18-MONTH OUTLOOK

From June 2009 to November 2010

ieso

Power to Ontario. On Demand.

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

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Executive Summary

Several factors on both the supply and demand side of Ontario's electricity sector are contributing to a relatively positive reliability outlook for the province over the next 18 months.

From a supply perspective, nearly 3,800 megawatts (MW) of new and refurbished supply is scheduled to come into service over the next 18 months. This new generation comprises a range of projects, including nuclear, thermal and renewable resources like wind and small-scale hydroelectric.

In addition to this new supply, Ontario's import capability will increase with completion of the first stage of the new interconnection between Ontario and Québec, scheduled to be in service in the summer of 2009. Additional transmission reinforcements in Québec scheduled to be in service by May 2010 will allow transfers up to 1,250 MW.

The current schedule calls for the return to service of two refurbished units at the Bruce Power plant in the second half of 2010. This will increase Ontario's electricity supply options, but some of this new supply may be constrained until the Bruce-to-Milton transmission line is completed, along with other transmission enhancements.

The economic downturn that began last fall has triggered a noteworthy drop in demand for electricity across North America. In Ontario, peak and energy demand have declined in recent months, in part, as wholesale industrial consumers have scaled back on consumption. Over the first three months of the year, wholesale industrial consumption of electricity dropped by approximately 20 per cent compared with the same period in 2008. Other factors affecting demand are the growth in embedded generation and the impacts of conservation. Although the North American economy is expected to recover in 2010, electricity demand is unlikely to recover within the Outlook period. Overall, electricity demand in Ontario is expected to decline by 4.0 per cent in 2009 and 0.3 per cent in 2010.

In recent months, supply and demand conditions contributed to periods of surplus baseload generation (SBG) from late March to mid-April 2009. These periods were accompanied by record low negative prices. A confluence of factors led to these conditions:

- Low demand due to the economic downturn, increased conservation and embedded generation, and relatively mild spring weather
- High availability and output of baseload generation, including nuclear, wind and hydroelectric generation driven by spring freshet (or snow melt)

- Planned transmission outages, including an outage on the New York interconnection, which significantly reduced Ontario's export capability

Surplus generation conditions will reappear at various times over the next 18 months, particularly when demands are low or baseload and intermittent generator production is high. Those periods may represent opportunities for large volume customers to take advantage of lower hourly prices through increased consumption.

The following table summarizes the planned scenario's peak demands for the upcoming seasons under the Normal and Extreme weather scenarios

Season	Normal Weather Peak (MW)	Extreme Weather Peak (MW)
Summer 2009	24,351	26,454
Winter 2009-10	22,886	24,046
Summer 2010	24,160	26,348

Conclusions & Observations

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

Overall

- The system is positioned to operate reliably over the Outlook period. There will be challenges associated with accommodating new facilities and growing surplus baseload generation.

Demand Forecast

- The current recession has significantly reduced electricity demand on the system. Both energy and peak demands are tracking much lower than a year ago. Although the economy is expected to recover in 2010, electricity demand will not due to structural change in the Ontario economy, higher levels of conservation and continuing growth in embedded generation.
- Lower energy and peak demand levels will act to enhance system reliability. Although high peak demands are likely under extreme weather conditions they should not pose any province-wide reliability concerns.
- The economic downturn has led to a reduction in base load demand. The impact is particularly evident overnight when weather sensitive loads are quite small. Therefore, the system is experiencing lower minimum demand levels. This can have operational impacts as lower minimum demands increase the likelihood of surplus base load generation.

Resource Adequacy

- A number of units are scheduled to return to service from planned outage before summer. Meeting these schedules is critical to maintaining adequate reserve levels over the summer season. Delays will have a negative impact to the reliability of the system.
- The Outlook demonstrates that the initial emission targets from coal-powered generation should be achievable over the next 18 month period without impacting on reliability, although the complete strategy for 2010 has not been confirmed.
- Resource adequacy assessments look at two different resource scenarios (Planned and Firm) and two different weather scenarios (Normal and Extreme). Results of the resource adequacy assessment are summarized in the matrix below.

	Normal Weather Scenario	Extreme Weather Scenario
Planned Scenario	• Reserves are higher than required for all but two weeks.	• There are 18 weeks where reserves are lower than required.
Firm Scenario	• There are four weeks when reserves are lower than required.	• There are 28 weeks where reserves are lower than required.

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

Transmission Adequacy

- The Ontario transmission system with the planned system enhancements and transmission outages is expected to be adequate to supply the demand under the extreme and normal weather conditions forecast for the Outlook period.
- The supply reliability under extreme weather conditions, in particular to the GTA, will be improved with the availability of Goreway Station, the combined cycle operation of Portlands Energy Center and, looking further ahead, by the addition of Halton Hills Generating Station.
- Several projects relating to local load supply improvements will be placed in service during the timeframe of this Outlook to help relieve loadings of existing transformer stations and provide additional transformer capacity for future load growth.
- The ongoing forced outage of BP 76 on the New York – Ontario interface at Niagara will result in a reduced total Ontario - New York import and export scheduling capability until the circuit's scheduled return to service in Q3 2010.
- The new Ontario-Québec interconnection commissioning now and is scheduled for service by the middle of 2009. Additional transmission reinforcements in Québec are scheduled to be in service in May 2010 which will allow transfers up to 1,250 MW.
- Transmission outages scheduled in this Outlook period in the Bruce, Niagara, Southwest and West zones will result in reductions to the transfer capability out of the Bruce area for periods of time. The resulting limit reductions along with the increase of available generation in those areas will result in bottled generation capacity in the Bruce and West zones. Outages in the Northeast and Northwest zones will cause a reduction of the EWTE limit that contribute to the amount of bottled generation expected to occur in these zones.
- With the availability of Greenfield Energy Center, St Clair Energy Center and Lambton GS resources in the first quarter of the 2009, transmission constraints may limit the ability to utilize resources in southwestern Ontario in conjunction with imports from Michigan. The frequency and magnitude of congestion could be further increased by transmission outages and weather conditions.

- Hydro One's plan to enhance the existing Mississagi TS and Algoma TS generation rejection schemes by the later part of 2009 will improve the power transfer capability of the transmission corridor east of Mississagi and reduce the bottling of resources west of Mississagi.
- The deregistration of facilities and subsequent retirement of the Niagara 25 Hz system is complete. The Northeast 25 Hz system is also expected to be retired by 2010.

Operability

- Surplus baseload supply situations have occurred more frequently this spring than in previous years and the expected frequency will increase further as more baseload generation is added to the system and minimum demand levels continue at low levels due to the combined impacts of current economic conditions and conservation.

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Caution and Disclaimer

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1.0 Introduction

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

The purpose of the 18-Month Outlook is:

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

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

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

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

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

- Toll Free: 1-888-448-7777
- Tel: 905-403-6900
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2.0 Updates to This Outlook

2.1 Updates to Demand Forecast

The demand forecast was based on actual demand, weather and economic data through to the end of February 2009. The economic outlook has been updated based on the most recent data. Actual weather and demand data for March and April has been included in the tables.

Past outlooks have included both a planned and firm demand scenario. This outlook only presents the scenario where conservation, demand management and embedded generation are expected to grow over the forecast horizon. This is consistent with the previous planned demand scenarios.

2.2 Updates to Resources

Installed capacity has increased by 935 MW since the last Outlook as the following projects became operational:

- Lac Seul Hydroelectric Project (12 MW)
- St. Clair Energy Centre (678 MW MW)
- Portlands Energy Centre Combined Cycle Operation (245 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 April 27, 2009.

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 27, 2009 were used.

2.4 Updates to Operability Outlook

The IESO has begun to report on system operability issues as they affect reliability. This topic is expected to evolve and grow over time as the new supply mix unfolds. Surplus baseload assumptions have been enhanced over the previous Outlook.

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3.0 Demand Forecast

The IESO is responsible for forecasting electricity demand on the IESO-controlled grid. This demand forecast covers the period June 2009 to December 2010 and supersedes the previous forecast released March 2009. Tables containing supporting information are contained in the 2009 Q2 Outlook Tables spreadsheet.

