18-MONTH OUTLOOK

From December 2010 to May 2012

ieso
Power to Ontario. On Demand.

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

Executive Summary

Ontario's supply outlook for the next 18 months remains positive. With 1,700 megawatts (MW) of new generation expected to come online, and a transmission system adequate to meet expected demands, the period from December 2010 to May 2012 presents no new reliability or adequacy concerns.

Of the 1,700 MW of new grid-connected generation, almost 1,000 MW represent renewable resources. In addition, approximately1,400 MW of additional embedded renewables are expected to come into service by the end of May 2012, bringing the total embedded generation contracted through the Feed In Tariff (FIT) and Renewable Energy Standard Offer (RESOP) programs to approximately 2,100 MW.

Although this Outlook covers the period up to and including May 2012, that entire year looks to be a real watershed in the evolution of Ontario's power system. Current projections for 2012 indicate new renewable resources will come into service at a rate of about 200 MW per month. Through this period – and beyond – the IESO will facilitate innovations in the way the province's bulk power system is operated, with an ongoing focus on reliability and efficiency.

The IESO is already preparing for tomorrow's renewable future. Grid-connected and embedded renewables contracted through the FIT and Renewable Energy Supply RES III programs are targeted under the recently-released Long Term Energy Plan at 10,700 MW by the end of 2018. This new supply is in addition to the 9,000 MW targeted for hydroelectric generation. The supply mix of the future will have unique operating characteristics and degrees of variability never before seen in Ontario.

In order to effectively manage the forecast uncertainty inherent with these new types of resources and ensure reliability going forward, the IESO is actively developing new operational policies and processes. The priority is to integrate renewables in a way that leverages existing processes, and maintains the efficient and reliable scheduling and commitment of electricity supply on a daily basis. This means optimizing the use of existing and anticipated generation and providing mechanisms to efficiently dispatch variable resources. To achieve that objective, the IESO is undertaking a renewables integration initiative covering a broad range of areas including centralized forecasting, dispatch requirements, treatment of and relationships with embedded facilities, management of surplus baseload generation, settlement issues, etc.

The planned deregistration of four coal-fired units went ahead as scheduled this fall with no adverse consequences to the Ontario grid. The removal of two additional Nanticoke units in 2011 was announced in the Long Term Energy Plan which was released as this outlook was being finalized. Results of IESO's assessments of the closure of the two units will be included in the next 18-Month Outlook, however the IESO does not foresee any reliability or adequacy concern with a shutdown following the summer peak load period. Although the supply conditions for the next 18 months are positive, the move to eliminate coal-fired generation by

2014 is still dependent on the completion of a number of infrastructure projects currently at various stages of construction including two Bruce nuclear units being re-started and the refurbishment project's associated transmission developments.

Over the forecast horizon, electricity demand will continue to be shaped by a number of competing forces. Population growth, an increase in the number of energy-intensive end-use electrical devices and greater economic activity are pushing demand for electricity upwards. However, this growth in demand is being mitigated by conservation measures and increased contributions from embedded generation.

Ontario's economy has experienced modest economic growth over the course of 2010. However, continued weakness in the world economy, in general, and the U.S. economy, in particular, is likely to moderate economic growth through 2011 and beyond. This is due to the fact that both consumers and governments have indicated they will curb spending to combat high levels of public and private debt.

Against this backdrop of low economic growth, conservation measures, embedded generation and time-of-use electricity rates will act to reduce peak demands throughout the forecast. Energy demand, on the other hand, will remain virtually flat in 2011 before showing a small increase in 2012. Energy consumption is expected to grow by 0.3% in 2011 and 0.6% in 2012.

The following table summarizes the key demand numbers.

Season	Normal Weather Peak (MW)	Extreme Weather Peak (MW)
Winter 2010-11	22,271	23,346
Summer 2011	23,481	25,861
Winter 2011-12	22,249	23,386

Conclusions & Observations

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

Demand Forecast

- Throughout the forecast, both peak and energy demand will face downward pressure from conservation programs and an increase in the amount of embedded generation.
- Electricity demand is expected to show small increases over 2011 and 2012. Underlying demand growth will remain weak, reflecting the state of the world economy in general and the U.S. economy in particular. Ontario's manufacturing sector is being squeezed by lower export demand and increased competition due to a lower U.S. dollar.
- Peak demands will remain fairly flat throughout the forecast. Conservation programs targeting peak demand, the growth in embedded generation and time-of-use rates will offset the increases due to population and building stock growth.
- With lower peak demand levels, system reliability will remain robust. Although high peak demands are likely under extreme weather conditions, they are not expected to pose any province-wide reliability concerns.

Resource Adequacy

- Reserve requirements are expected to be met for all weeks in both the firm and planned normal weather scenarios.
- Four coal-fired generation facilities were successfully de-registered this fall with no adverse consequences to the Ontario grid
- The Bruce nuclear unit refurbishments have been further delayed to Q1 and Q3 of 2012.
- As hydroelectric output levels are showing signs of returning to median levels, the methodology used to forecast hydroelectric output capability for the next 18 months has returned to median historic hydroelectric output values.

