18-MONTH OUTLOOK

From June 2012 to November 2013

ieso
Power to Ontario. On Demand.

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

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 2,000 megawatts (MW) of capacity added to the grid, comprising approximately 1,500 MW of nuclear generation and 500 MW of grid-connected renewable generation. Both refurbished Bruce nuclear units are expected in service in the third quarter of 2012. Recently, 438 MW of gas-fired peaking generation at York Energy Centre came into service. The new Bruce to Milton line is now in service. This new transmission line, with its associated supporting facilities, is capable of accommodating the full output from all eight generating units at the Bruce complex and the upcoming renewable resources in southwestern Ontario. Once these generation and transmission projects have been successfully integrated onto the grid and have shown reliable operations, Ontario will be in a good position for the continued removal of coal-fired generation from the system.

By November 2013, the total wind and solar generation connected to the transmission and distribution networks in Ontario will reach approximately 3,800 MW. Through Stakeholder Engagement (SE) 91, the IESO is continuing its efforts to incorporate renewable resources into the dispatch process. The centralized forecasting initiative is also moving forward, with the forecast being developed for all variable resources. This initiative will support better forecasting of renewable energy production to achieve more accurate generation commitment in real time. As Ontario's 3,500 MW of flexible coal-fired generation is removed from the system over the next two years, maximum flexibility from all remaining resources is imperative to manage operations effectively.

Ontario's trade-based economy has been negatively impacted by weak global growth and financial concerns over European debt loads. Despite the positive news of a stronger U.S. economy, the recent run-up in oil prices will also act as a drag on growth. An increase in economic growth in Ontario will result in rising electricity consumption but that additional usage will be partially offset by conservation initiatives and increased embedded generation. Electricity consumption is expected to increase a modest 0.1 per cent in 2012.

Those same factors, as well as the impact of time-of-use rates will mean that peak electricity demand will remain flat over the forecast. The following table summarizes the forecasted seasonal peak demand numbers.

Season	Normal Weather Peak (MW)	Extreme Weather Peak (MW)
Summer 2012	23,298	25,768
Winter 2012-13	22,192	23,395
Summer 2013	23,301	25,582

Over the past several years and continuing through this Outlook period, new sources of generation have been brought into service to meet future supply needs and replace coal-fired capacity. The early incorporation of this supply is required to ensure Ontario has the power it needs for 2020 and beyond. It can take over 10-years to build new generation, including additional baseload generation from nuclear and renewable sources. The additional baseload generation coupled with declining demand during off-peak periods, has led to periods of surplus generation. Over the next 18 months, the growing volumes of variable generation, the return to service of two Bruce nuclear units and the addition of the Bruce to Milton transmission line may contribute to the frequency and magnitude of SBG. This will need to be managed in the short-term until baseload generation begins to decline when nuclear refurbishment programs get underway later in the decade.

Four phase angle regulators (PARs) are now operational and regulating flow over the Ontario-Michigan interconnections. The operation of these PARs will help control inter-jurisdictional flows and assist in the management of system congestion.

Conclusions & Observations

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

Demand Forecast

- Both peak and electricity demand are expected to remain fairly flat over the forecast horizon.
- Economic and population growth are forecast to put upward pressure on peak and energy demands while additional usage will be partially offset by increasing levels of conservation, energy efficiency and the growth in embedded generation.
- Time of use rates and the actions of large customers to minimize global adjustment charges will influence reductions in peak demands.
- With the forecasted peak demand levels, supply adequacy will remain robust. Although higher 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 normal weather scenarios.
- Reserve requirements are not met in early June 2012 in extreme weather scenarios.
- York Energy Centre (438 MW) is now in service.
- Bruce unit 1 (750 MW) and Bruce unit 2 (750 MW) restarts are expected to be complete in Q3 2012.
- Decisions around the possible Pickering unit retirements and associated transmission upgrades are required within the timeframe of this Outlook to ensure supply adequacy continues beyond 2014, when coal-fired generation has ceased and some nuclear units begin to reach their expected end-of-life.

	Normal Weather Scenario	Extreme Weather Scenario
Planned Scenario	• There are no weeks when reserve is lower than required	• There is one week in June 2012 when reserve is lower than required
Firm Scenario	• There are no weeks when reserve is lower than required	• There are two weeks in June 2012 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.
- In York Region, the York Energy Centre is now in service 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.

- 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's installation of dynamic voltage control facilities at Nanticoke and Detweiler and modifications to the existing Bruce special protection system are anticipated to be completed during this Outlook period.
- 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.
- After assessment of the local area load in the Kitchener-Waterloo Cambridge Guelph area, Hydro One will be proceeding with the Guelph area transmission reinforcement project to reinforce the supply into Guelph-Cedar TS, with an expected completion date in the second quarter of 2016.
- The IESO, OPA, and Hydro One are examining options to meet the IESO's load restoration criteria for Cambridge and areas surrounding Toronto.
- Analysis is currently underway to determine interim and long-term transmission solutions to address the possible future shutdown of Pickering Nuclear Generating Station (NGS).

Operability

- The IESO is continuing with plans to move to an economic dispatch of variable generation to help manage general operability issues. A centralized forecast will be developed for all grid-connected variable resources with a full implementation set to be complete by Q1 2013. Forecasting for embedded variable resources will be developed in 2013. Additionally, Renewable Integration Initiative (RII) will facilitate the dispatching of renewable energy, with implementation set for Q4 2013.
- Variable generation dispatch will allow for greater flexibility and help alleviate surplus baseload generation concerns. The conditions of surplus are 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 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 June 2012 to November 2013 and supersedes the last Outlook released in February 2012.

The purpose of the 18-Month Outlook is:

- To advise market participants of the resource and transmission reliability of the Ontario electricity system;
- To assess potentially adverse conditions that might be avoided through adjustment or coordination of maintenance plans for generation and transmission equipment; and
- To report on initiatives being put in place to improve reliability within the 18-month timeframe of this Outlook.

