18-MONTH OUTLOOK:

An Assessment of the Reliability of the Ontario Electricity System

From January 2006 to June 2007

Power to Ontario. On Demand.

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Executive Summary

Recent additions to Ontario's generating capacity and planned market enhancements in the first half of 2006 contribute to a more positive outlook for Ontario's overall supply adequacy picture over the next 18 months. The overall Outlook for resource availability continues to indicate that for most weeks during the 18-Month Outlook timeframe, there are sufficient resources to meet the present resource requirements, under the normal weather demand scenario. Under extreme weather conditions, the Outlook results continue to identify significant reliance on imports in many weeks, to meet resource requirements.

While the overall supply situation appears adequate concerns remain in a number of areas within Ontario, particularly in the Greater Toronto Area (GTA) where the need for new supply and transmission facilities is particularly urgent. It is also critical that more efficient regulatory approvals processes be developed in order to enable timely implementation of the required new generation and transmission facilities.

The Independent Electricity System Operator (IESO) regularly assesses the adequacy and reliability of Ontario's power system. This 18-month Outlook provides our assessment of the reliability of the Ontario electricity system from January 2006 to June 2007. The assessment uses the most up to date forecast information and considers experience gained from past operations.

A number of changes are forecast for the Ontario electricity sector to address the risks in the GTA and to implement the provincial government's plan for coal replacement and a transition to cleaner forms of generation. The IESO is monitoring the progress of the inter-related generation, transmission and demand management projects underway and planned and the resulting impact on reliability.

Experience Gained from Past Operations

There were a number of challenges to maintain reliability of Ontario's bulk power system during the summer of 2005. Soaring temperatures brought significant demand and drought-like conditions limited hydroelectric generation, resulting in a continued strain on the power system. The IESO relied on extensive use of Emergency Control Actions in order to maintain reliability and avoid power interruptions. Public appeals urging customers to cut back on electricity consumption were issued on 12 separate days, five per cent voltage reductions were implemented across the province on two days in August with two additional voltage reductions implemented in the GTA. This occurred despite good performance and availability of the Ontario generation and transmission facilities and the support from neighbouring markets.

Increased supply brought into service in the fourth quarter of 2005 (515 megawatts from Pickering Unit 1), as well as changes proposed by the IESO to put imports into Ontario on a more secure footing during times of need, should improve the supply-demand situation and help reduce the likelihood of a repeat of the events of the past summer.

A Reliability Demand Response Program similar to those of neighbouring markets is being developed for the summer of 2006 to give more certainty that an IESO request for demand response will be followed and to allow for activation earlier in the list of control actions.

To increase the certainty of capacity and energy availability through day-ahead arrangements, the IESO is working with stakeholders to implement a Day Ahead Commitment Process for the summer of 2006.

In the western GTA, and in central Toronto, transformer load levels were near, and in some cases exceeded their capability in summer 2005. The need for transmission enhancements and new supply to unload these transformers continues to be a priority requirement for the IESO.

Outside the GTA, the transmission system is expected to be adequate to supply demand under the forecast conditions studied in this Outlook, with some exceptions. Limitations experienced over the summer of 2005 in the Windsor area, northward into the Hamilton-Burlington area, and westward from the St. Lawrence transformer station limited the use of available Ontario generation and/or limited imports into the province during hot weather, high-demand periods. Changes and upgrades are underway, and will improve but not completely relieve the situation for summer 2006.

Other Concerns

There are a number of growing reliability risks that need to be addressed during this assessment period in order to have timely solutions available.

Toronto currently relies on supply generated outside the city to meet demand. The main transmission paths and related facilities carrying this power into the city are already nearing capacity.

New generation must be installed by the summer of 2008 to address the risk of rotating power cuts to areas of central Toronto during periods of high demand. Increased demand response and conservation efforts will reduce but not eliminate the need for new supply. The IESO is working with the Ontario Power Authority to address the need for new supply in Toronto. But in the absence of a viable, approved plan, timely resolution is at risk. The IESO will continue to work with stakeholders to assess the needs and develop options.

Even with new generation installed by 2008, the risk will again grow to unacceptable levels without new transmission, requiring a third transmission path into Toronto early in the next decade to maintain reliability under extremely hot summer weather conditions.

