generation and time of use rates will more than offset the increases due to population and building stock growth.
- Lower peak demand levels will act to enhance system reliability. Although high peak demands are likely under extreme weather conditions they should not pose any province-wide reliability concerns.
- Low minimum demand periods remain a concern which will persist throughout the forecast. The lower minimum demand levels can have operational impacts as they increase the likelihood of surplus baseload generation.

Resource Adequacy

- Reserve requirements are expected to be met for all weeks in the normal weather scenario.
- A number of generating units are scheduled to return to service from planned outage before summer. It is important that accurate planned outage information be made available to assess reliability.
- For many weeks of the Outlook period, reductions in generation outage assumptions are contributing to a higher reserve above requirement than reported in the previous outlook.
- Plans to shutdown four coal generation units by late 2010 will continue as announced. Similarly, plans for the return to service of two refurbished Bruce nuclear units in 2011 remain unchanged.
- This Outlook demonstrates that the initial emission limits from coal-powered generation should be achievable over the next 18 month period without impacting on reliability, although the complete strategy to achieve reductions for 2010 onwards has not been confirmed.

	Normal Weather Scenario	Extreme Weather Scenario
Planned Scenario	• Reserves are higher than required for all weeks.	• There are 7 weeks where reserves are lower than required.
Firm Scenario	• Reserves are higher than required for all weeks.	• There are 10 weeks where reserves are lower than required.

- Under the extreme weather scenario, periods where the forecast reserves are not sufficient to meet requirements may result in reliance on imports, the rejection of planned outages by the IESO, or the use of emergency operating procedures.

Transmission Adequacy

- The Ontario transmission system with the planned system enhancements and scheduled maintenance outages is expected to be adequate to supply the demand under the normal weather conditions forecast for the Outlook period**.**
- The supply reliability under extreme weather conditions, in particular to the GTA, will be further improved with the addition of the Halton Hills Generating Station. For the duration of major planned outages scheduled for spring 2010 to commence during a period of low demand, the loading of the 500/230 kV autotransformers at Trafalgar, Claireville and Cherrywood are expected to increase. Under extreme weather conditions some load reduction measures might be required during this outage period. The long term de-rate currently on a Trafalgar autotransformer aggravates this situation. Outages which aggravate this situation will be at risk of cancellation by the IESO.
- Several projects relating to local load supply improvements will be placed in service during the timeframe of this Outlook to help relieve loadings of existing transformer stations and provide additional transformer capacity for future load growth.
- The 230 kV circuit BP76 forms an integral part of the Ontario - New York interface at Niagara Falls. Due to the variable nature of its flows, this interface is one of the most challenging to manage in the Eastern Interconnection, keeping system operators around the Great Lakes, which include the IESO, NYISO, PJM and MISO, fully engaged. The ongoing forced outage of the BP76 interconnection has compounded the complexities of these reliability coordination efforts, added to Ontario's surplus baseload generation (SBG) events and has materially led to increased nuclear reductions and hydroelectric spill conditions over the last year. Planned outages of two other lines of the Niagara interconnection (PA301 and PA 302) are currently being assessed during the period from November to December 2010. These outages have the potential to reduce the transfer capability of the Niagara interconnection to zero and significantly impact the Ontario to Michigan transfers.
- Transmission outages scheduled in this Outlook period in the East, Northwest, Southwest, Toronto and West zones will result in small reductions to the grid transfer capability for periods of time. The resulting limit reductions along with the increase of available generation in those areas may result in temporarily bottled generation capacity.
- Transmission constraints over the 230 kV Sarnia/Windsor to London area may limit the ability to utilize the generation resources in southwestern Ontario in conjunction with imports from Michigan. This congestion could further increase as a result of transmission outages and weather conditions. The scheduled shutdown of two Lambton GS units in October 2010 is expected to reduce the congestion over the remainder of this Outlook period. Hydro One is currently installing additional reactive compensation in western and southwestern Ontario in preparation for the planned shutdown of the major southern Ontario coal-fired units.
- Managing grid voltages in the Northwest has always required special attention, but with the significantly lower demand, it has been increasingly difficult to maintain an acceptable voltage profile without compromising the security and reliability of the supply. The

replacement of the failed synchronous condenser at Lakehead TS with a new static VAR compensator (SVC) has improved the situation in that immediate area, but there is still a need for additional reactive compensation for voltage control in the remainder of the Northwest.

- Hydro One's plan to enhance the existing Mississagi TS and Algoma TS generation rejection schemes scheduled for completion in the first quarter of 2011 will improve the power transfer capability of the transmission corridor east of Mississagi and reduce the bottling of resources west of Mississagi.
- Retirement of the Northeast 25 Hz system is expected to be complete before the end of the second quarter in 2010. These are the last 25 Hz facilities operating in the province.

Operability

- SBG conditions are expected in summer 2010 and 2011.
- In November and December 2010, scheduled outages on the Ontario – New York interconnection at Niagara will impact Ontario's ability to export power, and increase the risk of SBG.

- End of Section -

Caution and Disclaimer

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1.0 Introduction

This Outlook covers the 18-month period from March 2010 to August 2011 and supersedes the last Outlook released in November 2009.

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.

The reader should be aware that Security and Adequacy Assessments are published on the IESO web site on a weekly and daily basis that progressively supersedes information presented in this report.

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

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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 December 2009. The economic outlook has been updated based on the most recent data. Actual weather and demand data for January has been included in the tables.