Demand is expected to decline over the forecast horizon. The economy is expected to hit its trough later this year before recovering late in 2010. In the near term both peak and energy demand will fall with the economic contraction. Economic recovery, as measured in GDP, will not coincide with a recovery in electricity demand. Both peak and energy demand will be lower due to structural changes in the Ontario economy, increased conservation and growth in embedded generation.

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 2009	24,351	26,454
Winter 2009-10	22,886	24,046
Summer 2010	24,160	26,348
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 (Forecast)	142.9	-4.0%
2010 Energy (Forecast)	142.5	-0.3%

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,
- a discussion on the drivers affecting demand.

The data contained in the Ontario Demand Forecast document are included in the Outlook – Table spreadsheet.

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4.0 Resource Adequacy Assessment

This section provides an assessment of the adequacy of resources to meet the forecast demand. The key messages are:

- When reserves are below required levels with potentially adverse effects on the reliability of the grid, the IESO has the authority to reject outages based on their order of precedence.
- Conversely, an opportunity exists for additional outages when reserves are above required levels.

These actions address shortages and surpluses of reserves to a large extent.

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

Over the course of the Outlook period over 3,800 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. Additionally, the new interconnection with Québec will increase transfer capabilities by the middle of 2009.

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

Table 4.1 Existing Installed Generation Resources as of May 5, 2009

Fuel Type	Total Capacity (MW)	Number of Stations	Change in Capacity (MW)	Change in Stations
Nuclear	11,426	5	0	0
Hydroelectric	7,835	69	12	0
Coal	6,434	4	0	0
Oil / Gas	7,582	25	923	1
Wind	704	6	0	0
Biomass / Landfill Gas	75	5	0	0
Total	34,056	114	935	1

4.1 Committed and Contracted Generation Resources

Table 4.2 summarizes generation that is scheduled to come into service, be upgraded or retired within the Outlook period. This includes generation projects in the IESO's Connection Assessment and Approval Process (CAA) that are under construction and projects contracted by the OPA. Details regarding the IESO's CAA process and the status of all projects in the CAA queue can be found on the IESO's web site at http://www.ieso.ca/imoweb/connassess/ca.asp.

The estimated effective date in Table 4.2 indicates the date on which additional capacity is assumed to be available to meet Ontario demand. For projects that are under contract, the estimated effective date is the best estimate of the date when the contract requires the additional capacity to be available. If a project is delayed the estimated effective date will be the best estimate of the commercial in-service date for the project.

Table 4.2 Committed and Contracted Generation Resources

Proponent/Project Name	Zone	Fuel Type	Estimated Effective Date	Change	Project Status	Capacity Considered in Scenario (MW)	
						Firm (MW)	Planned (MW)
Lac Seul Hydroelectric Project	Northwest	Water			In-Service		
Portlands Energy Centre Combined Cycle Operation	Toronto	Gas			In-Service		
LaSalle Recreation Centre	West	Oil	2009-Q2		Commissioning	1	1
St. Clair Energy Centre	West	Gas			In-Service		
Goreway Station Project	Toronto	Gas	2009-Q2		Commissioning	839	839
Algoma Energy Cogeneration Facility	Northeast	By-Product Gas	2009-Q2		Construction	63	63
Enbridge Ontario Wind Farm (formerly Underwood WGS or Leader Wind Power Projects)	Southwest	Wind	2009-Q2		Commissioning	182	182
Wolfe Island Wind Project	East	Wind	2009-Q3		Construction	198	198
Nuclear Upgrade	N/A	Uranium	2009-Q3		Construction	27	27
East Windsor Cogeneration Centre	West	Gas	2009-Q3		Construction		84
Retirement of Wawaitin 25 Hz generation to	Northeast	Water	2010-Q1		Connection Assessment	-11	-11
Thorold Cogeneration Project	Niagara	Gas	2010-Q2		Construction		236
Healey Falls	East	Water	2010-Q2		Construction		16
Bruce Unit 2	Bruce	Uranium	2010-Q3	Delayed	Construction		750
Raleigh Wind Energy Centre	West	Wind	2010-Q3		Approvals & Permits		78
Halton Hills Generating Station	Southwest	Gas	2010-Q3		Construction		632
Bruce Unit 1	Bruce	Uranium	2010-Q4	Delayed	Construction		750
Total						**1,299**	**3,845**

Notes to Table 4.2:

1. Shading indicates a change from the previous Outlook.
2. The total may not add up due to rounding. Total does not include In-Service facilities.
3. Project status provides an indication of the project progress. The milestones used are:
    a. Connection Assessment - the project is undergoing an IESO system impact assessment
    b. Approvals & Permits - the proponent is acquiring major approvals and permits required to start construction (e.g. environmental assessment, municipal approvals etc)
    c. Construction - the project is under construction
    d. Commissioning - the project is undergoing commissioning tests with the IESO

4.2 Summary of Scenario Assumptions

In order to assess future resource adequacy, the IESO must make assumptions on the amount of available resources. The Outlook considers two scenarios: a Firm Scenario and a Planned Scenario. Both scenarios' starting point is the existing installed resources shown in Table 4.1.

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

The generation capability assumptions are as follows:

- Hydroelectric capability (including energy and operating reserve) is based on median historical values during weekday peak demand hours from May 2002 to March 2009.
- Thermal generators' capacity and energy contributions are based on market participant submissions, including planned outages, expected forced outage rates and seasonal deratings.

- For wind generation the monthly Wind Capacity Contribution (WCC) values are used at the time of weekday peak, while total energy contribution is assumed to be 30%.

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

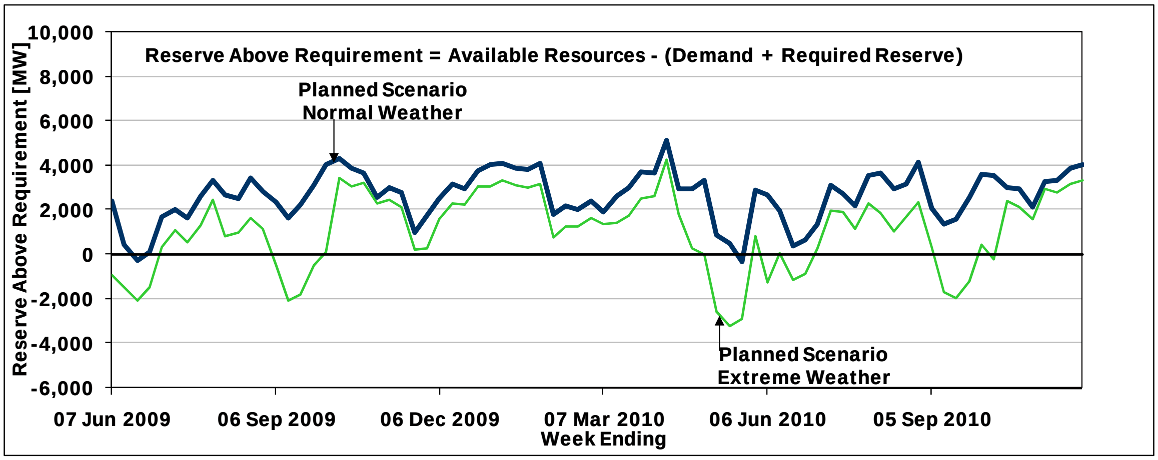
Table 4.3 Summary of Scenario Assumptions

Assumptions		Planned Scenario	Firm Scenario
Resource	Existing Installed Resources	Total Capacity	Total Capacity
		34,056 MW	34,056 MW
	New Generation and Capacity Changes	All	Only Capacity Changes, Commissioning Generators and Generators starting in the first 3 months
		3,845 MW	1,299 MW
Demand Forecast	Conservation	Incremental	
		Incremental growth of 215 MW at time of peak	
	Embedded Generation	Incremental	
		Incremental growth of 145 MW at time of peak	
	Demand Measures	Incremental	Existing
		624 MW	375 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.