The contents of this Outlook focus on the assessment of resource and transmission adequacy. Additional supporting documents are located on the IESO website at http://www.ieso.ca/imoweb/monthsYears/monthsAhead.asp

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

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

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

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

- End of Section -

2.0 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 April 2012. The economic outlook has been updated based on the most recent data. Actual weather and demand data for February, March and April have been included in the tables.

The demand models were re-estimated and adjusted to reflect the current relationship between demand and the economy, weather, conservation and embedded generation.

2.2 Updates to Resources

York Energy Centre (438 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 June 14, 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 March 14, 2012 were used.

2.4 Updates to Operability Outlook

An outlook of surplus baseload generation (SBG) conditions for the next 18 months has been updated with submitted generation outage plans as of June 14, 2012. Table A9 of the Outlook Tables has been modified to include the weekly median minimum demand, baseload generation prior to exports, the SBG range prior to exports, and the SBG range including export assumptions.

- 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 June 2012 to November 2013 and supersedes the previous forecast released in February 2012. Tables containing supporting information are contained in the 2012 Q2 Outlook Tables spreadsheet.

Electricity demand is expected to show limited growth over the remainder of 2012 before showing an incremental improvement in 2013. Ontario's trade oriented economy will continue to be influenced by exchange rates and the growth in the global economy, with the U.S. economy being by far the most impactive. The U.S. had shown strong growth at the end of 2011 but has been disappointing in 2012. High oil prices and on-going debt issues continue to act as a drag on the world's economies.

Peak demands are expected to remain flat as conservation programs, the growth in embedded generation and time-of-use rates will act to offset underlying growth driven by economic expansion and population growth.

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	23,298	25,768
Winter 2012-13	22,192	23,395
Summer 2013	23,301	25,582
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)	141.4	0.1%
2013 Energy (Forecast)	142.8	1.0%

Forecast Details

The companion document, the Ontario Demand Forecast, looks at demand in more detail. It contains the following:

- Details on the demand forecast
- Analysis of historical demand
- Discussion on the impact of the drivers affecting demand

The data contained in the Ontario Demand Forecast document are included in the 2012 Q2 Outlook Tables spreadsheet.

- 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.

Recently, 438 MW of gas-fired peaking generation at York Energy Centre came into service. Both refurbished Bruce nuclear units are expected in service in the third quarter of 2012. Over the outlook period, approximately 500 MW of grid connected renewable will be added to the system.

Current supply is adequate to meet demand under normal scenarios and all extreme scenarios except early June 2012. To ensure adequate supply is maintained beyond the middle of the decade, the IESO expects decisions to be made over the next 18-months regarding future generation such as plans for the Pickering Nuclear station.

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

Table 4.1 Existing Generation Resources as of June 15, 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	5,662	71	0	0
Coal	3,504	3,387	4	0	0
Oil / Gas	9,987	8,556	29	438	1
Wind	1,511	202	12	0	0
Biomass / Landfill Gas	122	41	6	0	0
Total	34,517	28,406	127	438	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)
Comber Wind Limited Partnership	West	Wind	2012-Q2		Commissioning	166	166
Pointe Aux Roches Wind	West	Wind	2012-Q2		Commissioning	49	49
Bruce Unit 1	Bruce	Uranium	2012-Q3		Construction	750	750
Bruce Unit 2	Bruce	Uranium	2012-Q3		Construction		750
Atikokan shutdown for conversion to biomass	Northwest	Coal	2013-Q1			-211	-211
Leamington Pollution Control Plant	West	Oil	2013-Q1		Construction		2
Thunder Bay Condensing Turbine Project	Northwest	Biomass	2013-Q1		Construction		40
Conestogo Wind Energy Centre 1	Southwest	Wind	2013-Q1		pre-NTP		69
Summerhaven Wind Energy Centre	Southwest	Wind	2013-Q1		pre-NTP		125
McLean's Mountain Wind Farm	Northeast	Wind	2013-Q2		pre-NTP		60
Becker Cogeneration Plant	Northwest	Biomass	2013-Q4		Construction		8
Total						**753**	**1,807**

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%.

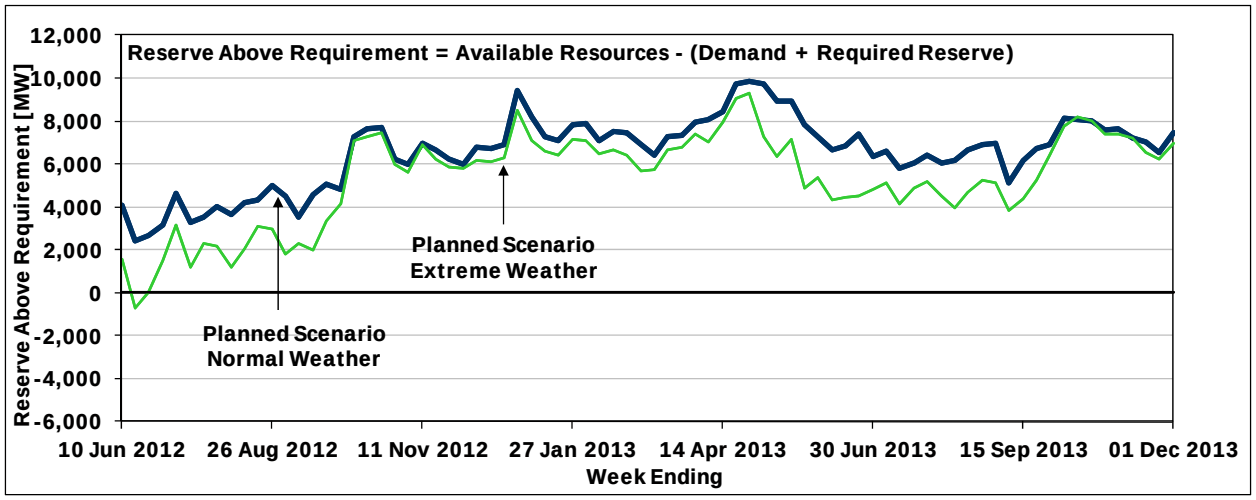
Table 4.3 Summary of Scenario Assumptions

Assumptions		Planned Scenario	Firm Scenario
Resource	Existing Installed Resources	Total Capacity	Total Capacity
		34,517	34,517
	New Generation and Capacity Changes	All	Generator shutdowns or retirements, Commissioning Generators and Generators starting in the first 3 months
		1,807	753
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	Exisiting + Incremental	Existing
		1,315	1,141

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.