2.2 Updates to Resources

Installed capacity has increased by 20 MW as a result of the following changes:

- Cameron Falls runner upgrade (+3 MW)
- East Winsor Cogeneration generating capability increase (+17 MW).

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 February 9, 2010.

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 28, 2009 were used, while the latest update to the BP76 forced outage as of February 11, 2010 was also reflected in this Outlook.

2.4 Updates to Operability Outlook

A forecast of surplus baseload generation (SBG) conditions for the next 18 months has been updated with submitted generation outage plans as of February 9, 2010. The expected contribution to baseload from variable resources such as hydroelectric and wind generation has also been updated to reflect the most recent information.

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3.0 Demand Forecast

The IESO is responsible for forecasting electricity demand on the IESO-controlled grid. This demand forecast covers the period March 2010 to August 2011 and supersedes the previous forecast released November 2009. Tables containing supporting information are contained in the 2010 Q1 Outlook Tables spreadsheet.

Electricity demand is expected to show a slight increase over the forecast horizon as the Ontario economy slowly picks up steam in 2010-11. Although industrial demand is not expected to reach pre-recession levels during the forecast horizon, it will show improvement over the lows experienced in 2009. The high dollar and modest economic growth – both in Canada and the U.S. – will lead to only small increases in industrial production.

Unlike energy demand, peak demands are expected to decline over the forecast horizon. Conservation programs, the growth in embedded generation and time of use rates will act to reduce 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 2010	23,556	25,756
Winter 2010-11	22,379	23,454
Summer 2011	23,356	25,556
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 (Forecast)	141.1	0.5%
2011 Energy (Forecast)	141.9	0.6%

Forecast Details

The following table shows the weekly peak and energy demands for the system. Additional tables in the 2010 Q1 Outlook Tables spreadsheet contain detailed forecast information. The spreadsheet contains information on the following topics:

- details on the demand forecast,
- analysis of historical demand,
- discussion on the impact of the drivers affecting demand.

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)
07-Mar-10	21,309	22,156	403	2,870	05-Dec-10	21,166	22,893	762	2,785
14-Mar-10	20,598	22,498	830	2,840	12-Dec-10	21,835	23,188	585	2,860
21-Mar-10	20,326	22,126	699	2,799	19-Dec-10	21,890	23,076	351	2,857
28-Mar-10	19,682	21,507	804	2,735	26-Dec-10	20,501	21,833	571	2,774
04-Apr-10	18,830	20,919	879	2,561	02-Jan-11	20,931	22,182	471	2,768
11-Apr-10	18,771	20,130	768	2,594	09-Jan-11	21,838	22,898	387	2,951
18-Apr-10	18,311	19,671	820	2,553	16-Jan-11	21,824	22,879	555	2,977
25-Apr-10	18,395	21,527	500	2,503	23-Jan-11	22,379	23,399	432	3,040
02-May-10	17,721	21,383	627	2,464	30-Jan-11	22,165	23,352	414	3,008
09-May-10	17,639	20,997	787	2,468	06-Feb-11	22,350	23,454	443	3,025
16-May-10	17,848	21,448	350	2,440	13-Feb-11	21,692	22,992	587	2,976
23-May-10	18,575	21,376	1,365	2,477	20-Feb-11	21,654	22,745	413	2,955
30-May-10	18,844	22,092	1,393	2,433	27-Feb-11	21,295	22,518	430	2,925
06-Jun-10	19,787	24,254	1,491	2,541	06-Mar-11	20,920	21,791	415	2,892
13-Jun-10	20,020	23,061	1,320	2,533	13-Mar-11	20,387	22,171	764	2,845
20-Jun-10	21,580	23,985	1,113	2,642	20-Mar-11	20,094	22,051	907	2,821
27-Jun-10	22,475	24,878	1,163	2,682	27-Mar-11	19,520	21,406	914	2,757
04-Jul-10	21,794	24,361	1,398	2,643	03-Apr-11	18,909	20,657	986	2,626
11-Jul-10	22,483	24,144	856	2,768	10-Apr-11	18,582	19,998	872	2,615
18-Jul-10	22,968	24,837	1,097	2,753	17-Apr-11	18,116	19,446	789	2,567
25-Jul-10	23,556	25,756	1,283	2,858	24-Apr-11	17,865	21,455	949	2,483
01-Aug-10	22,868	24,937	927	2,795	01-May-11	17,449	21,367	870	2,485
08-Aug-10	21,812	24,635	988	2,735	08-May-11	17,393	20,727	855	2,483
15-Aug-10	22,931	25,664	1,009	2,768	15-May-11	17,756	21,211	355	2,451
22-Aug-10	22,580	25,047	979	2,742	22-May-11	18,369	21,171	1,365	2,497
29-Aug-10	21,727	24,350	842	2,701	29-May-11	18,513	21,814	1,454	2,447
05-Sep-10	21,634	24,386	1,149	2,691	05-Jun-11	19,604	24,039	1,364	2,564
12-Sep-10	20,779	24,841	1,491	2,566	12-Jun-11	19,535	22,729	1,341	2,535
19-Sep-10	20,034	24,465	1,419	2,529	19-Jun-11	21,038	23,464	1,090	2,645
26-Sep-10	19,002	23,720	1,305	2,506	26-Jun-11	22,246	24,631	1,205	2,686
03-Oct-10	18,364	22,447	1,071	2,473	03-Jul-11	21,702	24,274	1,421	2,673
10-Oct-10	18,297	22,652	635	2,525	10-Jul-11	22,213	23,925	886	2,792
17-Oct-10	18,638	19,645	484	2,508	17-Jul-11	22,848	24,739	1,101	2,779
24-Oct-10	19,008	20,061	509	2,593	24-Jul-11	23,356	25,556	1,283	2,885
31-Oct-10	19,415	20,320	657	2,644	31-Jul-11	22,434	24,498	918	2,834
07-Nov-10	19,671	20,577	826	2,644	07-Aug-11	21,841	24,676	961	2,730
14-Nov-10	19,981	21,094	800	2,659	14-Aug-11	22,502	25,469	1,057	2,775
21-Nov-10	20,480	21,725	691	2,714	21-Aug-11	22,490	24,957	953	2,747
28-Nov-10	20,762	22,299	1,024	2,752	28-Aug-11	21,209	24,009	998	2,706