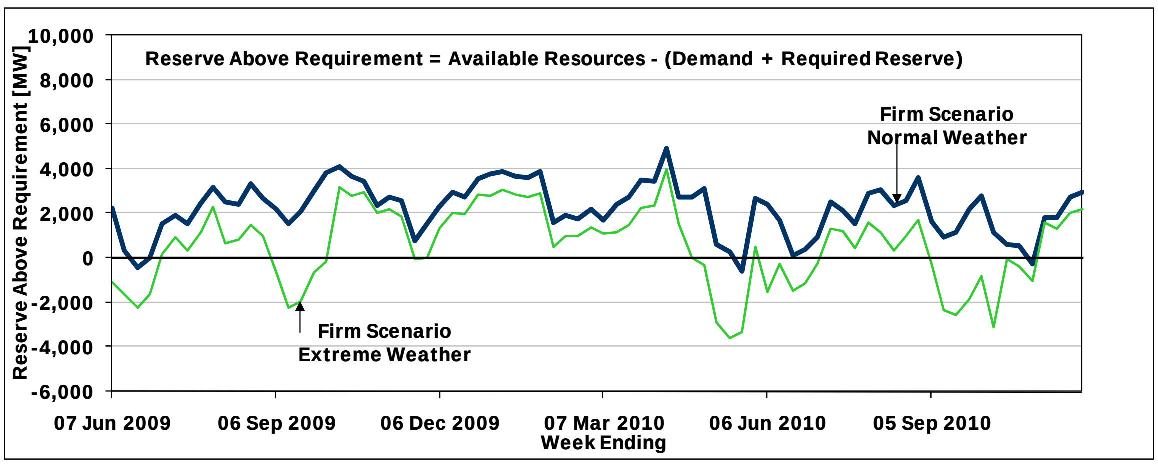
Figure 4.1 Reserve Above Requirement: Planned Scenario with Normal vs. Extreme Weather



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 5.2.

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 2009 Q2 Outlook Tables Appendix A, Table A7.

Table 4.4 Summary of Available Resources

Notes	Description	Summer Peak 2009		Winter Peak 2010		Summer Peak 2010	
		Firm Scenario	Planned Scenario	Firm Scenario	Planned Scenario	Firm Scenario	Planned Scenario
1	Installed Resources (MW)	35,338	35,338	35,365	35,449	35,355	36,519
2	Imports (MW)	0	0	0	0	0	0
3	Total Resources (MW)	35,338	35,338	35,365	35,449	35,355	36,519
4	Total Reductions in Resources (MW)	6,148	6,148	5,957	6,041	6,250	6,958
5	Demand Measures (MW)	375	516	375	624	375	647
6	Available Resources (MW)	29,566	29,706	29,784	30,033	29,480	30,208

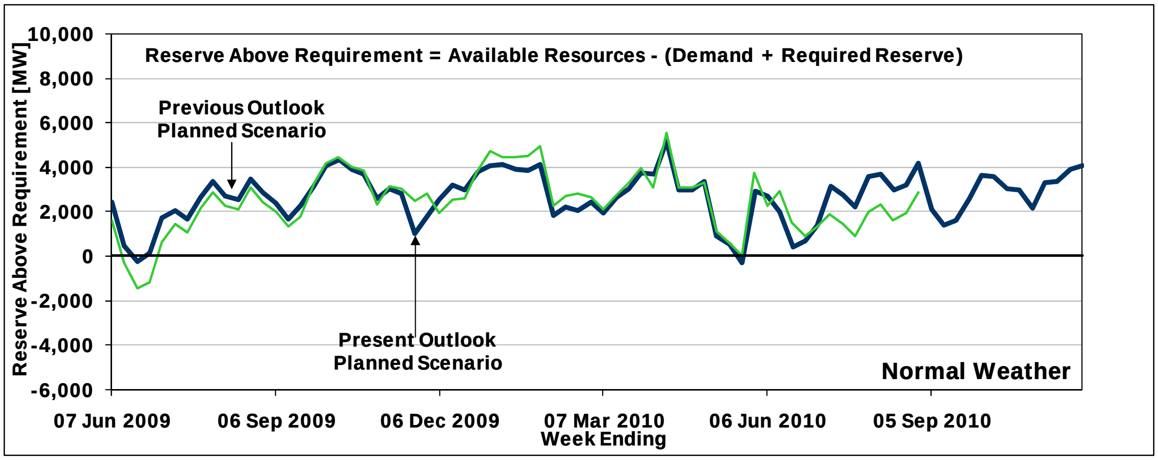
Notes to Table 4.4:

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 March 16, 2009. The difference is mainly due to the changes to generator 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:

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

5.1 Transmission and Load Supply Projects

The IESO requires transmitters to provide information on the transmission projects that are planned for completion within the 18 month period. Construction of several transmission reinforcements are planned for service during the Outlook period. Major transmission and load supply projects planned to be in service are shown in Appendix B. Projects that are in service or whose completion has been deferred well beyond the period of this Outlook are not shown. The list includes only the transmission projects that represent major modifications or are considered to provide significant improvement to system reliability. Minor transmission equipment replacements or refurbishments are excluded.

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

Connection assessments performed by the IESO concluded that these proposed projects will provide relief to existing transformer stations, some of which are presently overloaded, and will improve the supply to various load areas. In some of these assessments the IESO found that the local transmission system may be reaching its maximum capability and identified the need for installation of local voltage support equipment. As a result, Hydro One has initiated the installation of low voltage capacitor banks at a number of transformer stations in the system.

Transmission assessments performed by transmitters in collaboration with distributors also identified transmission reinforcements required to ensure load supply reliability. These needed reinforcements were confirmed by the IESO during related connection assessments. Several of these transmission reinforcements are currently under construction or are to start construction soon.

5.2 Transmission Outages

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

The IESO's assessment of the transmission outage plans is shown in Appendix C, Tables C1 to C10. In these tables, each element is assessed individually by indicating the possible impacts and the reduction in transmission interface and interconnection limits. Where multiple outages are scheduled during the same period, the combined effect of all outages on the reduction in transmission interface and interconnection limits is presented. Where multiple outages are scheduled during the same period and reliability is affected, the IESO will request the transmitter to reschedule some of the outages. The methodology used to assess the transmission outage plans is described in the IESO document titled "Methodology to Perform Long Term Assessments" (IESO_REP_0266).

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

This assessment will also identify any resources that have potential or are forecast to be constrained due to transmission outage conditions. Transmitters and generators are expected to have a mutual interest in developing an ongoing arrangement to coordinate their outage planning activities. Transmission outages that may affect generation access to the IESO controlled grid should be coordinated with the generator operators involved, especially at times when deficiency in reserve is forecast. Under the Market Rules, where the scheduling of planned outages by different market participants conflicts such that both or all outages cannot be approved by the IESO, the IESO will inform the affected market participants and request that they resolve the conflict. If the conflict remains unresolved, the IESO will determine which of the planned outages can be approved according to the priority of each planned outage as determined by the Market Rules detailed in Chapter 5, Sections 6.4.13 to 6.4.18. This Outlook contains transmission outage plans submitted to the IESO as of March 27, 2009.

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 was projected to exceed the capability of the transmission facilities, there is also an increased risk of load interruptions.

IESO continues to work 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 is practical, especially those addressing reliability needs for peak demand periods of this Outlook. IESO has also been working closely with the OPA to specify the transmission enhancements location, timing and minimum 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 extreme and normal weather conditions forecast for the Outlook period.

5.3.1 Toronto and Surrounding Area

The Greater Toronto Area (GTA) electricity supply is mainly provided by the Trafalgar, Claireville, Parkway and Cherrywood 500/230 kV autotransformers, Pickering generation station (GS) and other local resources as depicted in Figure 6.1. The availability of these facilities is critical to ensure reliable electricity supply for Toronto and surrounding area.

Figure 6.1 Greater Toronto Area Electricity System

The reliable supply of demand in the GTA under extreme weather conditions forecasted for the Outlook period requires a minimum number of autotransformers at Trafalgar, Claireville, Parkway and Cherrywood and Pickering units in service at rated capabilities. For summer 2009, all autotransformers and Pickering units are expected to be in service. The projected loadings on the Trafalgar, Claireville, Parkway and Cherrywood autotransformers are expected to be within their continuous capability with all transmission facilities and resources in the GTA in service. The presence of Portlands Energy Center and the expected completion of Goreway Station before June 2009 reduce the loadings of all GTA autotransformers and thereby, increase their spare capability.