	Normal Weather Scenario	Extreme Weather Scenario
Planned Scenario	• There are no weeks where reserve is lower than required	• There is 1 week where reserves are lower than required.
Firm Scenario	• There are no weeks where reserve is lower than required	• There is 1 week where reserves are lower than required.

- Under all scenarios, 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, has been further improved with the addition of the Halton Hills Generating Station. A long-term de-rated Trafalgar autotransformer may require minor mitigation measures under extreme weather conditions if additional transmission elements are lost.
- Demand growth over the last decade in different regions of the province 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, several Ontario transmitters and distributors have initiated plans to build new or replace existing transformer stations and reinforce the transmission system as necessary. As a result of this coordinated effort, several projects relating to local load supply improvements, shown in Appendix B, 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.
- In order to help facilitate outages of two of the Niagara interties scheduled for November and December 2010, Hydro One constructed a bypass facility around the failed R76 voltage regulator. This bypass facility has allowed BP76 circuit to be returned to service for the duration of this work. The expected return to service of BP76, with R76 replaced, is currently December 2012.
- 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 retirement of Lambton GS units 1 and 2, completed in October 2010, is expected to significantly reduce, but not totally eliminate, local congestion over the remainder of this Outlook period.
- In preparation for the planned removal from service of major southern Ontario coal-fired units, Hydro One is installing additional reactive compensation in western and southwestern Ontario.
- 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 IESO has contacted Hydro One, and is also in conversations with the OPA, in efforts to examine the short- and long-term solutions to this problem. Conversion of the Atikokan GS to biomass will preserve its ability for voltage control in that part of the system.

Operability

- SBG conditions are expected in summer and winter 2011 although they may occur during other periods but should be of minor duration.

  The IESO is currently working to address potential future operability issues associated with the growing amount of renewable resources expected to come into service over the next few years.

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Table of Contents

List of Tables

List of Figures

1.0 Introduction

This Outlook covers the 18-month period from December 2010 to May 2012 and supersedes the last Outlook released in August 2010.

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 August 2010. The economic outlook has been updated based on the most recent data. Actual weather and demand data for September and October have been included in the tables.

2.2 Updates to Resources

The following changes have occurred since the previous outlook.

- Shutdown of coal-fired Units 1 & 2 at Lambton and Units 3 & 4 at Nanticoke (-1,950 MW)
- Halton Hills Generating Station (+705 MW)
- Conversion of Sandy Falls from 25 Hz to 60 Hz (+6 MW)
- Conversion of Wawaitin from 25 Hz to 60 Hz (+15 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 October 12, 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 September 24, 2010 were used.

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 October 12, 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.

- 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 December 2010 to May 2012 and supersedes the previous forecast released September 2010. Tables containing supporting information are contained in the 2010 Q4 Outlook Tables spreadsheet.

Electricity demand is expected to show small incremental growth over 2011 and 2012. The post-recession period has not lead to a strong rebound in the global economy. High public debt, low consumer confidence and the reduction of stimulus spending will mean weak economic growth over the forecast horizon. In addition to this economic backdrop, Ontario's energy-intense export industries are further hampered by the low U.S. dollar.

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

The following table shows the seasonal peaks and annual energy demand over the forecast horizon of the Outlook.

Table 3.1: Forecast Summary

Season	Normal Weather Peak (MW)	Extreme Weather Peak (MW)
Winter 2010-11	22,271	23,346
Summer 2011	23,481	25,861
Winter 2011-12	22,249	23,386
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)	142.4	1.4%
2011 Energy (Forecast)	142.9	0.3%
2012 Energy (Forecast)	143.7	0.6%

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 of the impact of the drivers affecting demand

The data contained in the Ontario Demand Forecast document are included in the 2010 Q4 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

Over the course of the Outlook period about 1,700 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 Generation Resources as of October 20, 2010

Fuel Type	Total Installed Capacity (MW)	Forecast Capability at Winter Peak* (MW)	Number of Stations	Change in Installed Capacity (MW)	Change in Stations
Nuclear	11,446	11,339	5	0	0
Hydroelectric	7,924	6,180	70	21	0
Coal	4,484	4,267	4	-1,950	0
Oil / Gas	9,497	8,054	28	705	1
Wind	1,084	364	8	0	0
Biomass / Landfill Gas	122	34	6	0	0
Total	34,557	30,239	121	-1,224	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.

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 existing capacity 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