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 was very mild. It ranked as the second warmest November since 1970 and was practically devoid of snow. Peak demand was an anaemic 19,710 MW (21,309 MW weather-corrected). Energy demand was also quite low at 11.1 TWh – this is the lowest November since 1994. Weather-corrected demand was a more respectable 11.9 TWh. Wholesale customers' consumption was down 11% compared to November 2008.
- December's weather was normal with a peak demand of just under 22,000 MW (21,921 MW and 22,061 MW weather-corrected). Overall energy demand was 12.7 TWh (both actual and weather-corrected). Both peak and energy numbers are the lowest since

the late 1990's. Wholesale customers' consumption fell 13.3% compared to the previous December.

- January was slightly milder than normal overall and the peak day was fairly mild as the cold weather landed on weekends throughout the month. Due to this, the peak demand of 22,045 MW was a noticeably higher 22,378 MW after correcting for the weather. Energy demand was 13.1 TWh (13.3 TWh weather-corrected) which was the lowest January since the late 1990's. Weather-corrected energy demand for the month was slightly lower (0.9%) than January 2009. Wholesale customers consumed 13.1% less electricity than the previous year.

The results for wholesale customers remain mixed. Certain sectors appear to have begun their recovery while others have lagged. Mining and pulp & paper continue to show declines whereas the steel, chemical and automotive sectors appear to have stabilized. Lower consumption in the mining sector is also attributable to work disruptions.

In the 2010 Q1 Outlook Tables spreadsheet there are several tables containing historical data. They are:

- Table 3.3.1 which provides weekly weather and demand history since market opening
- Table 3.3.2 which provides the monthly weather and demand history since market opening
- Table 3.3.3 which provides the monthly demand data by Market Participant role.

3.2 Forecast Drivers

Economic Outlook

The economy is currently in a period of recovery. By historical standards this recovery is quite modest. Given the amount of money injected into the global economies through stimulus packages, there remains a concern that the economy may flounder as that stimulus spending is wound down. That, combined with the weak recovery, has meant that the notion of a double-dip recession has not dissipated.

Global conditions aside, Ontario's economy continues to be challenged by the high dollar and low product demand. Although industries have done well to manage inventories, new orders have not been strong or consistent enough to bolster business confidence.

- Table 3.3.4 of the 2010 Q1 Outlook Tables spreadsheet has the economic assumptions for the demand forecast

Weather Scenarios

For the purpose of forecasting 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 2010 Q1 Outlook Tables spreadsheet has the weekly weather data for the forecast period.

Conservation and Demand Management

This forecast assumes that conservation will continue to grow based on information provided by the OPA. 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. The key messages are:

- 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

Over the course of the Outlook period about 2,600 MW of new and refurbished supply is scheduled to come into service. Most of the new supply projects have started their commissioning phase or are in the construction phase.

The existing installed generating capacity is summarized in Table 4.1. This excludes capacity that is commissioning.

Table 4.1 Existing Installed Generation Resources as of February 4, 2010

Fuel Type	Total Capacity (MW)	Number of Stations	Change in Capacity (MW)	Change in Stations
Nuclear	11,426	5	0	0
Hydroelectric	7,914	70	3	0
Coal	6,434	4	0	0
Oil / Gas	8,552	27	17	0
Wind	1,084	8	0	0
Biomass / Landfill Gas	75	5	0	0
Total	35,485	119	20	0

4.1 Committed and Contracted Generation Resources

Table 4.2 summarizes generation that is scheduled to come into service, be upgraded or shutdown 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 all projects in the CAA queue can be found on the IESO's web site at http://www.ieso.ca/imoweb/connassess/ca.asp.

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 shutdown. 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