Under summer 2009 normal and extreme weather conditions, loadings on the autotransformers are not expected to exceed their long term emergency capability following either the forced outages of any one GTA autotransformer and two Pickering units, or the forced outages of one Pickering unit and any two autotransformers. The presence of Goreway Station is critical to provide significant loading relief to Claireville TS in case of multiple autotransformer outages.

Subsequent autotransformer or generation outages or deratings could result in mitigating measures being required to reduce the remaining GTA autotransformers loadings within their long term emergency rating.

The 230 kV transmission corridor between Trafalgar TS and Richview TS which supplies Brampton, Mississauga and parts of Caledon and Halton Hills may become loaded above capability during summer 2009 under extreme weather conditions. The new Hurontario switching station and the expansion of the 230 kV lines from Cardiff TS are planned for service before summer 2010 and will relieve the loading of this corridor and alleviate this problem.

To be able to serve the load growth in the York Region, the new Holland transformer station, planned to be in service by mid 2009 is being commissioned. This area will be subsequently reinforced in 2011 with the addition of a new generation resource that was recently announced by the OPA.

Outages for the Claireville TS enhancement work continue in the first half of 2009. Some outages will reduce the limit on the Flow East to Toronto (FETT) transmission interface.

5.3.2 Bruce and Southwest Zones

Planned refurbishments at the Bruce generation station and new wind power resources in southwestern Ontario will increase generation capacity in the Bruce and Southwest zones. In the near term, transmission reinforcements that will increase the transfer capability out of Bruce include the up-rating of the Hanover to Orangeville 230 kV circuits and the installation of seven additional high voltage shunt capacitors at Buchanan, Middleport and Nanticoke.

In addition to the near-term reinforcements described above, interim measures are being planned for the time when Bruce is operated with seven and eight units before the proposed 500 kV double-circuit line between Bruce and Milton is available. The interim measures would include the installation of additional voltage control facilities at Nanticoke and when necessary, maximizing the available reactive power from Nanticoke units. These measures together with the new shunt capacitors and the deployment of the existing Bruce special protection system will further reduce the potential for constrained generation. In the longer-term, the proposed 500 kV line from Bruce to Milton would provide the required transmission capability to deliver the full benefits of the Bruce refurbishment project and the development of new renewable resources in southwestern Ontario.

The proposed 500 kV line from Bruce to Milton received the OEB approval for leave to construct on September 15, 2008. Hydro One has prepared a construction plan and related equipment outages are expected to start in the second quarter of 2009.

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

Hydro One is currently undertaking major upgrade work at Burlington TS which will resolve limitations in the station's ability to supply the Burlington 115 kV area loads. The 230/115 kV autotransformer replacement was completed. The remaining work which includes the replacement of all 115 kV breakers and the replacement of limiting bus sections is scheduled to be completed by the end of Q2 in 2012. Hydro One has also recently identified deratings associated with some of their 115 kV load supply transformer stations in the Guelph area which resulted in load transfers to the Burlington and Detweiler 115 kV areas further aggravating the load supply reliability. Hydro One, the affected distributors and the IESO are actively working on mitigating both the short-term issues and implementing a long term solution to these problems.

5.3.3 Niagara Zone and the New York Interconnection

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

The forced outage to the circuit BP76 on the Ontario-New York interconnection at Niagara continues to reduce the total Ontario-New York import and export capability until its scheduled return to service in Q3 of 2010.

5.3.4 East Zone and Ottawa Zone

The new interconnection between Hawthorne transformer station (TS) in Ontario and Outaouais station in Québec is commissioning now and is scheduled for service by middle of 2009. The new interconnection is designed for an ultimate capacity of 1,250 MW but for most of the Outlook period the import and export capability could be limited to less than the nominal capacity depending on level of load and generation in the Outaouais region. After the completion of transmission reinforcement work in Québec, anticipated for May 2010, the interconnection will be able to operate up to its nominal capacity. The interconnection will be accompanied by the installation of a new Special Protection System (SPS) at Hawthorne TS and modifications to the existing SPS at St. Lawrence TS. The SPSs will allow simultaneous imports from Québec and New York to be maximized. The existing functionality of the St. Lawrence SPS will be maintained.

The current Reliability Must Run (RMR) contract between the IESO and Ontario Power Generation for Lennox GS covers the period October 2008 to September 2009. Lennox GS is presently needed to maintain local area reliability in the Ottawa zone and the area of Ontario that is located east of the FETT transmission interface. As part of the interconnection work at Hawthorne, the addition of voltage support facilities may reduce reliance on Lennox for local Ottawa zone needs. Similarly, supply improvements from new generation additions and conservation in and around Toronto through 2010 are expected to reduce the need for Lennox to control flows on the FETT interface. Therefore, the reliance on Lennox for local area reliability is expected to decrease starting with the second half of 2009. The IESO will continue to monitor any material changes in the load forecast and resource availability, and if necessary, reassess the need for another RMR contract. However, Lennox GS is also required for provincial resource adequacy, and must be retained or replaced. This resource adequacy requirement cannot be achieved through an RMR under the current Market Rules. The Integrated Power System Plan filed by the OPA with the OEB in August, 2007 assumes that Lennox remains in service and is categorized as a planned gas resource starting in 2011.

A new 230 kV section was added at Gardiner TS in preparation for connecting Wolfe Island wind farm which is currently under construction, expected to go in service during Q3, 2009.

5.3.5 West Zone and the Michigan Interconnection

With the availability of Greenfield, St Clair and Lambton resources in the second quarter of the 2009, 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.

Phase angle regulators (PARs) are installed on the Ontario-Michigan interconnection at Lambton TS, representing two of the four interconnections with Michigan, but are not currently operational until completion of agreements between the IESO, the Midwest ISO, Hydro One and International Transmission Company. The expected in service date is not known at the time of this Outlook. The operation of the these PARs along with the PAR on the Ontario-Michigan interconnection near Windsor will control flows to a limited extent, and assist in the management of system congestion..

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

Two transmission outages will result in Michigan – Ontario transfer capability to be reduced. The 230 kV circuit J5D outage between September 21, 2009 and October 9, 2009 will penalize the transfer limit by about 350 MW in directions, import and export. Between October 19, 2009 and November 27, 2009, the L4D 230 kV circuit outage will reduce the transfer capability by 190 and 550 MW, import and export, respectively.

5.3.6 Northeast and Northwest Zones

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

For the near–term, the IESO has recommended that the existing Mississagi generation rejection scheme be enhanced as soon as possible to alleviate constrained generation west of Mississagi and to reduce congestion over the North-South transmission corridors. Hydro One is planning to implement the required modifications by the third quarter of 2010.

In the second half of 2009, extensive line work on 230 kV transmission circuits west of Mackenzie transformer station continues. This series of outages will reduce the Ontario-Manitoba and Ontario-Minnesota interconnection transfer capacity and also the East-West transmission interface capability. The reduction of the East-West Transfer East (EWTE) limit will contribute to the increased amount of bottled generation in the Northwest zone.

At the beginning of March 2009 one 500/230 kV autotransformer failed at Porcupine TS. The replacement unit is scheduled to go in service before the end of Q3 2009. Until then, upon failure of the remaining transformer the 230 kV customers supplied from Porcupine TS may be required to reduce their loading for a period of up to 20 days. Hydro One is continuously monitoring this remaining transformer to detect early signs of a possible failure and therefore reduce, possibly eliminate the full load restoration time.

Close to the end of March 2009 ten transmission towers collapsed due to ice accumulation on the 230 kV Marathon TS to Lakehead TS double circuit line resulting in additional bottled generation in the Northwest zone and significantly reduced import/export capability to Manitoba and Minnesota. The circuits were restored at full capability on temporary wood structures at the beginning of April.

5.3.7 Ontario 25 Hz System

The Niagara 25 Hz system was de-energized on April 30, 2009, when Units 1 and 2 at Beck#1 GS were decommissioned. The decommissioning of the entire system is well underway and expected to be completed during Q2 of 2009.

In northeastern Ontario, the 25 Hz system will also be retired. It is expected that the remaining facilities will be deregistered before the end of this Outlook period. There are no longer any 25 Hz loads in this area.