Proponent/Project Name	Zone	Fuel Type	Estimated Effective Date	Change (Previous Reported Date)	Project Status	Capacity Considered	
						Firm (MW)	Planned (MW)
Return of Lower Sturgeon as 60 Hz plant	Northeast	Water	2010-Q4		Construction	14	14
Hound Chute	Northeast	Water	2010-Q4		Construction	10	10
Gosfield Wind Project (RES III)	West	Wind	2010-Q4	Advanced	Commissioning	51	51
Raleigh Wind Energy Centre (RES III)	West	Wind	2011-Q1		Construction	78	78
Kruger Energy Chatham Wind Project (RES III)	Southwest	Wind	2011-Q1	Advanced	Commissioning	99	99
Talbot Windfarm (RES III)	Southwest	Wind	2011-Q1	Advanced	Construction		99
Leamington Pollution Control Plant	West	Oil	2011-Q2		Approvals & Permits		2
Greenwich Wind Farm (RES III)	Northwest	Wind	2011-Q3	Advanced	Construction		99
Becker Cogeneration (CHP III)	Northwest	Biomass	2011-Q3		Construction		15
McLean's Mountain Wind Farm 1 (FIT)	Northeast	Wind	2011-Q3		U/D		50
McLean's Mountain Wind Farm 3 (FIT)	Northeast	Wind	2011-Q3		U/D		10
Comber West - C23Z Wind Project (FIT)	West	Wind	2011-Q3		U/D		83
Comber East - C24Z Wind Project (FIT)	West	Wind	2011-Q3		U/D		83
Pointe Aux Roches Wind (FIT)	West	Wind	2011-Q3		U/D		49
Conestogo Wind Energy Centre 1 (FIT)	Southwest	Wind	2011-Q4		U/D		69
Bruce Unit 2	Bruce	Uranium	2012-Q1	Delayed	Construction		750
Summerhaven Wind Energy Centre (FIT)	Southwest	Wind	2012-Q1		U/D		125
Bow Lake Phase 1 (FIT)	Northeast	Wind	2012-Q2		U/D		20
Total						**252**	**1,706**

***The removal of two Nanticoke units in 2011, as indicated in the Ministry of Energy's Long Term Energy Plan is not reflected in this analysis.**

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. U/D - Feed-in Tariff (FIT) projects are not tracked for milestones and therefore indicated as under development (U/D)

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. Both scenarios recognize that resources that are in service are not available during times for which the generator has submitted planned outages. What is also considered for both scenarios is 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 and generation capacity.

The generation capability assumptions are as follows:

- Low hydroelectric output during the summer caused the IESO to utilize 98th percentile historic values to represent hydroelectric capability for the months of September and October in the previous outlook.

- With hydroelectric output returning to median values, the hydroelectric capability (including energy and operating reserve) for the duration of this outlook has returned to being based on median historical values during weekday peak demand hours from May 2002 to March 2010.
- 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 29%.

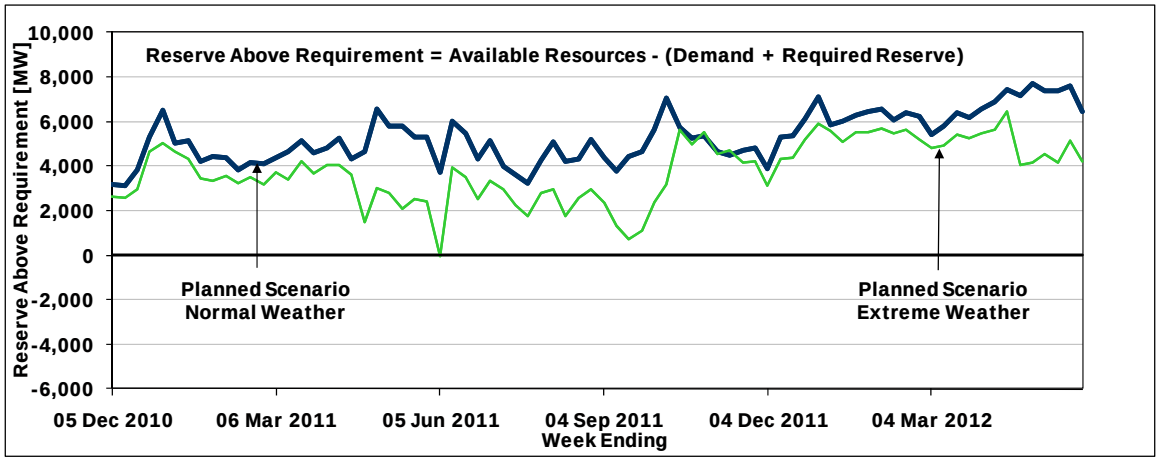
Table 4.3 Summary of Scenario Assumptions

Assumptions		Planned Scenario	Firm Scenario
Resource	Existing Installed Resources	Total Capacity	Total Capacity
		34,557 MW	34,557 MW
	New Generation and Capacity Changes	All	Only Capacity Changes, Generator shutdowns or retirements, Commissioning Generators and Generators starting in the first 3 months
		1705 MW	252 MW
Demand Forecast	Conservation	Incremental	
		Incremental growth of 75 MW on winter peak	
	Embedded Generation	Incremental	
		Incremental growth of 50 MW on winter peak	
	Demand Measures	Incremental	Existing
		1,049 MW	685 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.