Proponent/Project Name	Zone	Fuel Type	Estimated Effective Date	Change	Project Status	Capacity Considered	
						Firm (MW)	Planned (MW)
Retirement of Wawaitin 25 Hz generation to convert to 60 Hz	Northeast	Water	2010-Q1		Connection Assessment	-11	-11
Nuclear Upgrade	N/A	Uranium	2010-Q2	Delayed	Construction	27	27
Healey Falls G1	East	Water	2010-Q2		Construction		16
Thorold Cogeneration Project	Niagara	Gas	2010-Q2		Commissioning	236	236
Conversion of Fort Frances Steam Turbine to burn biomass	Northwest	Biomass	2010-Q3	Delayed	Commissioning	47	47
Halton Hills Generating Station	Southwest	Gas	2010-Q3		Construction		632
Shutdown of Lambton G1 and G2	West	Coal	2010-Q4			-970	-970
Shutdown of Nanticoke G3 and G4	Southwest	Coal	2010-Q4			-980	-980
Return of Sandy Falls as 60 Hz plant	Northeast	Water	2010-Q4		Construction		5
Return of Lower Sturgeon as 60 Hz plant	Northeast	Water	2010-Q4		Construction		14
Return of Wawaitin as 60 Hz plant	Northeast	Water	2010-Q4		Construction		15
Hound Chute	Northeast	Water	2010-Q4		Construction		10
Leamington Pollution Control Plant	West	Oil	2011-Q1		Approvals & Permits		2
Raleigh Wind Energy Centre	West	Wind	2011-Q1	Delayed	Construction		78
Bruce Unit 2	Bruce	Uranium	2011-Q1		Construction		750
Bruce Unit 1	Bruce	Uranium	2011-Q3		Construction		750
Becker Cogeneration	Northwest	Biomass	2011-Q3		Approvals & Permits		15
Total						**-1,651**	**636**

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

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. Both scenarios' starting point is the existing installed resources shown in Table 4.1.

Under both scenarios, all existing resources and resources that are scheduled to come into service are assumed to be available over the study period, except for those units scheduled to shutdown and those for which the generator has submitted planned outages.

The generation capability assumptions are as follows:

- Hydroelectric capability (including energy and operating reserve) is based on median historical values during weekday peak demand hours from May 2002 to March 2009.
- 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 are used at the time of weekday peak, while total energy contribution is assumed to be 30%.

The Firm and Planned Scenarios differ in their assumptions regarding the amount of demand measures and generation capacity. These differences are summarized in the following table.

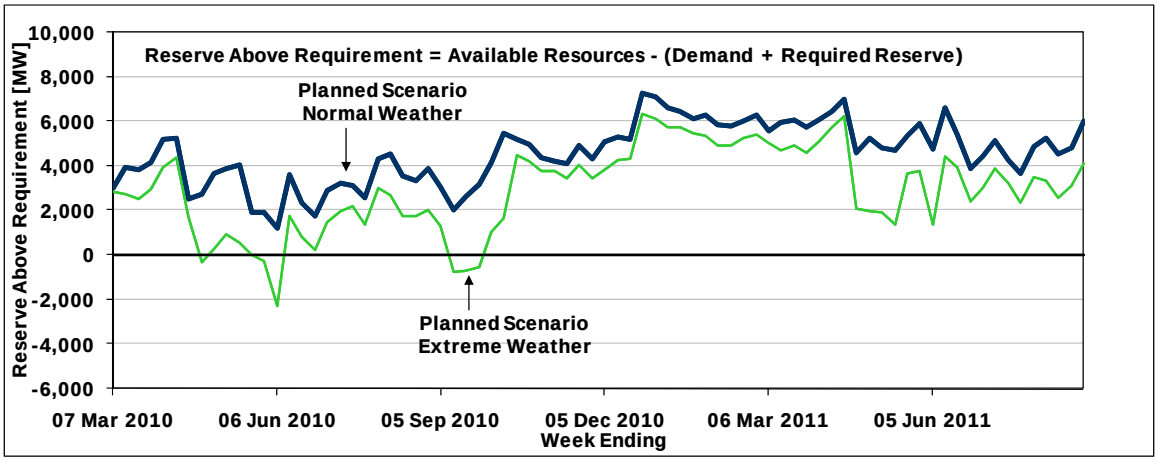
Table 4.3 Summary of Scenario Assumptions

Assumptions		Planned Scenario	Firm Scenario
Resource	Existing Installed Resources	Total Capacity	Total Capacity
		35,485 MW	35,485 MW
	New Generation and Capacity Changes	All	Only Capacity Changes, Commissioning Generators and Generators starting in the first 3 months
		636 MW	-1651 MW
Demand Forecast	Conservation	Incremental	
		Incremental growth of 140 MW on peak	
	Embedded Generation	Incremental	
		Incremental growth of 105 MW on peak	
	Demand Measures	Incremental	Existing
		699 MW	1115 MW

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.

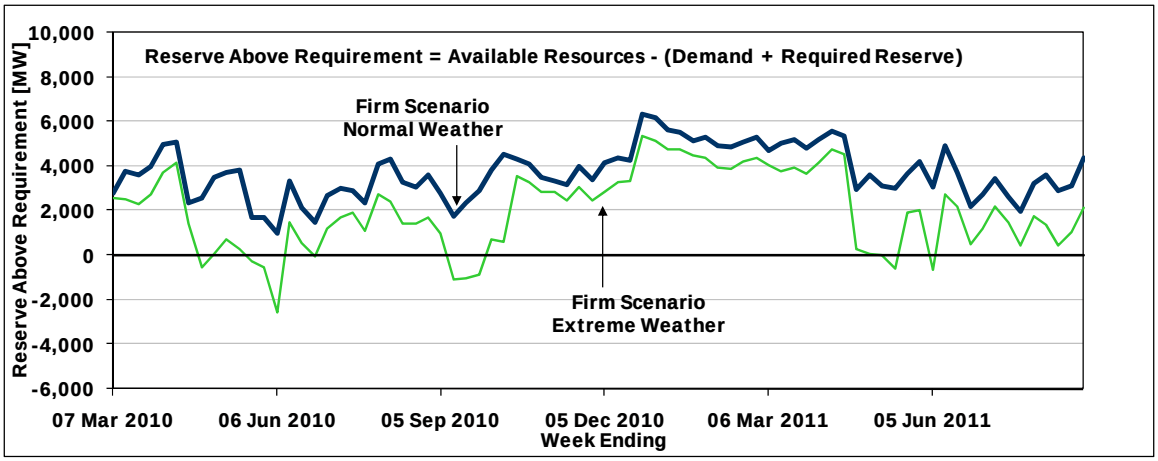
Figure 4.1 Reserve Above Requirement: Planned Scenario with Normal vs. Extreme Weather



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 2010 Q1 Outlook Tables Appendix A, Table A7.