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6.0 Operability Assessment

The IESO monitors existing and emerging operability issues that could potentially impact system reliability. This Outlook continues its focus on surplus baseload generation (SBG). Over the next 18 months, low overnight demand and significant additions to baseload generation capacity are expected to contribute to an increase in the frequency of SBG, especially over the summer months.

SBG conditions typically arise during periods of low demand. Certain types of generation such as nuclear and some hydroelectric generators must maintain minimum output levels to ensure generation is available in future high demand hours; or to respect environmental, operational or safety constraints. In addition, intermittent and self-scheduling generation may inject power into the grid during low demand periods. Intermittent generation, such as wind or landfill gas, operates whenever its "fuel" is available. Self-scheduling generation, such as combined heat and power (CHP) and commissioning generators, may also choose to operate during periods of low demand. At the same time, transmission line outages can exacerbate SBG by reducing or eliminating the flow of electricity on key circuits, at times impacting Ontario's ability to export surplus generation.

From late March to mid-April 2009, Ontario experienced extended periods of SBG during overnight hours, weekends, and the Easter holiday. These conditions were the result of a combination of factors (as described above):

- low demand,
- high availability/output of baseload generation; and
- an outage on the Ontario to New York interconnection circuits at Niagara that reduced export capability to zero MW, and also limited Ontario to Michigan export capability.

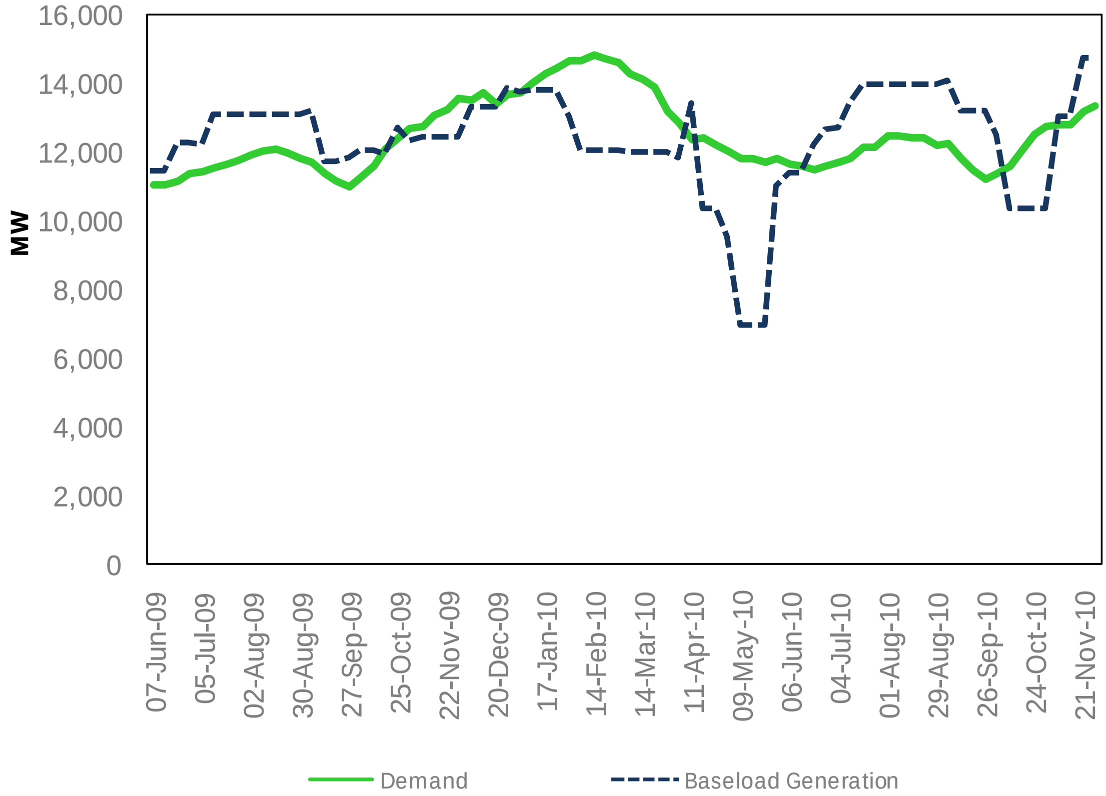
As noted in section 7.4, this period of SBG was accompanied by record low negative prices, a signal to the market of the prevailing over-generation conditions.

Figure 6.1 shows projected weekly minimum demand against the expected level of baseload generation. The baseload generation line has been updated from the previous Outlook to include expected self-scheduling and intermittent generation (in addition to nuclear, baseload hydroelectric and wind). The analysis also includes an assumption of 1,000 MW of exports. From Figure 6.1, it is clear that low minimum demands and high availability of baseload generation are especially prevalent in summer 2009 and 2010.

The expected output from commissioning units is explicitly excluded from this analysis due to uncertainty associated with commissioning schedules, as well as the highly variable nature of commissioning units. Readers are invited to make assumptions regarding commissioning generation based on expected in-service dates presented in Table 4.2.

Because of the impact surplus baseload generation can have on system and market operations, proper management of these occasions is a top priority for the IESO. The IESO is actively engaged with market participants to review and enhance the processes for managing these conditions.

Figure 6.1 Minimum Demand and Baseload Generation



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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 Historical Review

Since the last forecast the actual demand and weather data for March and April has been recorded. Overall, the weather experienced this year has been near normal. For the first four months actual energy demand has been 5.3% lower than the previous year. On a weather-corrected basis that figure is -5.9%. The decline is slightly overstated due to the fact that 2008 was a leap year and had an extra day's worth of electricity demand. So far, economic factors have far out-weighed any weather impacts through the beginning of 2009. This has been evidenced in the wholesale customers' consumption which has dropped 21% compared to the first four months of 2008.

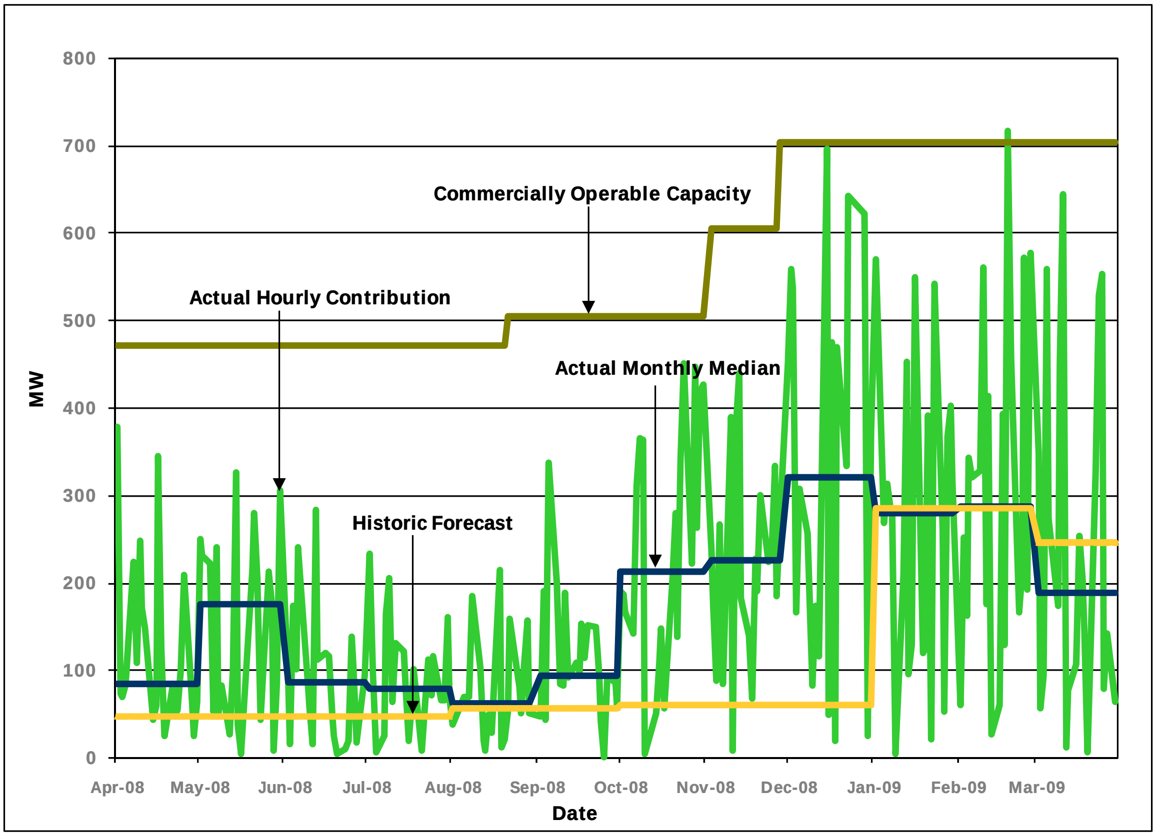
7.2 Hourly Resource Contributions at Time of Weekday Peak

The figures from 7.2.1 to 7.2.7 show the contributions made by wind generators, hydro generators, imports, and net interchange into Ontario at the time of weekday peak. A period of April 1, 2008 to March 31, 2009 was analyzed. Historical data of up to four years is also provided to highlight certain trends that were observed. Holiday data was not considered in the analysis since hydro peaking generation and interchange data during this timeframe is not typical of periods of time when Ontario may be challenged from a supply adequacy perspective.