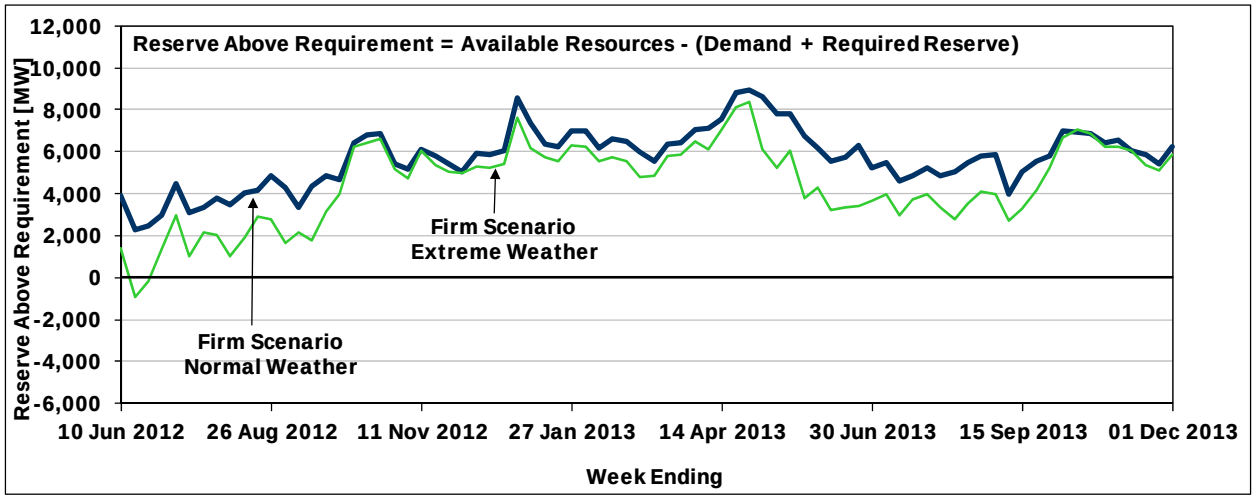
Figure 4.1 Reserve Above Requirement: Planned Scenario with Normal vs. Extreme Weather



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 Q2 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)	34,731	34,731	35,270	36,022	35,270	36,316
2	Imports (MW)	0	0	0	0	0	0
3	Total Resources (MW)	34,731	34,731	35,270	36,022	35,270	36,316
4	Total Reductions in Resources (MW)	6,224	6,224	4,944	4,925	5,160	5,328
5	Demand Measures (MW)	1,141	1,315	1,141	1,315	1,141	1,505
6	Available Resources (MW)	29,648	29,823	31,467	32,412	31,251	32,493

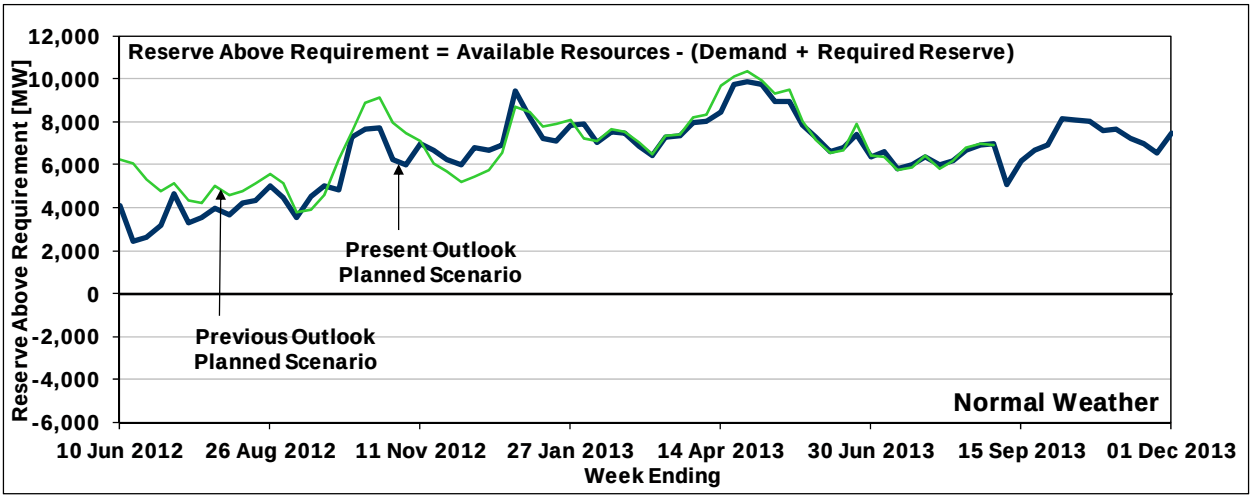
Notes to Table 4.4:

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 February 24, 2011. The difference is mainly due to the changes to outages, the change in the demand forecast, and the reduction in locked-in capacity for the rest of 2012 due to the completion of the Bruce to Milton line.

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 March 14, 2012.

5.3 Transmission System Adequacy

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

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 currently examining transmission solutions available to manage long-

term load supply that will result from future growth in the southwestern GTA For the short-term, day-to-day operating procedures are available to manage the forecasted transmission loading under high loads.