Table 4.4 Summary of Available Resources

Notes	Description	Summer Peak 2010		Winter Peak 2011		Summer Peak 2011	
		Firm Scenario	Planned Scenario	Firm Scenario	Planned Scenario	Firm Scenario	Planned Scenario
1	Installed Resources (MW)	35,738	35,753	33,788	34,559	33,788	35,309
2	Imports (MW)	0	0	0	0	0	0
3	Total Resources (MW)	35,738	35,753	33,788	34,559	33,788	35,309
4	Total Reductions in Resources (MW)	6,626	6,629	3,902	4,021	5,465	5,583
5	Demand Measures (MW)	699	951	699	1,042	699	1,114
6	Available Resources (MW)	29,811	30,075	30,585	31,580	29,022	30,840

Notes to Table 4.4:

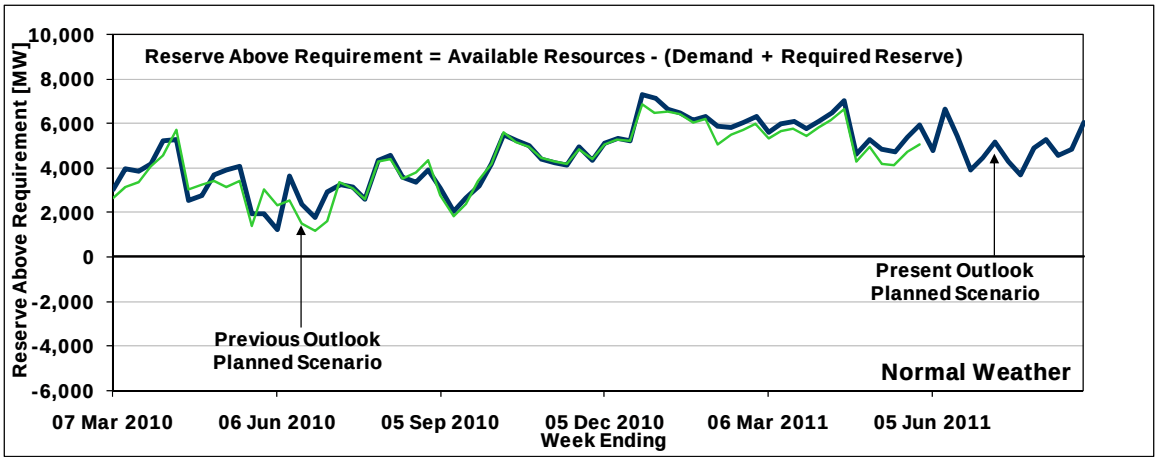
1. Installed Resources: This is the total generation capacity assumed to be installed at the time of the summer and winter peaks.
2. Imports: The amount of external capacity considered to be delivered to Ontario.
3. Total Resources: The sum of Installed Resources (line 1) and Imports (line 2).
4. Total 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 17, 2009. The difference is mainly due to the changes to generator outages, in-service delays 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).

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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:

- To identify all major transmission and load supply projects that are planned for completion during the Outlook period and to present their reliability benefits.
- To 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 the base flow limit associated with the interface or interconnection.
- To identify equipment outage events on the grid 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 transmission 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 are planned for service 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 has been deferred well beyond the period of this Outlook are not shown. The list includes only the transmission projects that represent major modifications or are considered to provide significant improvement to system reliability. Minor transmission equipment replacements or refurbishments are excluded.

Demand growth over the last decade has resulted in some area loads reaching or exceeding the capability of the local transmission system. To address this problem and provide additional transmission capacity for future load growth, Ontario transmitters and distributors have initiated plans to build new or replace existing transformer stations and reinforce the transmission system as necessary.

These needed reinforcements were confirmed by the IESO during related connection assessments. Several of these projects are currently under construction and planned for in service during the period of this Outlook.

5.2 Transmission Outages

The assessment of transmission outages is limited to those with a scheduled duration of greater than five days or to those outages that are part of a project where the combined scheduled duration is greater than five days. As the start time of the outage approaches, actual outage schedule and additional outage requirements, as well as outages with a scheduled duration of five days or less could impose further transmission capacity restrictions. Prior to approving and releasing an outage, the IESO will reassess the outage for potential system impacts, taking into account all current and forecasted conditions.

The IESO's assessment of the transmission outage plans is shown in Appendix C, Tables C1 to C10. In these tables, each element is assessed individually by indicating the possible impacts and

the reduction in transmission interface and interconnection limits. Where multiple outages are scheduled during the same period, the combined effect of all outages on the reduction in transmission interface and interconnection limits is presented. Where multiple outages are scheduled during the same period and reliability is affected, the IESO will request the transmitter to reschedule some of the outages. 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).