7.2.1 Wind Contributions

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. For the time period of April 1, 2008 to December 31, 2008 the IESO forecasted available wind generation as 10 percent of installed capacity, assuming a constant contribution over a yearly basis. The forecast methodology has since been revised effective January 1, 2009 to take into account seasonal variances in wind patterns, among other factors. Wind generation increased from the previous year; however that can be directly attributed to the increase in operable capacity.

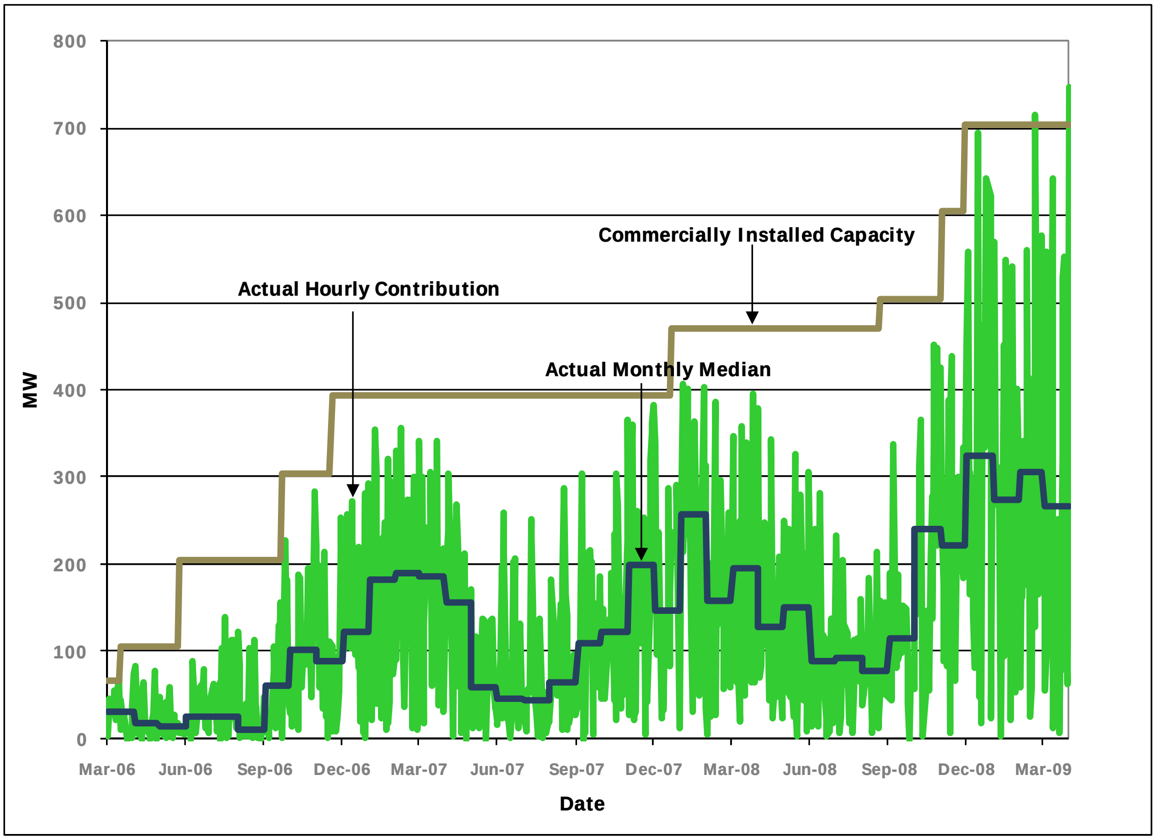
Figure 7.2.1 Wind Contributions at the Time of Weekday Peak



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

Figure 7.2.2 is a graph showing wind contributions in the past three years. Wind did not start commissioning in Ontario until February of 2006. Again, the increase in generation can be directly attributed to the increase in wind generating capability in the province.

Figure 7.2.2 Wind Contributions at the Time of Weekday Peak for the Past Three Years



7.2.2 Hydroelectric Contributions

Figure 7.2.3 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. Although 2008 was a record year for hydroelectric energy and the summer saw high production levels, the capacity contributions at peak often were below the long-term average levels, particularly following the summer.

Figure 7.2.3 Hydro Contributions (Energy and Operating Reserve) at the Time of Weekday Peak