In York Region, the York Energy Centre is now in service 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 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.

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

OPA, Hydro One and the IESO are examining options to address the identified limited capability of existing transmission infrastructure into Woodbridge TS, Vaughan #3 TS and Kleinburg TS to meet the IESO's load restoration criteria following a contingency.

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 500 kV line from Bruce to Milton, went in service in May 2012 and 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.

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

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

5.3.3 Niagara Zone

The completion date for transmission reinforcements from the Niagara region into the Hamilton-Burlington area continues to be delayed. When complete, the transmission reinforcements from the Niagara region into the Hamilton-Burlington area 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 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.

Four phase angle regulators (PARs) are now operational and regulating flow over the Ontario-Michigan interconnections. The operation of these PARs helps control inter-jurisdictional flows and assists in the management of system congestion.

5.3.6 Northeast and Northwest Zones

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

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

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. 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 provide 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. The IESO, OPA and Hydro One are examining solutions to 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.

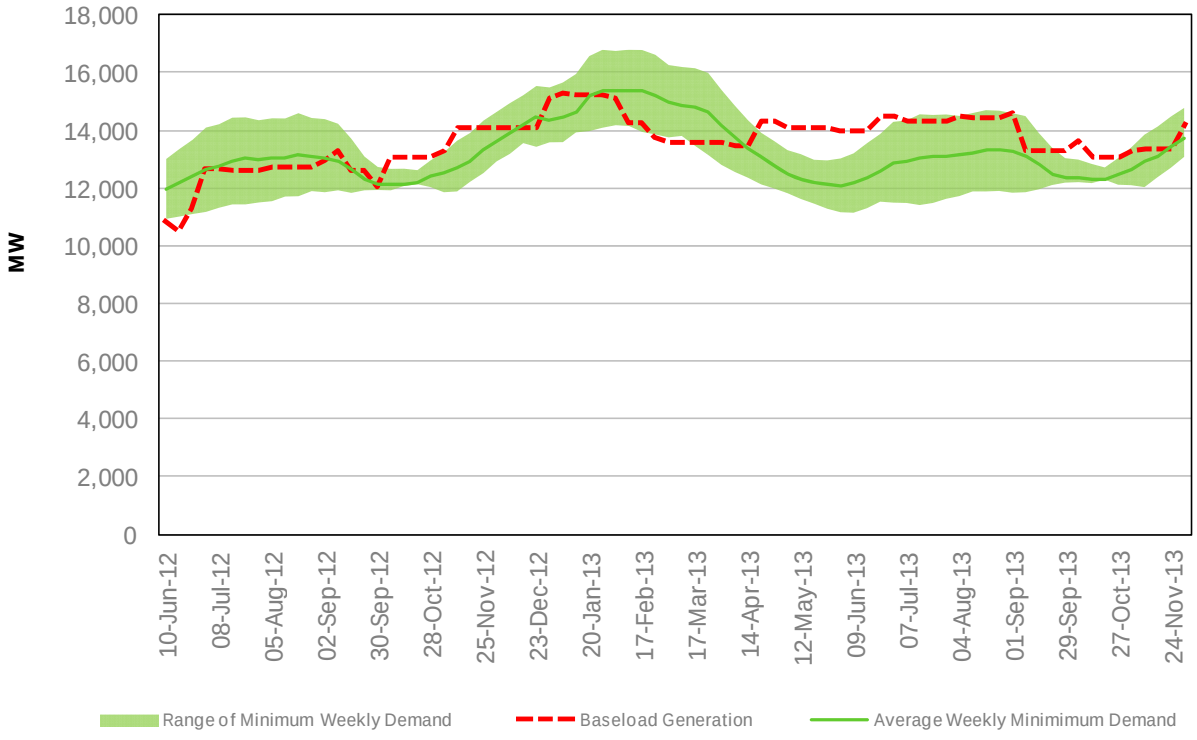
- End of Section -

6.0 Operability Assessment

The IESO monitors existing and emerging operability issues that could potentially impact system reliability. While Ontario is expected to have an adequate supply of electricity to meet projected needs over the next 18 months, increasing amounts of baseload generation, much of it variable, expected over the next few years coupled with low demands during off peak hours will likely result in the ongoing management of SBG conditions.

A low demand period with heavy winds, during freshet, with neighbours either unwilling or unable to take our exports, may lead to a time when the province must find alternatives to normal market responses to mitigate SBG. 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)



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

[1] An export assumption of 1,500 MW is applied under conditions which allow Ontario's aggregate export capability to be higher than 2,600 MW. A 1,200 MW export assumption will be applied when forecast planned outages are expected to limit Ontario's aggregate export capacity to between 1,400MW 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.

reflect the latest data. Output from commissioning units is explicitly excluded from this analysis due to uncertainty and the highly variable nature of commissioning schedules.

Since the start of 2011, out of market control actions were required approximately five percent of the time to mitigate SBG, and going forward the frequency and magnitude of SBG events is expected to rise for the spring and fall of both 2012 and 2013. This will need to be managed in the short-term until baseload generation begins to decline when nuclear refurbishment programs get underway later in the decade. With the forecast increase in SBG, 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. When variable generation becomes dispatchable, additional flexibility will be available to diminish the frequency of out of market control actions for SBG.

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. Lately, the IESO benefited from substantially increased maneuverability and out of market actions provide by Ontario nuclear and hydro baseload generators. The availability of 300 MW of maneuvering per nuclear unit at Bruce Power and additional adaptability of all baseload market participants has been very helpful in alleviating SBG conditions and minimizing the need for lengthy nuclear shutdowns. With wind and solar becoming more prominent resources on the electricity system, the need for maximum flexibility from all resources becomes integral for the reliable and efficient operation of the grid. The IESO will continue to examine and pursue the ability to dispatch these resources to manage SBG conditions.