The planned transmission outages are reviewed in correlation with major planned resource outages and scheduled completion dates of new generation and transmission projects. This allows the IESO to identify transmission system reliability concerns and to highlight those outage plans that need to be adjusted. A change to an outage may include rescheduling the outage, reducing the scheduled duration or reducing the recall time.

This assessment will also identify any resources that have potential or are forecast to be constrained due to transmission outage conditions. Transmitters and generators are expected to have a mutual interest in developing an ongoing arrangement to coordinate their outage planning activities. Transmission outages that may affect generation access to the IESO controlled grid should be coordinated with the generator operators involved, especially at times when deficiency in reserve is forecast. Under the Market Rules, where the scheduling of planned outages by different market participants conflicts such that both or all outages cannot be approved by the IESO, the IESO will inform the affected market participants and request that they resolve the conflict. If the conflict remains unresolved, the IESO will determine which of the planned outages can be approved according to the priority of each planned outage as determined by the Market Rules detailed in Chapter 5, Sections 6.4.13 to 6.4.18. This Outlook contains transmission outage plans submitted to the IESO as of December 28, 2009, as well as the latest changes to the BP76 forced outage as of February 11, 2010.

5.3 Transmission System Adequacy

Generally, IESO Outlooks identify the areas of the IESO controlled grid where the projected extreme weather loading is expected to approach or exceed the capability of the transmission facilities for the conditions forecast in the planning period. Where the loading is projected to exceed the capability of the transmission facilities, there is also an increased risk of load interruptions.

The Ontario generation mix is changing rapidly with the addition of new forms of resources and the planned shutdown of coal resources. The transmission system needs to evolve to accommodate the supply mix changes and the incorporation of new generation while maintaining the reliable delivery of electricity to the consumers. Over the last few years, Hydro One, the OPA and the IESO have been collaborating in the development of a number of transmission enhancements required to accommodate these changes. Some of these transmission enhancements are planned for in service during the period of this Outlook.

The IESO works with Hydro One and other Ontario transmitters, to identify the highest priority transmission needs, and to ensure that those projects whose in service dates are at risk are given as much priority as practical, especially those addressing reliability needs for peak demand periods of this Outlook. We have also been working closely with the OPA to specify the transmission enhancements location, timing and requirements to satisfy reliability standards and support the new vision for the provincial electricity system.

Within the context of this approach, the Ontario transmission system with the planned system enhancements and known transmission outages 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 mainly provided by the Trafalgar, Claireville, Parkway and Cherrywood 500/230 kV autotransformers, Pickering generation station (GS) and other local resources as depicted in Figure 5.1. The availability of these facilities is critical to ensuring reliable electricity supply for Toronto and surrounding area.

Figure 5.1 Greater Toronto Area Electricity System

The reliable supply of demand in the GTA under extreme weather conditions forecasted for the Outlook period requires a minimum number of 500/230 kV autotransformers at Trafalgar, Claireville, Parkway and Cherrywood and Pickering units in service at rated capabilities. For the summer 2010 forecasted peak demand, all 500/230 kV autotransformers are expected to be in service. In spring 2010, major planned outages are scheduled to commence during a period of low demand. The projected loadings on the Trafalgar, Claireville, Parkway and Cherrywood 500/230 kV autotransformers, under normal weather conditions, are expected to be within their capability during these planned outages. Under extreme weather conditions, some load

reduction measures may be required during the outage period to manage additional contingencies. The long term de-rate currently on a Trafalgar autotransformer aggravates this situation. Outages which aggravate this situation will be at risk of cancellation by the IESO.

The capability of the GTA 500/230 kV autotransformers is sufficient to supply the summer 2010 normal and extreme weather demand following either the forced outage of any one GTA 500/230 kV autotransformer as long as at least four Pickering units are in service, or the forced outages of any two 500/230kV autotransformers as long as at least five Pickering units are in service. Subsequent autotransformer, generation outages or deratings could result in mitigating measures being required to reduce the remaining GTA 500/230 kV autotransformers loadings within their capability. Under the current set of forecast conditions, mitigating measures may be required.

Portlands Energy Center provides loading relief mainly to the 230/115 kV Leaside autotransformers but also to the Cherrywood 500/230 kV autotransformers. Its availability will be critical during the major planned outages in spring 2010. Goreway Station provides significant loading relief to the Claireville 500/230 kV autotransformers, especially in case of multiple autotransformer outages. The planned addition of Halton Hills GS in the third quarter of 2010 will further reduce the peak loading of the Trafalgar 500/230 kV autotransformers and allow for more operational flexibility.

The 230 kV transmission corridor between Trafalgar TS and Richview TS which supplies Brampton, Mississauga and parts of Caledon and Halton Hills may become loaded very close to its capability during summer 2010 under extreme weather conditions. The new Hurontario switching station and the expansion of the 230 kV lines from Cardiff TS are planned for service before the summer and will relieve the loading of this corridor and alleviate this problem.

The York region load serving capability improved with the addition of the Holland transformer station will be subsequently reinforced with the addition of York Energy Centre that is scheduled to go in service at the end of 2011.

Outages for the Claireville TS enhancement work continue during the current Outlook period. Some outages will result in small reductions to southern Ontario transmission interfaces limits.

5.3.2 Bruce and Southwest Zones

Planned refurbishments at the Bruce generation station and new wind power resources in southwestern Ontario will increase generation capacity in the Bruce and Southwest zones. The near term transmission reinforcements required to accommodate the extra generation are on schedule. Two new high voltage capacitors were installed at Nanticoke, and the installation of one additional capacitor at Buchanan is underway.