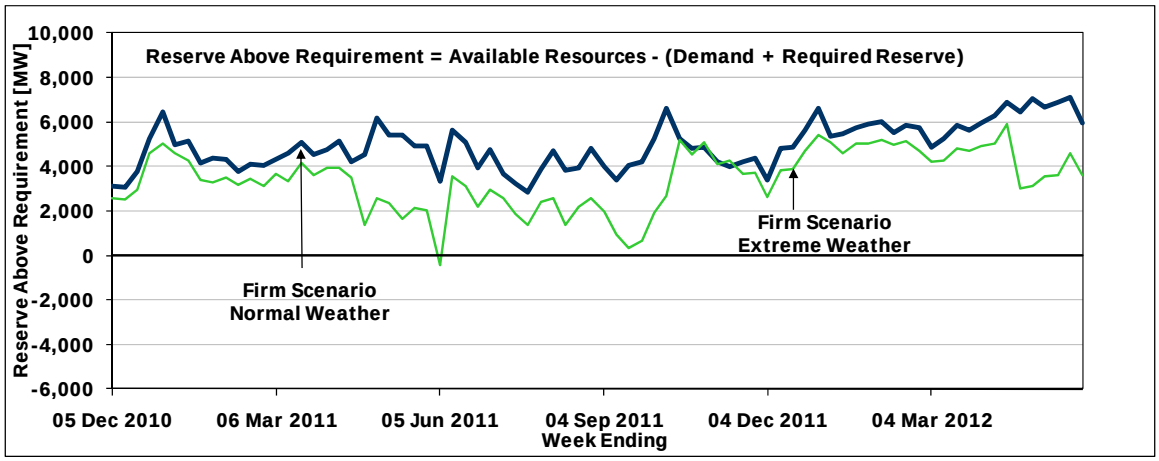
Figure 4.1 Reserve Above Requirement: Planned Scenario with Normal vs. Extreme Weather



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 Q4 Outlook Tables Appendix A, Table A7.

Table 4.4 Summary of Available Resources

Notes	Description	Winter Peak 2011		Summer Peak 2011		Winter Peak 2012	
		Firm Scenario	Planned Scenario	Firm Scenario	Planned Scenario	Firm Scenario	Planned Scenario
1	Installed Resources (MW)	34,710	34,710	34,809	34,910	34,809	35,367
2	Imports (MW)	0	0	0	0	0	0
3	Total Resources (MW)	34,710	34,710	34,809	34,910	34,809	35,367
4	Total Reductions in Resources (MW)	5,732	5,763	5,068	5,154	4,199	4,613
5	Demand Measures (MW)	685	763	685	1,049	685	1,049
6	Available Resources (MW)	29,663	29,710	30,426	30,805	31,295	31,803

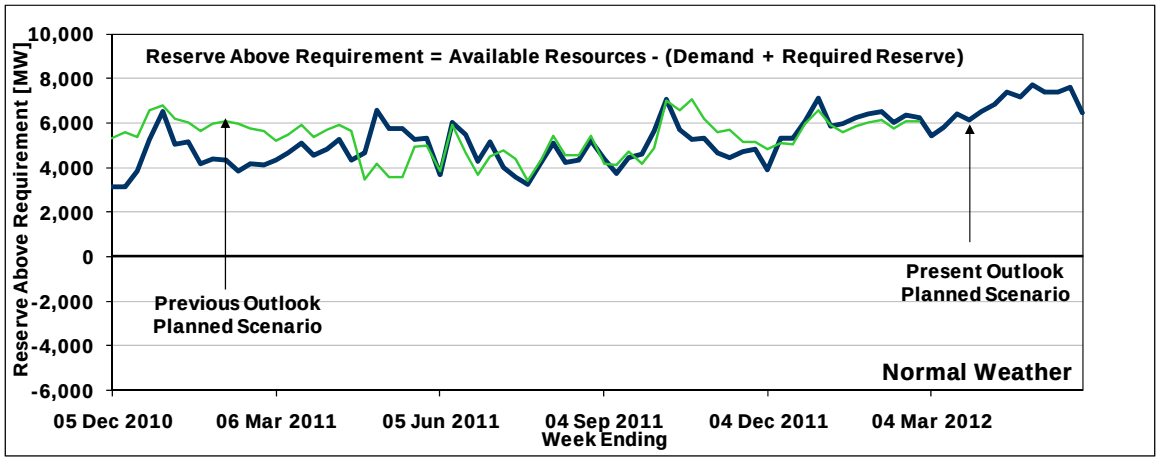
Notes to Table 4.4:

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 August 23, 2010. The difference is mainly due to the changes to outages, and the change in the demand forecast.

Figure 4.3 Reserve Above Requirement: Planned Scenario with Present Outlook vs. Previous Outlook



Resource adequacy risks are discussed in detail in the "Methodology to Perform Long Term Assessments" (IESO_REP_0266).

- End of Section -

5.0 Transmission Reliability Assessment

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

- Identify all major transmission and load supply projects that are planned for completion during the Outlook period and present 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 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, several Ontario transmitters and distributors have initiated plans to build new, replace or upgrade 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 to come 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 develop 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 September 24, 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 resources and the planned shutdown or conversion 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 scheduled to come into service during this Outlook period.

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 on identifying the transmission enhancements' location, timing and requirements to satisfy reliability standards.

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 expected to be adequate for supplying the forecasted demand.

The addition of Halton Hills GS reduced the peak loading of the Trafalgar 500/230 kV autotransformers allowing for more operational flexibility. Some mitigating measures may be required under extreme

conditions to accommodate a long term de-rated 500/230 kV autotransformer at Trafalgar TS and other possible unavailability events.

Over the last few years the southwest GTA demand experienced moderate growth, compared to previous years, resulting in supply margins still being available. Load growth is continuing, and although the need is not immediate, action on a solution is required in the near future. To address this need transmission reinforcement solutions are now being considered in order to maintain reliability in the area. Work is now commencing among the OPA, IESO and Hydro One in determining the preferred option to address this concern.