The existing coal fleet, though running at vastly reduced levels from previous years, provides the IESO with desirable flexibility under all operating conditions. As Ontario's coal-fired generation is shutdown over the next two years, the associated flexibility with them will be removed. As a result, new capacity should also have this flexibility to help facilitate the management of maintenance outages, provide effective ramp capability and even provide regulation, when necessary.

- End of Section –

7.0 Historical Review

This section provides a review of past power system operation, including the most recent months of operation, to identify noteworthy observations, emerging problems and variations from forecast.

7.1 Weather and Demand Historic Review

Since the last full Outlook document was released actual demand and weather data have been reported for the past winter.

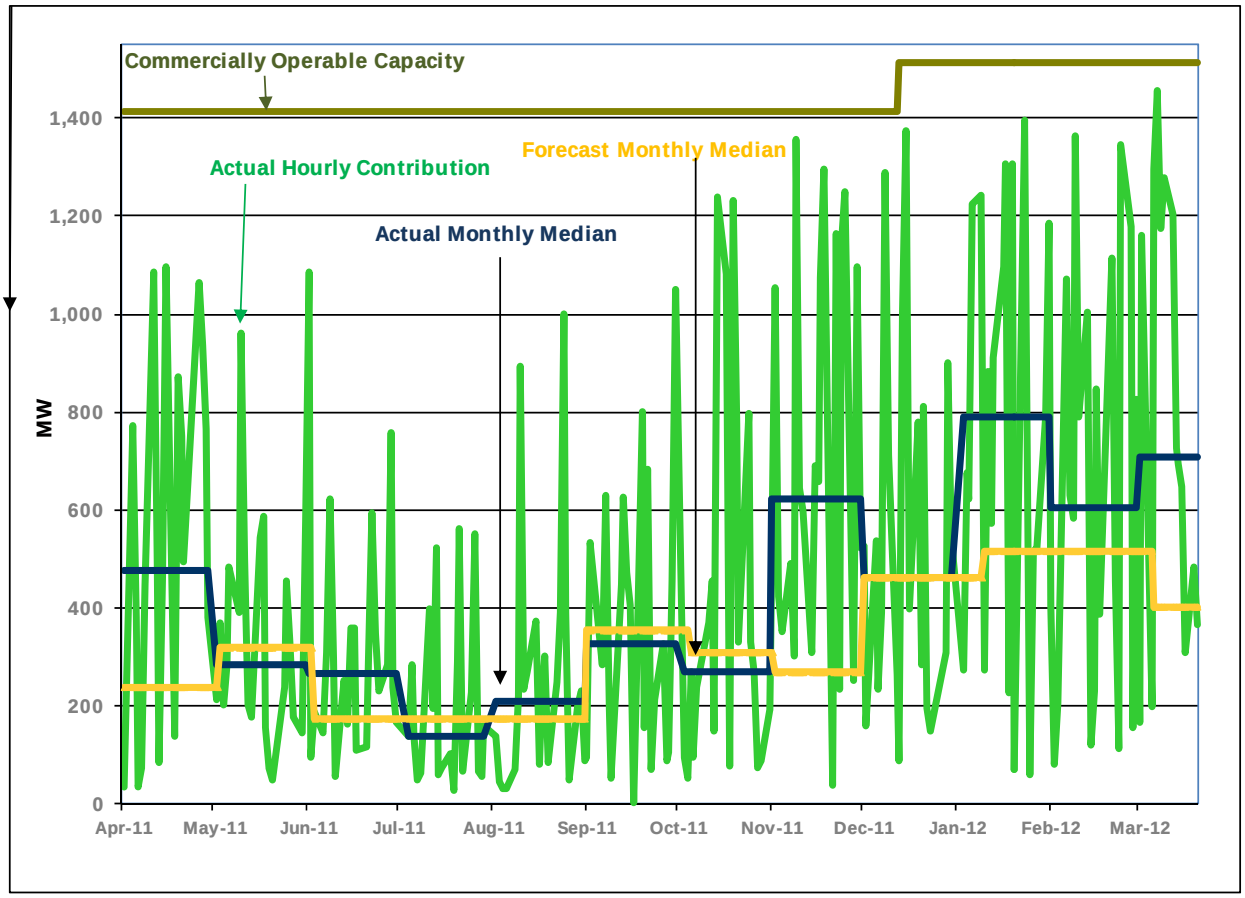
For the period November 2011 through April 2012, the weather was significantly milder than normal. In particular, the key winter months of December, January and February were all unusually mild. For all these months the actual energy demand was lower than the same month a year prior. After correcting for weather and the additional day due to the leap year, only November showed year over year growth. For the four months ending in April, actual demand is 3.7% lower compared to 2011 (-0.8% weather corrected). Demand is still 9.0% below that of the pre-recession levels of 2008 (-6.7% weather corrected).

7.2 Hourly Resource Contributions at Time of Weekday Peak

The figures from 7.2.1 to 7.2.4 show the contributions made by wind generators, hydro generators, imports, and net interchange into Ontario at the time of weekday peak. The period analyzed is from April 2011 to March 2012. Holiday and weekend data were not considered in the analysis since hydro peaking generation and interchange transactions during this timeframe are not typical of time periods when Ontario's supply adequacy may be challenged.

Figure 7.2.1 indicates the amount of wind contribution to the wholesale market at the time of weekday peak, compared to the forecast contributions. The forecast methodology takes into account seasonal variances in wind patterns, among other factors. Installed wind capacity is expected to grow with wind generation procured under the FIT programs.

Figure 7.2.1 Wind Contributions at the Time of Weekday Peak



Note: Commercially operable capacity does not include commissioning units. Therefore actual hourly contribution may exceed commercial capability.