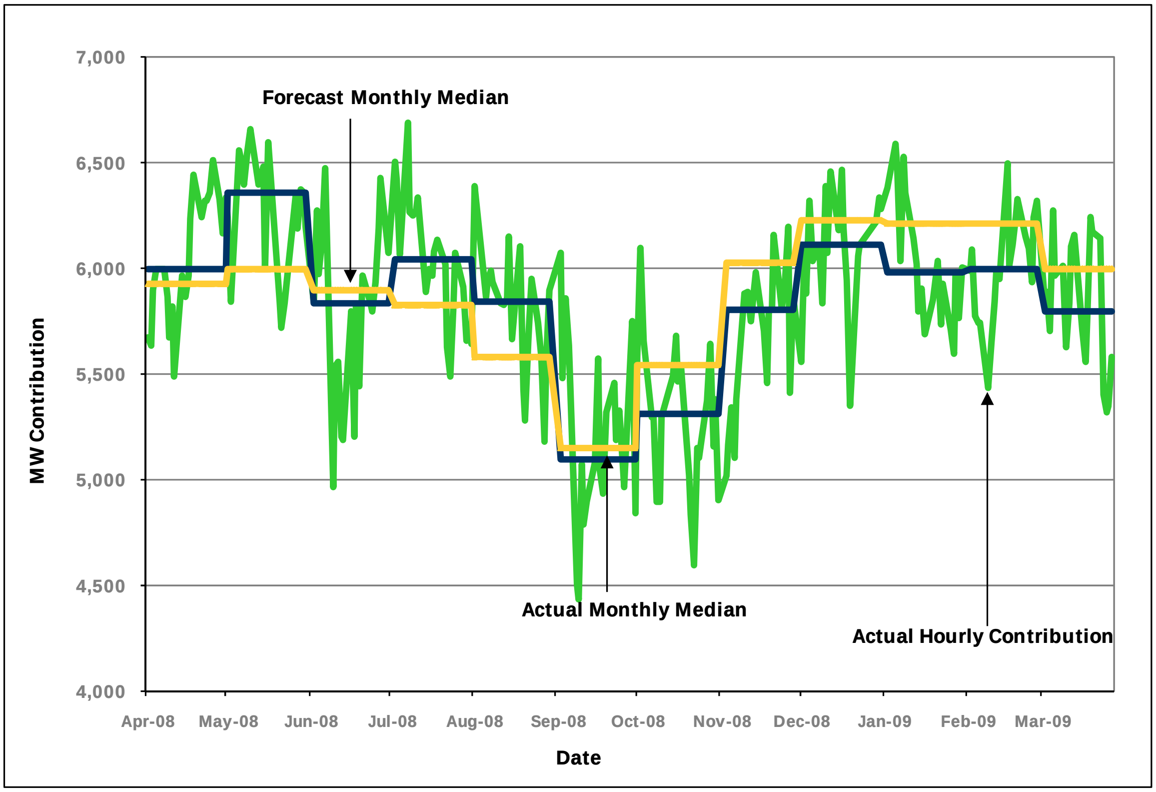
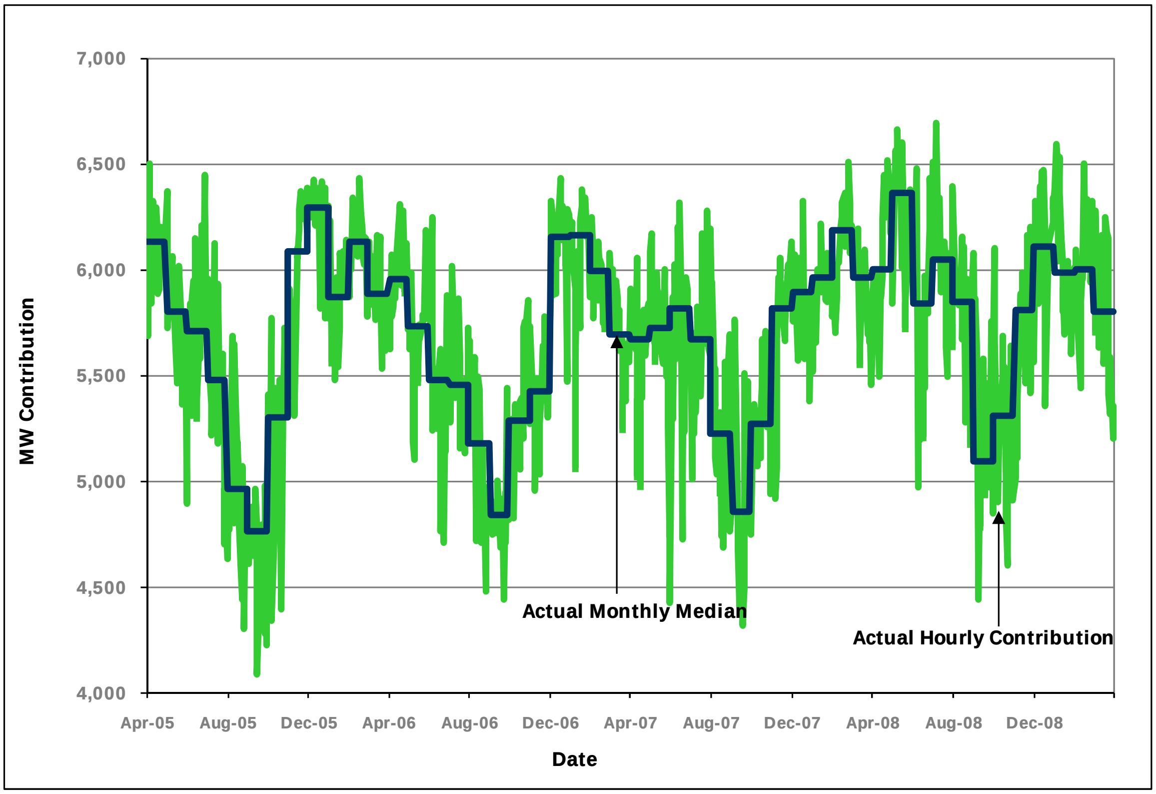


Figure 7.2.4 shows the amount of hydroelectric energy produced at time of weekday peak for the past four years. Due to higher than normal precipitation levels in Ontario, the peak hydro contribution was consistently elevated over the previous year's contribution by an average of 290 MW during the summer months. In June however, the loss of a major circuit restricted the ability to dispatch hydro resources in the Northeast resulting in a decreased aggregate hydro generation contribution for that month. The total energy production in 2008 of hydroelectric energy was significantly higher at 38.33 TWh compared to 33.44 TWh in 2007, 34.82 TWh in 2006 and 34.24 TWh in 2005.

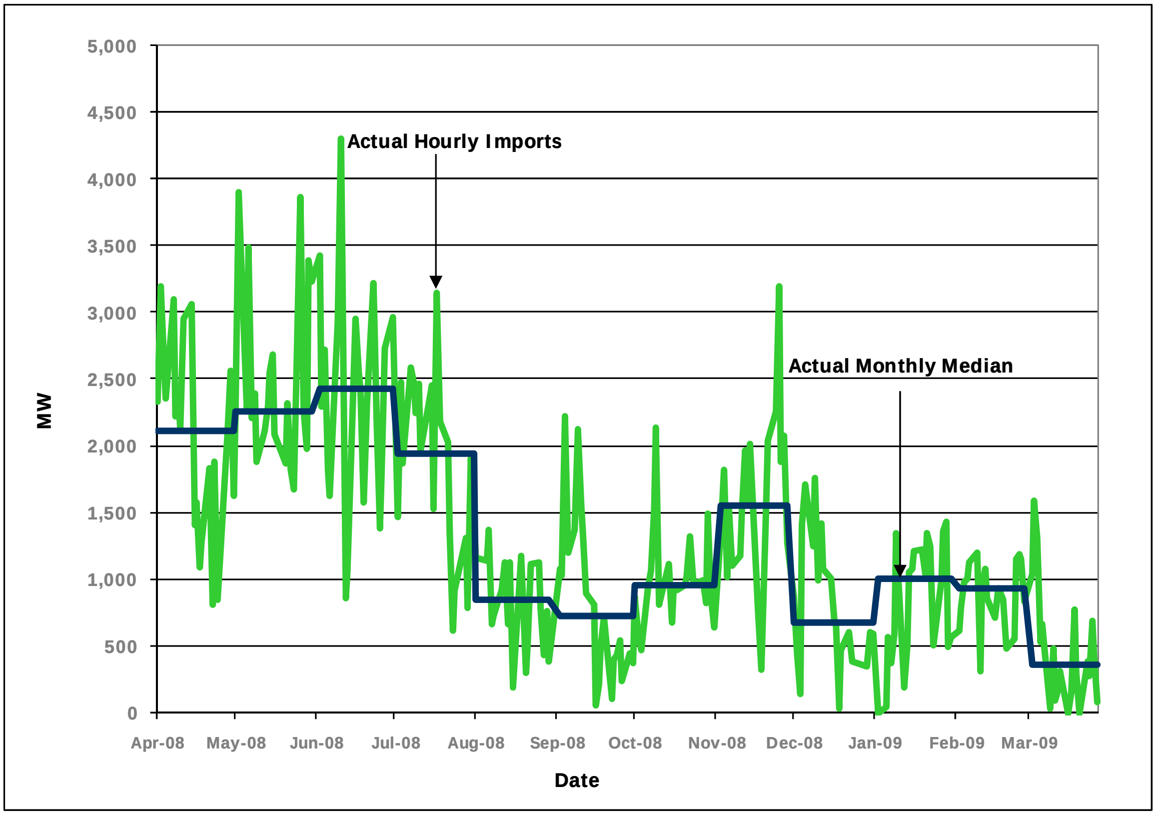
Figure 7.2.4 Hydro Contributions (Energy and Operating Reserve) at the Time of Weekday Peak for the Past Four Years



7.2.3 Imports into Ontario

Figure 7.2.5 shows imports into Ontario at the time of weekday peak. Imports were relatively low in this study period compared to the previous year's study period, especially during the last 6 months of the year. Low demands resulted in lower prices. Additionally, a sudden drop can be seen in imports in August 2008, with no corresponding reduction in net transactions. This is directly attributable to New York filing a Federal Energy Regulatory Commission (FERC) tariff which prohibited linked wheel transactions through their jurisdiction. Since many of these transactions were sourced from New York and were received at PJM, their removal caused no variation to Ontario's net transactions. However, when analyzing imports in isolation as in the figure below, this drop can be seen.

Figure 7.2.5 Imports into Ontario at the Time of Weekday Peak



7.2.4 Net Interchange into Ontario

Figure 7.2.6 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. Ontario was mostly a net exporter for the entire study period. This is a deviating trend from the past as generally in the past, Ontario has been a net importer for at least part of the peak periods. This non-reliance on imports can be explained by the abundance of baseload generation Ontario has had as a result of significant hydro resources as well as lower than normal primary demands during those typically peak periods.