The York Region load-serving capability will be reinforced with the addition of York Energy Centre that is scheduled to go in service mid-2012.

Some outages at Claireville TS and Parkway TS scheduled during the current Outlook period will result in reductions to southern Ontario transmission interface limits.

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 that will continue during this Outlook period. The successful shutdown of two Nanticoke units in October 2010 reduced the potential for constrained generation in this region.

In the longer term, the proposed 500 kV line from Bruce to Milton will provide the required transmission capability to deliver the full benefits of the Bruce refurbishment project and the development of new renewable resources in southwestern Ontario. The preparatory work for this line will continue during this Outlook period. Outages related to this work have the potential to temporarily reduce the transfer capability out of the Bruce zone. Hydro One and the affected parties are implementing the outage plan designed to minimize the overall impact of these outages.

To prevent low voltage conditions in the 115 kV transmission system in the Woodstock area during summer extreme weather conditions, Hydro One is planning to add a new transformer station and a second supply point by extending the 230 kV transmission lines from Ingersoll to the Woodstock area and installing a new 230/115 kV transformer station. These plans, scheduled to be completed during the third quarter of 2011, 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, allow future load growth and yield a more flexible configuration. The remaining work, which includes the replacement of all 115 kV breakers and limiting bus sections, is scheduled to be completed before the end of 2012.

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

As identified in previous IESO reports the existing transmission infrastructure in the Cambridge area is unable to meet the IESO's load restoration criteria following a contingency. The OPA is currently working on solutions to alleviate this issue pending a decision during this Outlook period.

5.3.3 Niagara Zone and the New York Interconnection

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

As indicated in previous outlooks, outages requiring the removal of two of the Niagara interties (PA301 and PA302) are currently underway and will continue into December 2010. These outages reduce the transfer capability of the Niagara interconnection and also impact Ontario to Michigan transfers. In order to help facilitate these outages, Hydro One built a bypass facility around the failed R76 voltage regulator that has allowed the BP76 circuit to be returned to service during this work. The expected return to service of BP76, with R76 replaced, is currently December 2012.

5.3.4 East Zone and Ottawa Zone

The planned outages in the East and Ottawa zones are not expected to have any impact on the load supply in this area.

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 successful shutdown of two Lambton GS coal-fired units in October 2010 reduced, but did not totally eliminate, the amount of bottled generation in this zone.

Phase angle regulators (PARs) are installed on the Ontario-Michigan interconnection at Lambton TS on the Ontario side and at Bunce Creek TS in Michigan, representing three of the four interconnections with Michigan. These will not be operational until completion of agreements between the IESO, MISO, Hydro One and International Transmission Company (ITC). These agreements are expected to be executed by the end of 2010 targeting Q1 of 2011 for starting PAR operations. The operation of these PARs along with the PAR on the Ontario-Michigan interconnection near Windsor will control flows to a limited extent, and assist in the management of system congestion.

5.3.6 Northeast and Northwest Zones

The transmission lines east of Mississagi TS and the north-south corridor have experienced increased congestion due to the continuing addition of new renewable resources and the lack of transmission reinforcements. It is expected that congestion will further increase with the proposed and under construction projects in the area becoming operational.

To help reduce this congestion and incorporate the future Lower Mattagami expansion projects and other renewables, Hydro One is planning to install additional dynamic and static reactive compensation facilities at Porcupine TS in the fourth quarter of 2010 and the fourth quarter of 2011, dynamic reactive compensation facilities at Kirkland Lake TS in the first quarter of 2011 and series compensation at Nobel SS on the north-south corridor in the fourth quarter of 2010.

Managing grid voltages in the Northwest has always required special attention. With significantly lower demands, it is increasingly difficult to maintain an acceptable voltage profile without compromising the reliability of the supply.

Over the past year it has become more difficult to manage voltages throughout the Northwest transmission system. 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 undermined the customer's supply reliability. Additional reactive compensation is required for voltage control in this zone.

The IESO has contacted Hydro One, and is also in conversations with the OPA, in an effort to examine the short- and long-term solutions to this problem.

Some loads connected to the circuits emerging from Ear Falls TS experienced significant growth over the last few years and recently indicated their intention to grow even further. The transmission circuits in the area are currently very close to their capability and as a result have no margin to support the expected load growth without upgrades or re-enforcements.