Figure 7.2.2 indicates the amount of hydroelectric contributions to energy and operating reserve markets at the time of weekday peak, excluding weekends and holidays, compared to the forecasted contributions. The forecasted monthly median consists of the median contribution of hydroelectric energy at the time of weekday peak since 2002. The hydroelectric production at the hour of weekday peak summer months were lower than forecasted. The lower summer values for 2011 are due to a decrease in precipitation levels from previous years and larger than usual outages scheduled for hydroelectric generating stations. We expect the impact of these outages to continue at varying degrees over the next 18 months. We have made adjustments to the forecast in this Outlook to account for these outages.

Figure 7.2.2 Hydro Contributions (Energy and Operating Reserve) at the Time of Weekday Peak

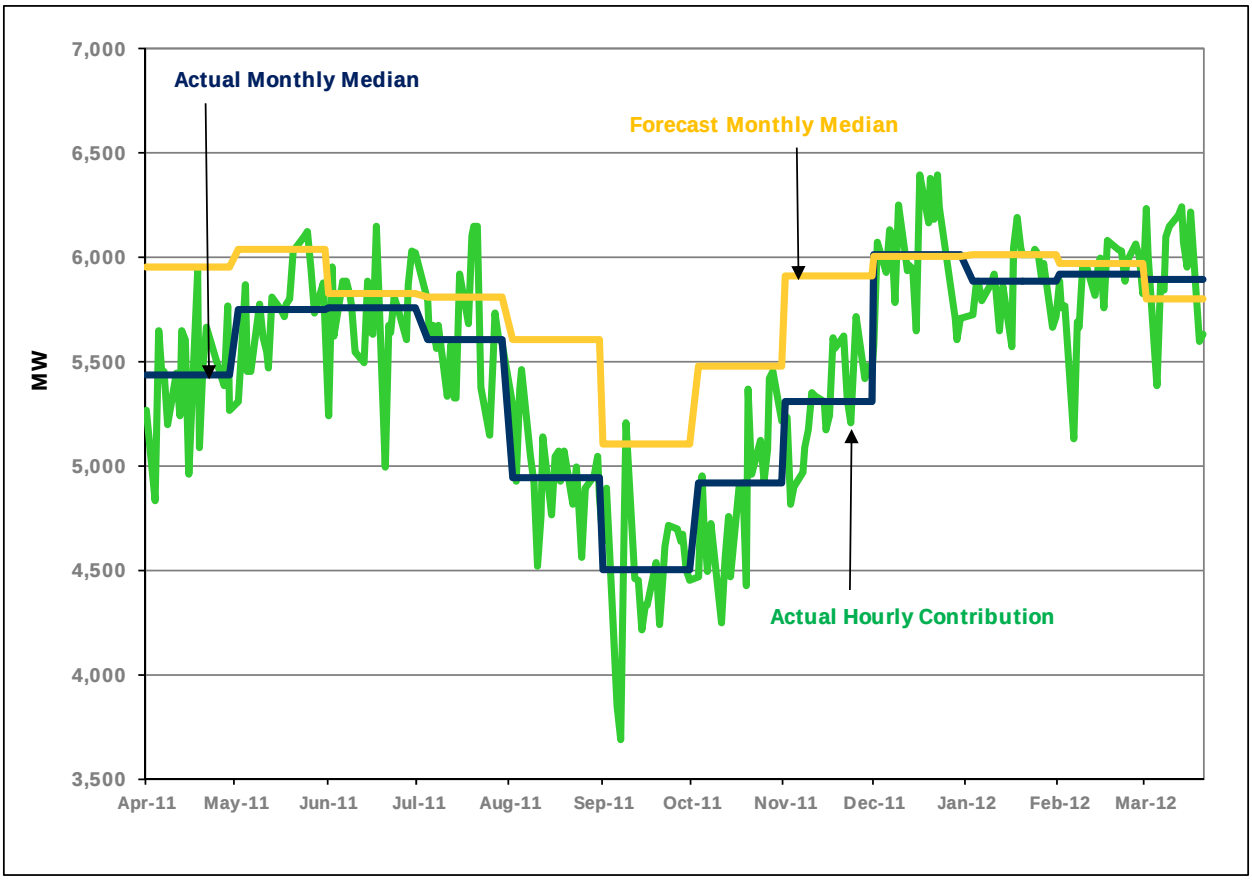


Figure 7.2.3 shows imports into Ontario at the time of weekday peak. Summer 2011 imports were noticeably higher than the rest of the reporting period. The extremely high temperatures in July contributed to high demands, high prices and consequently an increase in imports. In contrast, the mild winter of 2012 followed by record-breaking high temperatures in March contributed to low demand, low prices and therefore a decrease in imports compared to the same timeframe in 2011.