In addition to the near-term reinforcements described above, interim measures are being planned for the time when Bruce is operated with seven and eight units before the proposed 500 kV double-circuit line between Bruce and Milton is available. The interim measures would include the installation of additional dynamic voltage control facilities at Nanticoke and Detweiler and when necessary, maximizing the available reactive power from the remaining Nanticoke units. These measures together with the new shunt capacitors, the modifications of the existing Bruce special protection system and planned shutdown of four coal-fired units in October 2010 will further reduce the potential for constrained generation. In the longer-term, the proposed 500 kV line from Bruce to Milton would 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.

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 Woodstock area and installing a new 230/115 kV transformer station. These plans will provide an increased level of supply reliability, and support further load growth in the area.

Hydro One is currently undertaking major upgrade work at Burlington TS which will resolve limitations in the station's ability to supply the Burlington 115 kV area loads and yield a more flexible configuration. The remaining work which includes the replacement of all 115 kV breakers and the replacement of limiting bus sections is scheduled to be completed by the end of Q4 in 2012.

The existing transmission facilities in the Guelph area operate close to capacity and there is limited capability available to supply additional load. A solution remains required in the Cambridge area, as existing transmission infrastructure is unable to meet the IESO's criteria to restore power in the case of a contingency. Hydro One, the affected distributors, the OPA and the IESO are actively working on mitigating both the short-term issues and implementing a long term solution to these problems.

5.3.3 Niagara Zone and the New York Interconnection

The completion date for transmission reinforcement from Niagara region into the Hamilton-Burlington area continues to be delayed and to affect the use of both the available Ontario generation in the Niagara area and imports into the province, particularly during hot weather and high demand periods.

The 230 kV circuit BP76 forms an integral part of the Ontario - New York interface at Niagara Falls. Due to the variable nature of its flows, this interface is one of the most challenging to manage in the Eastern Interconnection, keeping system operators around the Great Lakes, which include the IESO, NYISO, PJM and MISO, fully engaged. The long term forced outage of the BP76 interconnection has compounded the complexities of these reliability coordination efforts, added to Ontario's surplus baseload generation (SBG) events and has materially led to increased nuclear reductions and hydroelectric spill conditions over the last year. Planned outages of two other lines of the Niagara interconnection (PA301 and PA302) are currently being assessed during the period from November to December 2010. These outages have the potential to reduce the transfer capability of the Niagara interconnection to zero and significantly impact the Ontario to Michigan transfers.

5.3.4 East Zone and Ottawa Zone

The new interconnection between Hawthorne transformer station (TS) in Ontario and Outaouais station in Québec has entered commercial operation. This new interconnection provides up to 1,250 MW import/export capability from/to Quebec and provides an added level of flexibility and efficiency to system management.

5.3.5 West Zone and the Michigan Interconnection

Transmission constraints in this zone may restrict resources in southwestern Ontario and imports from Michigan. This is evident in the bottled generation amounts shown for the Bruce and West zones in Tables A3 and A6. The planned shutdown of two Lambton GS coal-fired units will reduce, but not eliminate the amount of bottled generation in this zone.

Phase angle regulators (PARs) are installed on the Ontario-Michigan interconnection at Lambton TS, representing two of the four interconnections with Michigan, but are not currently operational until completion of agreements between the IESO, the Midwest ISO, Hydro One and International Transmission Company. The expected in service date is not known at the time of this Outlook. 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.

The capability to control flows on the Ontario-Michigan interconnection between Scott TS and Bunce Creek is unavailable. The PAR installed at Bunce Creek in Michigan has failed and is scheduled for replacement by the beginning of Q3 in 2010.

5.3.6 Northeast and Northwest Zones

The transmission corridor east of Mississagi TS has been experiencing increased congestion due to the addition of new resources and lack of transmission reinforcements. It is expected that congestion will increase even further when projects currently under construction in the area will become operational.

Hydro One is planning to implement in the fourth quarter of 2011 the modifications recommended by the IESO to the existing Mississagi generation rejection scheme, that will alleviate, on the near term, the constrained generation west of Mississagi.

To further reduce the congestion in northern Ontario and improve the transfer capability Hydro One has installed dynamic reactive compensation facilities at Lakehead, and by the end of 2010 is planning to install additional dynamic reactive compensation facilities at Porcupine and Kirkland Lake. In preparation for additional renewable generation in northern Ontario, Hydro One is planning to increase the north-south transfer capability by installing series compensation on the transmission lines, proposed to go in service in the last quarter of 2010.

During 2010, extensive work on the transmission circuits around Fort Frances is scheduled. The associated outages will reduce the Ontario-Manitoba and Ontario-Minnesota interconnection transfer capacity and also the East-West transmission interface capability. The reduction of the East-West Transfer East (EWTE) limit is expected to contribute to the increased amount of bottled generation in the Northwest zone. Managing grid voltages in the Northwest has always required special attention; with the significantly lower demands, it is increasingly difficult to maintain an acceptable voltage profile without compromising the security and reliability of the supply.

Over the past year it has become more difficult to manage voltages throughout the transmission system in north-western Ontario. On several occasions normal dispatch actions were exhausted, and exceptional voltage control measures were required, including the temporary removal of one or more transmission circuits from service during light load or low transfer conditions to maintain voltages within acceptable ranges. This reduced the grid's ability to withstand disturbances and subsequently the customer's supply reliability.