- End of Section -

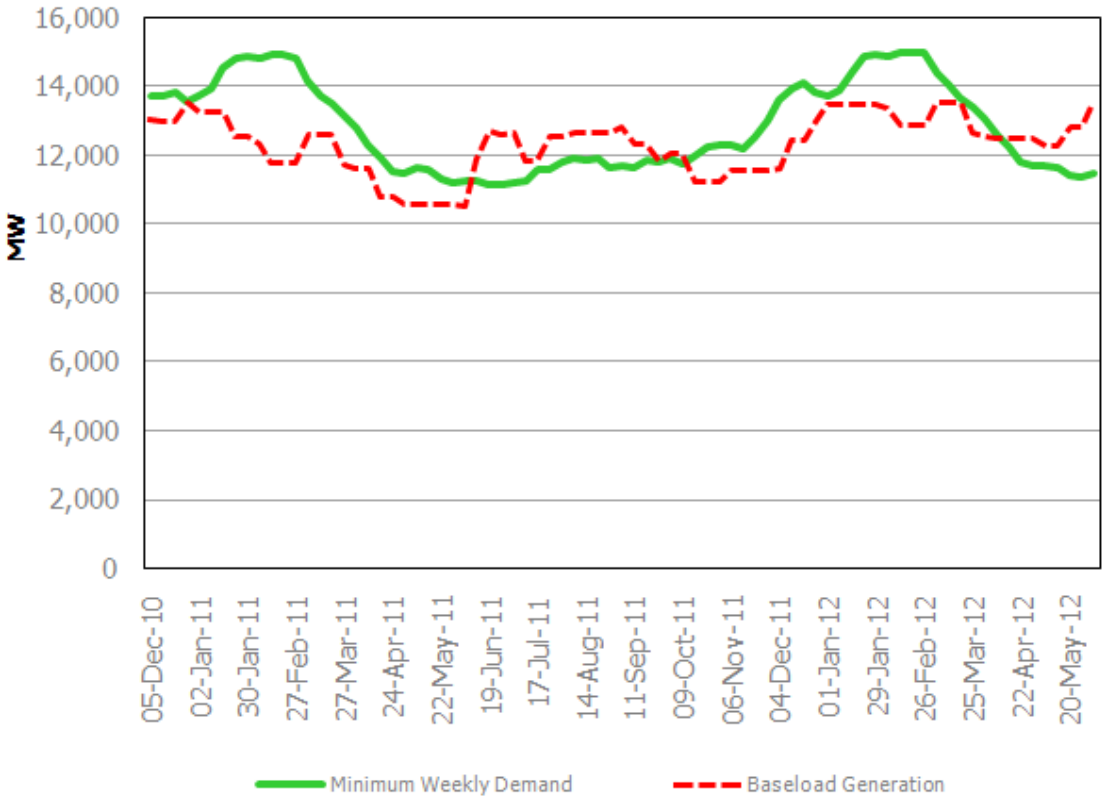
6.0 Operability Assessment

The IESO monitors existing and emerging operability issues that could potentially impact system reliability. Previous Outlooks have reported on the occurrence of, and provided forecasts for, surplus baseload generation (SBG). In addition to this, the current Outlook will introduce additional operability-related issues that are expected to emerge over the next 18 months. The primary driver for the reporting of these issues is the anticipated addition of significant amounts of variable generation on both the transmission and distribution system. Through various forums, the IESO has actively engaged and will continue to engage stakeholders in the development of potential solutions to emerging operability issues[1].

6.1 Surplus Baseload Generation Forecast

Since the last Outlook, there have been a few isolated incidents of SBG primarily on the weekends. Over the next 18 months, the IESO expects the risk of experiencing SBG conditions will be most prevalent over the summer of 2011. In addition, there is increased risk of SBG conditions in the spring of 2012, coincident with the return of nuclear generation from planned outage and refurbishment.

Figure 6.1 Minimum Demand and Baseload Generation



[1] Wind Power Standing Committee: http://www.ieso.ca/imoweb/consult/consult_windpower-sc.asp
(SE-57) Embedded and Renewable Generation: http://www.ieso.ca/imoweb/consult/consult_se57.asp
(SE-91) Renewable Integration: http://www.ieso.ca/imoweb/consult/consult_se91.asp

Figure 6.1 shows projected weekly minimum demand against the expected level of expected baseload generation. Baseload generation assumptions have been updated to include exports[2], the latest planned outage information, market participant submitted data, and in-service dates for new or refurbished generation. The expected contribution from self-scheduling and intermittent generation has also been updated to reflect the latest data. Output from commissioning units is explicitly excluded from this analysis due to uncertainty and highly variable nature of commissioning schedules.

6.2 Introduction to Additional Operability Issues

Over the next 18 months, approximately 1,000 MW wind capacity is expected to be added to the transmission system. An additional 300 MW of wind and 1,100 MW of solar capacity are also expected to connect to the distribution-side of the bulk power system. In all, approximately 4,000 MW of wind and solar generation will be in-service and generating electricity by June 2012. These types of renewable generation are notable for the variable nature of their fuel source, as well as the manner in which they currently operate as intermittent generators under existing IESO Market Rules, manuals and processes. In future Outlooks, the impact of variable generation will be reported on with respect to operability issues such as load following, regulation requirements and potential enhancements to energy reserves.

- End of Section -

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

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 six months of actual demand and weather data have been reported.