Figure 7.2.3 Imports into Ontario at the Time of Weekday Peak

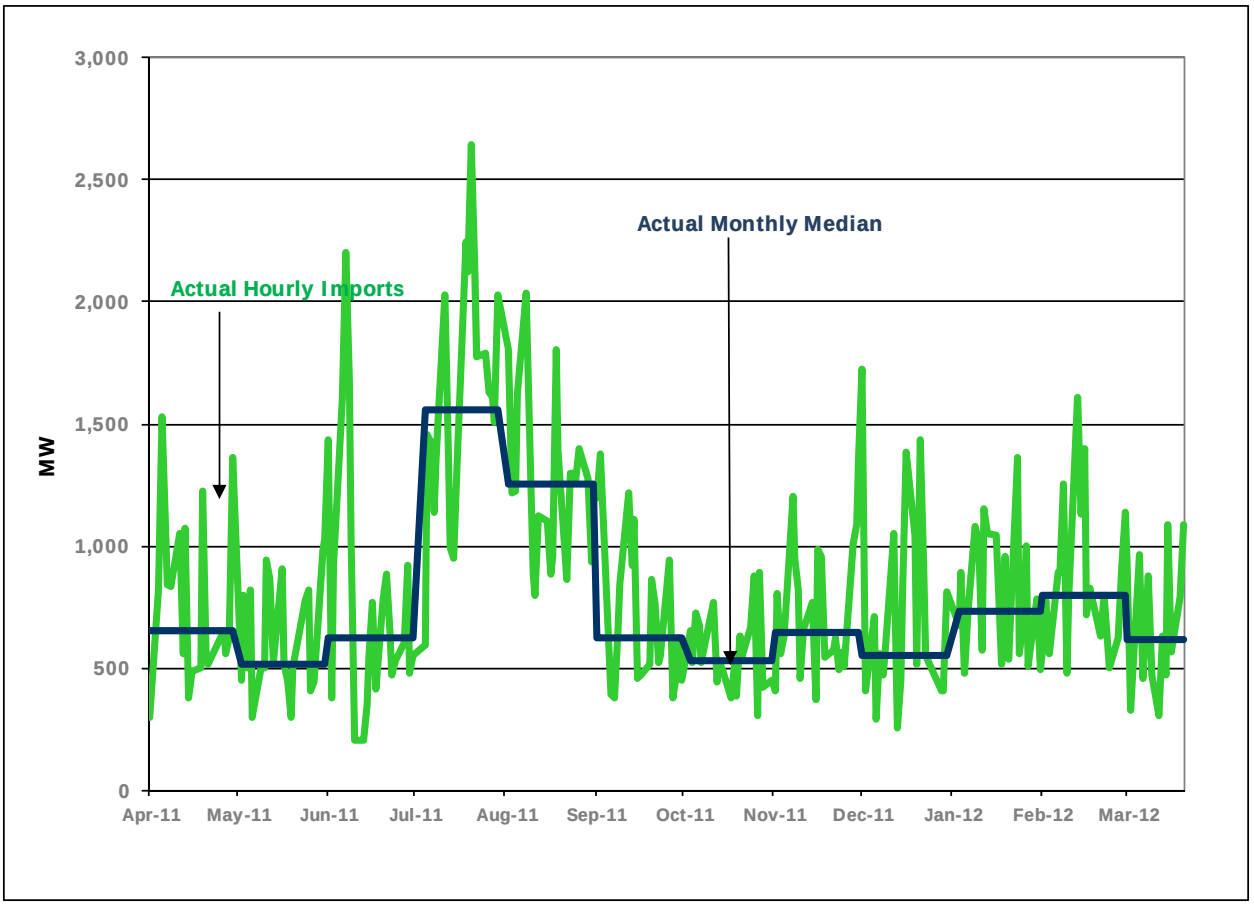
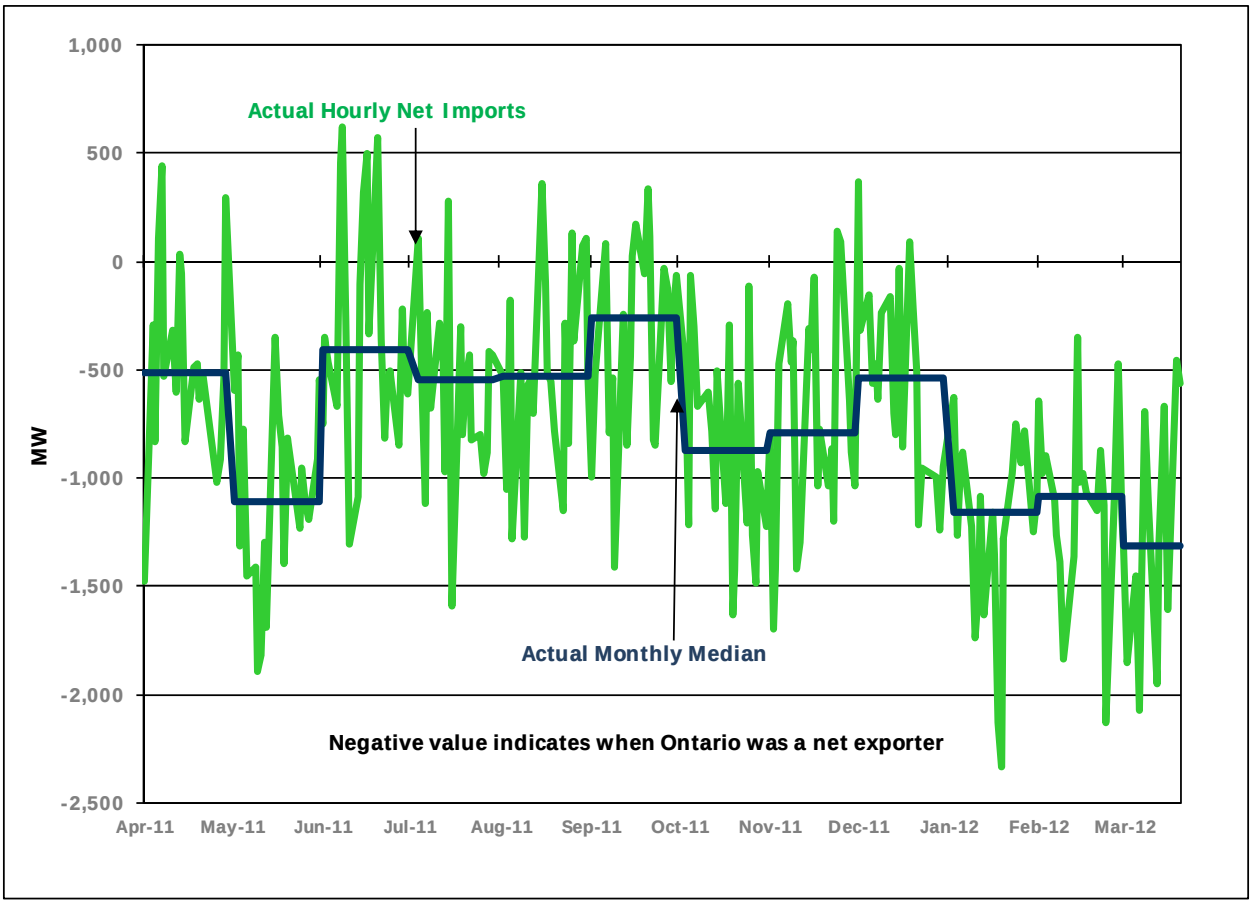