Although, the replacement of the failed synchronous condenser at Lakehead TS with a new static VAR compensator (SVC) has improved the situation in the immediate vicinity, there is still a need for additional reactive compensation for voltage control in the remainder of the zone. The IESO requested Hydro One to give a high priority to examining all available short-term and long-term solutions to this matter, particularly with respect to the expected development of future intermittent generation and transmission projects in the Northwest.

5.3.7 Ontario 25 Hz System

The 25 Hz system in northeastern Ontario is scheduled to be decommissioned during the second quarter of 2010.

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6.0 Operability Assessment

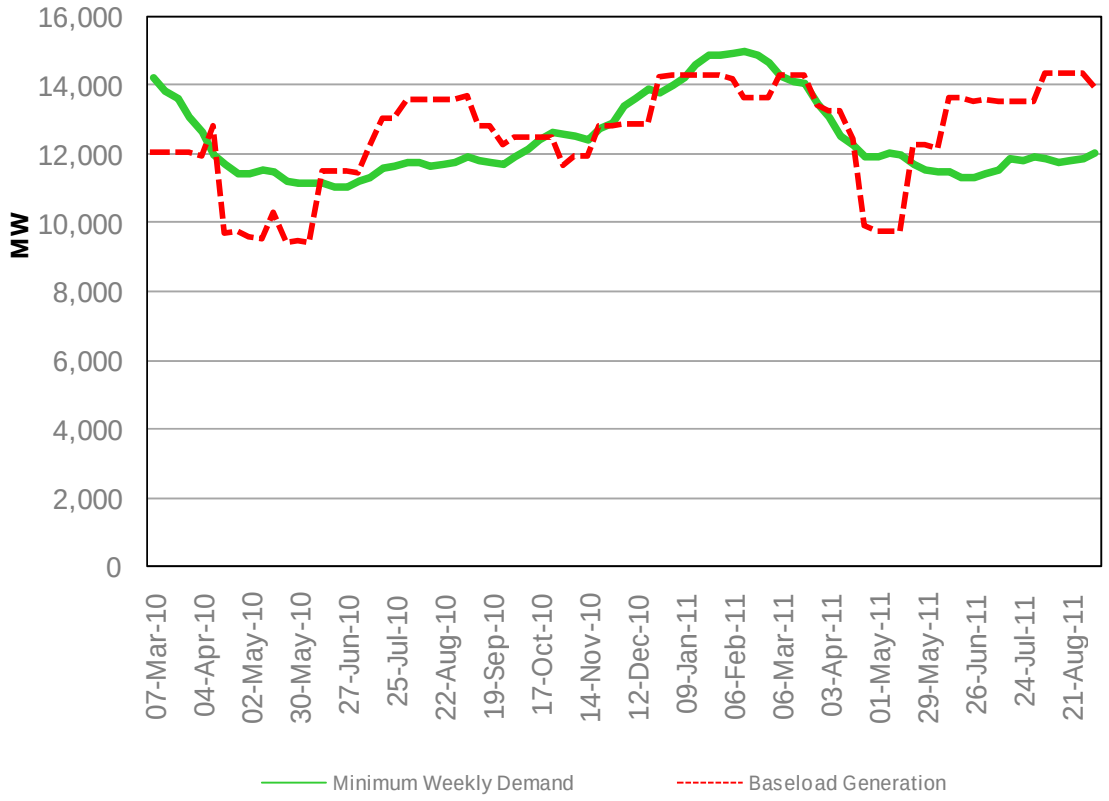
The IESO monitors existing and emerging operability issues that could potentially impact system reliability. A review of past few months, and a forecast for surplus baseload generation (SBG) conditions over the next 18 months is presented below.

In November 2009, SBG conditions were exacerbated by a confluence of factors: lower than forecast minimum demands due to unseasonably mild weather, higher than forecast baseload generation output, and outages to major interconnection circuits connecting Ontario to both New York and Quebec. During this time, the IESO and market participants worked together to mitigate over-generation conditions through: the maneuvering and temporary shutdown of nuclear generation, spilling water at baseload hydroelectric facilities, and curtailing import transactions. This past December and January, increasing overnight demand associated with overnight heating load has significantly reduced the frequency and magnitude of SBG events.

Figure 6.1 shows projected weekly minimum demand against the expected level of baseload generation. Baseload generation assumptions have been updated to include the latest planned outage information, 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. A 1,000 MW export assumption represented as a decrement to baseload generation is included in the diagram. Output from commissioning units is explicitly excluded from this analysis due to uncertainty and highly variable nature of commissioning schedules.

Over the next 18 months, the IESO expects the risk of experiencing SBG conditions will be most relevant over the summer periods. In addition, in November and December 2010, planned outages to the PA301 and PA302 circuits are being assessed in conjunction with the ongoing forced outage on the BP76 circuit – all of which are on the Ontario-New York interface at Niagara. If scheduled, these outages will significantly reduce Ontario's ability to export power which could exacerbate SBG conditions. Recent data showing a significant amount of exports on the new Ontario-Quebec HVDC tie suggest that the 1,000 MW export assumption is still achievable during this timeframe. As a result, the 1,000 MW export assumption remains the same throughout the 18-month period. Looking ahead, the IESO is exploring changes to the 1,000 MW export assumption to more appropriately reflect its expected impact on forecast SBG conditions.

Figure 6.1 Minimum Demand and Baseload Generation



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