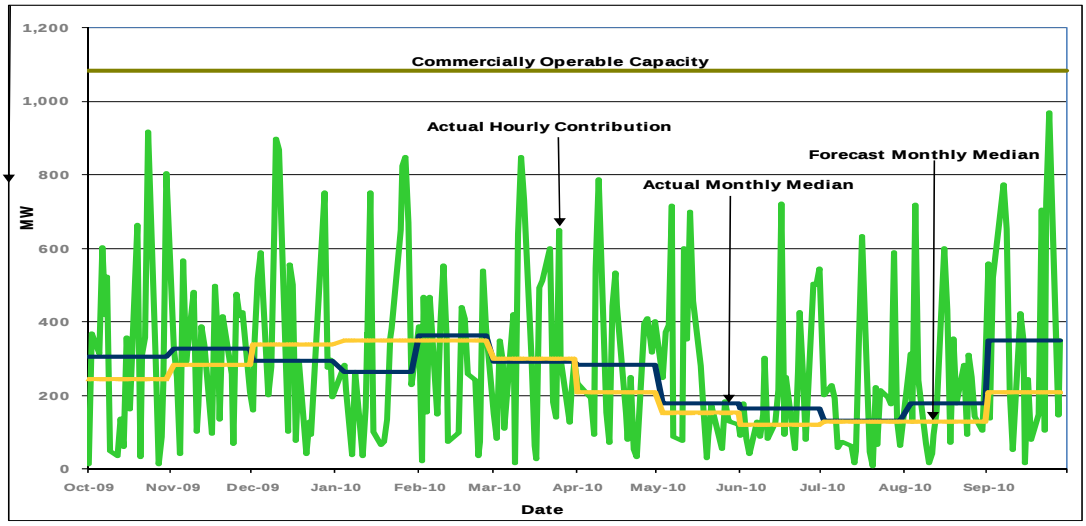
For the period May through October, the weather was generally hotter than normal, the exception being June. All of the months showed a year-over-year increase in demand with the exception being October. For the 10 months ending in October, actual demand is up 2.4% compared to 2009 (1.9% weather corrected). However, demand is still 4.5% below that of the pre-recession levels of 2008 (4.7% 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 October 1, 2009 to September 30, 2010. Holiday and weekend data were not considered in the analysis since hydro peaking generation and interchange data during this timeframe is 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. The median wind production over the 2010 summer is slightly higher than the forecast Wind Capacity Contribution (WCC) assumption. At the time, the WCC forecast was assumed to be approximately 11% of total installed capacity during the summer months. WCC values have now been updated and the summer values are now approximately 13%. As for trending, it follows the prevalent wind speeds during each season. Installed wind capacity is also expected to grow with wind generation procured under the RES III and 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 for most of the 2010 spring months was lower than forecasted. This is primarily due to a decrease in precipitation levels from previous years. In addition, a relatively calm spring thaw (or freshet) was observed due to reduced snow and ice accumulation over the winter. We expect that hydro will increase and return to similar historical trending. As for the winter months, the data generally coincided with expected levels of hydroelectric generation with the exception of November 2009.

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

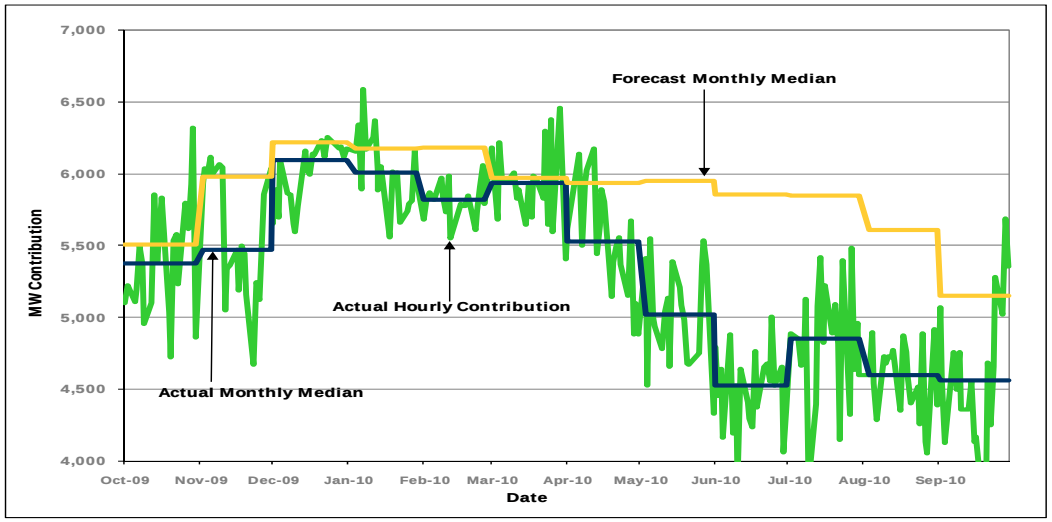


Figure 7.2.3 shows imports into Ontario at the time of weekday peak. Similar to the past year, Ontario followed its typical trend, attracting more imports during the relatively higher demand periods characteristic for the winter and summer months. Average hourly imports during the summer of 2010 saw an increase in frequency from a year ago as warmer temperatures were observed for most of the season.