Figure 7.2.4 shows the amount of net imports into Ontario at the time of weekday peak, excluding weekends and holidays. Net Interchange is the difference between total imports into Ontario and total exports out of Ontario. An average net export situation prevailed, which can be in part attributed to the continued export capability with Quebec and an increase in generator capacity over the previous year. Additionally, surplus baseload generation conditions caused by ample generation and lower demands further contributed to Ontario being a net exporter for most of the reporting period.

Figure 7.2.4 Net Interchange into Ontario at the Time of Weekday Peak



7.3 Report on Initiatives

Centralized forecasting for variable resources is an initiative designed to allow for better forecasting of energy production to ensure a more accurate unit commitment occurs. A centralized forecast will be developed for all grid-connected variable resources with a full implementation set to be complete by Q1 2013. Forecasting for embedded variable resources will be developed in 2013. Additionally, Renewable Integration Initiative (RII) will facilitate the dispatching of renewable energy, with implementation set for Q4 2013.

Variable generation dispatch will allow for greater flexibility and help alleviate surplus baseload generation concerns.

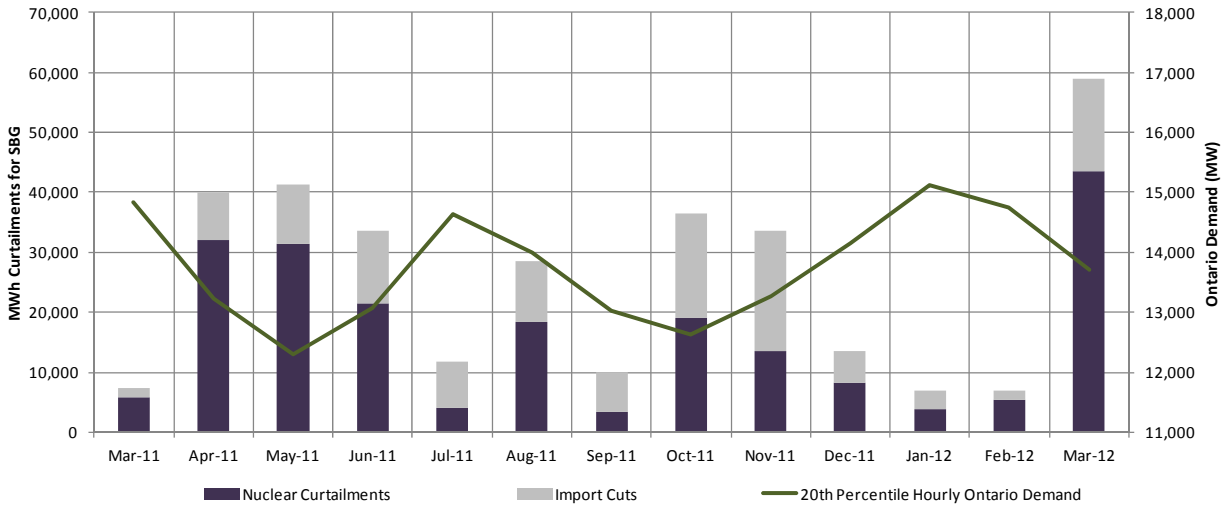
The Enhanced Day Ahead Commitment Process (EDAC) project successfully went live on October 11, 2011. EDAC is designed to enhance the efficiency of the electricity market through the advanced scheduling and commitment of resources that are required to provide electricity on a daily basis. The IESO will be carrying out an assessment of the project as part of our standard project closure – results of the assessment are expected to be available in the fall of 2012.

7.4 Surplus Baseload Generation (SBG)

Figure 7.4.1 shows the volume of nuclear and import curtailments due to surplus baseload conditions versus the bottom 20% hourly Ontario demand. Baseload generation is made up of nuclear, run of the river hydroelectric and variable generation such as wind. SBG conditions occur when the amount of baseload generation exceeds Ontario demand and is typically mitigated through exports. However, when the baseload fleet is expected to top Ontario demand plus scheduled exports, nuclear or import curtailments are often needed to eliminate the excess. When variable generation becomes dispatchable, additional flexibility will be available to diminish the frequency of out of market control actions for SBG. These actions usually occur in the spring and fall, when the Ontario demand is lowest, and seldom occurs in extreme heat or extreme cold conditions when air conditioning or heating keeps the demand high. The correlation between Ontario demand and surplus baseload curtailments is negative, that is, when Ontario demand is low, curtailments for SBG are typically high.

The amount of nuclear and import curtailments for SBG in Q1 of 2012 surpassed Q1 of 2011 by 41 GWh. The mild winter followed by the record-breaking high temperatures in March of this year escalated the SBG conditions.

Figure 7.4.1 MWh Curtailments for SBG versus Ontario Demand



7.4.1 Variation from 2011

One of the greatest variations seen in the first quarter of 2012 from last year is a decrease in imports. This difference was due to lower demands and prices, caused by a mild winter and record-breaking high temperatures in March.

Another large variation was in the frequency and energy volume of manual actions, such as nuclear unit maneuvers or import transaction curtailments, for surplus baseload generation conditions. In Q1 2012, there were 73 GWh of curtailments versus 32 GWh in Q1 of 2011. The rise in manual action is a result of lower minimum demands as well as a growing portfolio of baseload generation. The ability to dispatch renewable resources may help mitigate the need for these actions moving forward.

- End of Document -