Figure 7.2.6 Net Interchange into Ontario at the Time of Weekday Peak

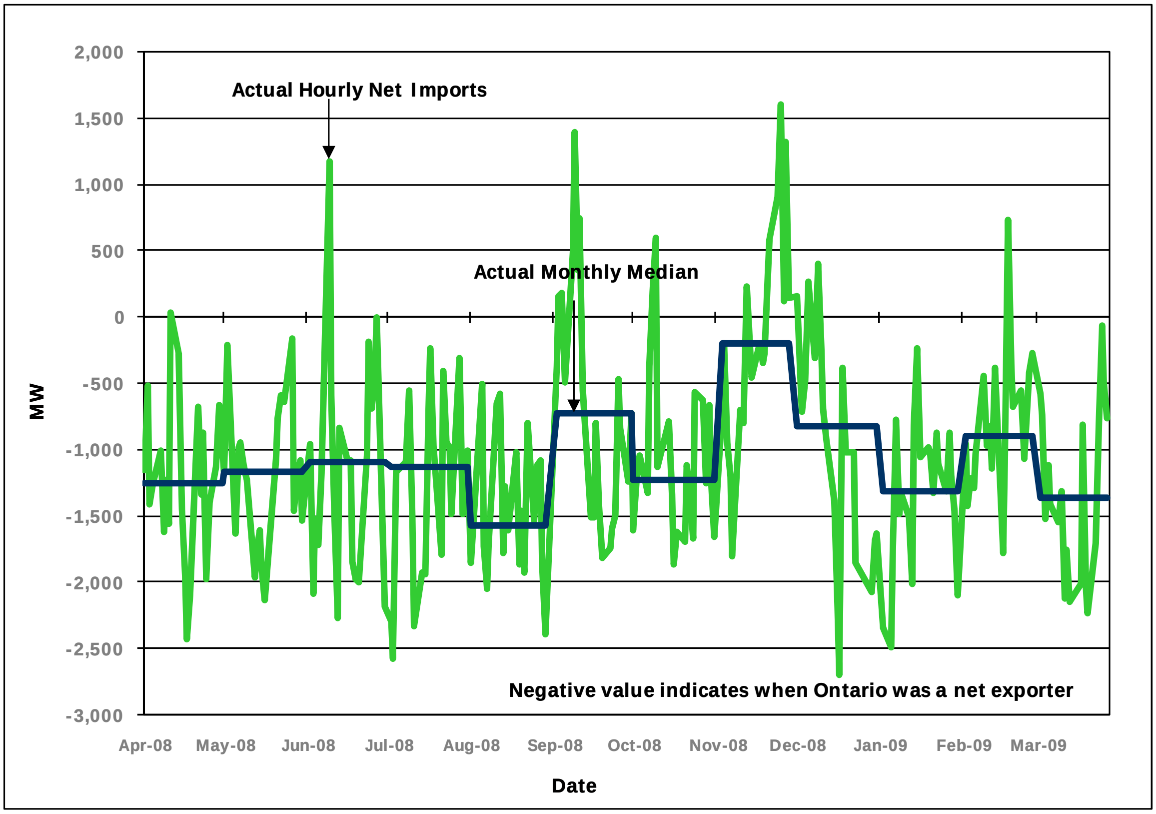
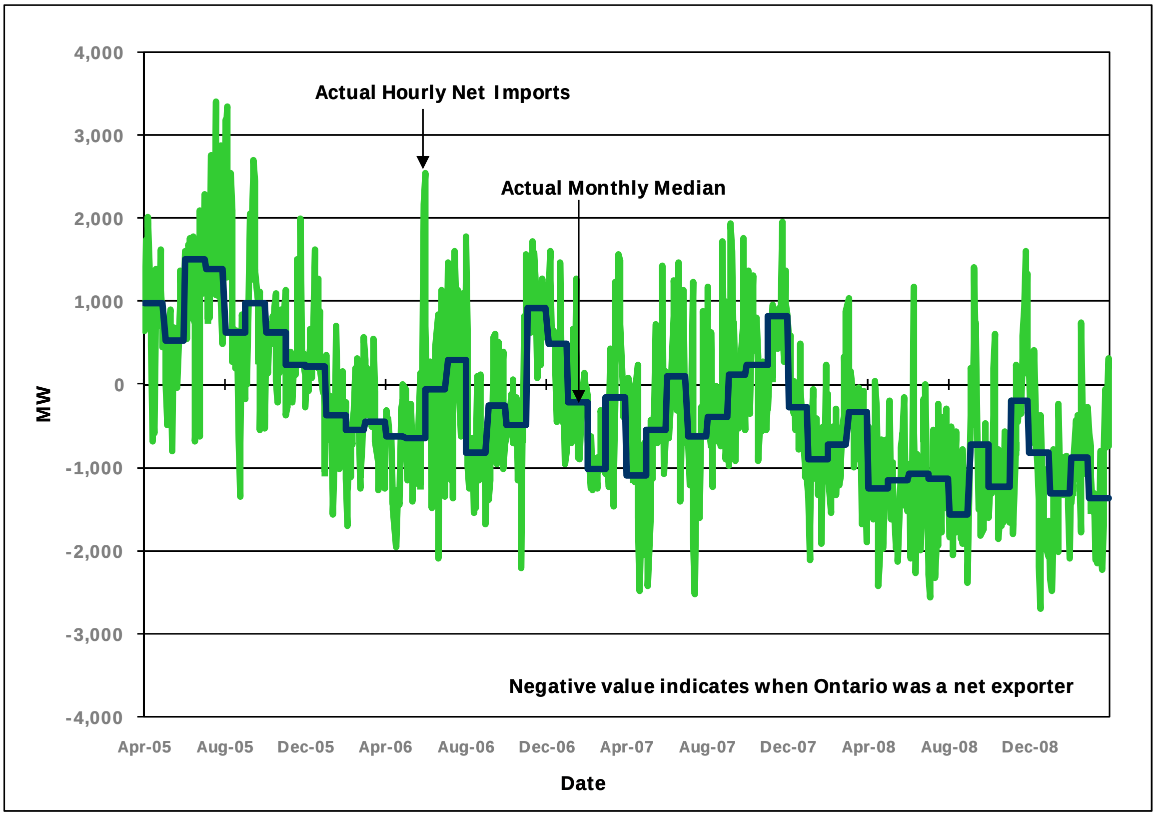


Figure 7.2.7 shows the amount of net imports into Ontario at the time of weekday peak, excluding weekends and holidays, for the past four years. Ontario's shift from net importer in 2005 to net exporter last year can be seen.

Figure 7.2.7 Net Interchange into Ontario at the Time of Weekday Peak for the Past Four Years



7.3 Generation/Transmission Disturbance Incidents

On March 25, 2009 circuits M23L, M24L, W21M and W22M were automatically removed from service resulting in an East-West Separation, disconnecting Northwestern Ontario from the rest of the Ontario system. The Northwestern system remained synchronously tied to both Manitoba and Minnesota by K21W/K22W and F3M. Manitoba and Minnesota scheduling limits were reduced to respect the operating security limits newly derived as a result of the contingency.

7.4 Negative Prices

During 2008, Ontario saw several instances where the Ontario Hourly Energy Price (HOEP) was negative, reaching a peak low of -$32.66. These prices were the result of lower demand conditions than forecast and low-priced generation resources offered to meet this market demand. The summer of 2008 saw unusually low prices (which were at times negative) as a result of low demand caused by milder than normal temperatures as well as an increase in production of hydroelectric baseload generation. There was a higher than normal amount of hydroelectric resources available during that period as a result of heavy snowfall during the winter and heavy rain throughout the spring and summer. This created an abundance of water which needed to flow and not spill for regulatory reasons. Prior to 2008, there had only been five instances of negative pricing in the province.

So far from January to March 2009, there have been 58 instances of negative pricing with a new peak low of -$51.00; all of which occurred during the last week of March. The negative prices can be attributed to lower demand conditions and low-priced baseload generation. The phenomenon was further exacerbated by a significant transmission outage which limited Ontario's ability to export. This outage resulted in a zero MW schedule with NY and a reduced scheduling limit with Michigan, limiting exports out of the province. The IESO, during these times, was required to dispatch down baseload generation that is not typically maneuvered. Generators were dispatched economically, according to offer prices.

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