Figure 7.2.3 Imports into Ontario at the Time of Weekday Peak

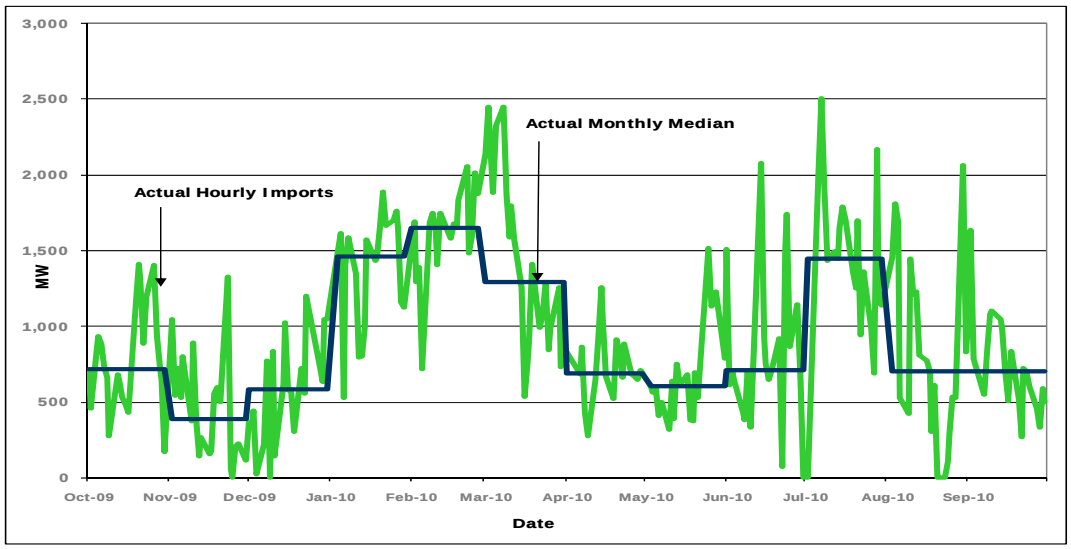
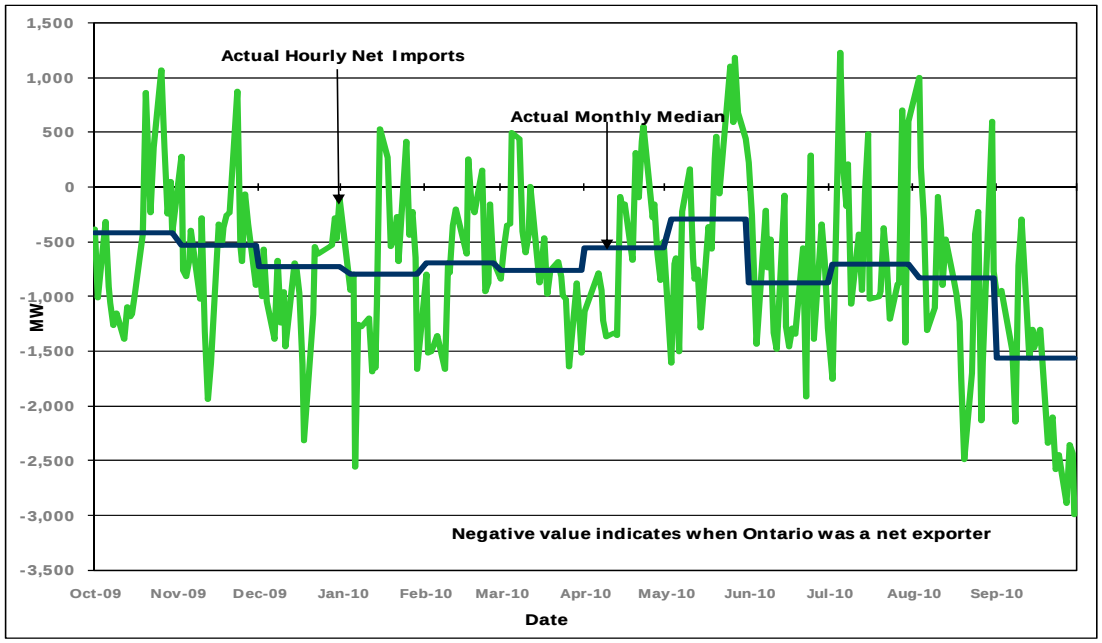


Figure 7.2.4 shows the amount of net imports into Ontario at the time of weekday peak, excluding weekends and holidays. Net Interchange is the difference between total imports into Ontario and total exports out of Ontario. Although actual import activity for the summer was higher, an average net export position still prevailed for the season. This can be attributed to an increase in export capability with Quebec, and an increase in generator capacity over the previous years.

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



7.3 Report on Initiatives

Centralized forecasting for wind resources is an initiative designed to allow for better forecasting of energy production to ensure a more accurate unit commitment occurs. A centralized wind forecast will be developed for all resources with an installed capacity of 5 MW or greater, with implementation set for 2012. This initiative may be extended to other variable resources such as solar as their aggregate installed capacity becomes material.

Replacement of the existing outage management system is underway with the implementation scheduled for December 2010. A web-based interface using the existing portal will allow market participants to electronically submit outages to the IESO through an Application Programming Interface (API). This initiative will significantly improve the outage management process through better communications and transparency of information with market participants.

The Enhanced Day Ahead Commitment (EDAC) project is an ongoing initiative 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 project is currently in the IT Design and Build phase which involves the update and delivery of systems and processes that the IESO uses to perform day-ahead functions. Testing of this phase commenced in the fall of 2010 and will continue until spring 2011.

7.4 Variation from Previous Year

The biggest variation from the previous year is that in 2010 we saw lower hydroelectric production during the spring and summer months. The major factor that contributed to this variation is the decrease in precipitation levels from previous years.

- End of Document -