New supply and transmission is also required in the western GTA to address overloading of transmission facilities supplying the GTA, to meet the forecast growth in demand and to control voltages in the area.

The recently announced Goreway natural gas units in Brampton will substantially reduce the reliability risks in the area but not completely remove them. Transmission facilities and lines serving the area exceeded their long-term emergency capability and the IESO's supply deliverability guidelines in summer 2005. A combination of new generation and transmission enhancements are required to address this. Necessary transmission solutions under discussion are likely to be required to provide time for the development of additional supply projects.

More Efficient Regulatory Processes Required

The current regulatory approvals process is complex and will impede the installation of new facilities in time to address projected reliability concerns. Given the amount of new supply and transmission enhancements required in such a short period of time, timely regulatory approvals processes are required. Serious consideration needs to be given to developing expedited, but thorough, approvals processes to ensure timely implementation of the new facilities.

Demand

Energy demand is expected to be 157.0 terawatt hours (TWh) for 2006, a 1.3 per cent increase over the projected energy demand for 2005 (154.9 TWh). The expected seasonal peak demand for the winter of 2006 is 24,899 MW. The expected seasonal peak for the summer 2006 is forecast to be 25,917 MW.

The following table shows the peak demand forecasts for the seasons covered in the Outlook period.

Season	Normal Weather Peak (MW)	Expected Seasonal Peak (MW)	Extreme Weather Peak (MW)
Winter 2006	24,285	24,899	25,802
Summer 2006	24,232	25,917	27,407
Winter 2007	24,547	25,161	26,088

While extreme weather conditions have a lower probability of occurring, history shows that even seasons with average weather will include periods of extreme weather Prudent planning dictates that the system be capable of operating reliably during extreme weather periods without significant use of emergency control actions.

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Caution and Disclaimer

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1.0 Introduction

This Outlook covers the 18 month period from January 1, 2006 to June 30, 2007. It supersedes the report titled "An Assessment of the Reliability of the Ontario Electricity System from October 2005 to March 2006", dated October 24, 2005. Its purpose is to advise market participants of the resource and transmission reliability of the Ontario electricity system, and to assess potentially adverse conditions that might be avoided through adjustment or coordination of maintenance plans for generation and transmission equipment.

This Outlook presents an assessment of resource and transmission adequacy based on the stated assumptions, and 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 judgement in considering possible future scenarios. This Outlook provides a base upon which updates in assumptions can be considered. The tables contained in the document can be downloaded from the Independent Electricity System Operator (IESO) web site in MS Excel format.

In addition to the comprehensive Outlook, the IESO generally publishes Interim Updates to the 18-Month Outlook during each month for which a full Outlook is not issued. These updates include a spreadsheet which reflects changes to Total Resources, Total Reductions to Resources, and Reserve Above Requirement values for the Planned Resource Scenario. The updates also include a summary of actual demand and forecast demand data. Similar to the full Outlooks, the Interim Updates are posted on the IESO web site. These updates provide Outlook information on a more frequent basis to allow market participants to better adjust their operational plans and outage schedules.

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 supersede information presented in this report.

The contents of this Outlook focus on the assessment of resource and transmission adequacy. Other supporting information and forecasts are contained in separate documents. These documents will be updated as required.

- The document entitled "Ontario Demand Forecast from January 1, 2006 to June 30, 2007" (IESO_REP_0254) (found on the IESO web site at http://www.ieso.ca/imoweb/pubs/marketReports/18Month_ODF_2005dec.pdf describes in detail the 18 month forecast of electricity demand for the Ontario Market used in this Outlook. The demand forecast document identifies the assumptions used to determine the forecast and identifies the details regarding peak and energy demand forecasts for the Ontario market and parts thereof. It also contains information regarding variations in demand due to weather, economic growth and calendar day types. Data from the demand forecast document can be downloaded in MS Excel format from the IESO web site.
- The document entitled "Methodology to Perform Long Term Assessments" (IESO_REP_0266) (found on the IESO web site at http://www.ieso.ca/imoweb/pubs/marketReports/Methodology_RTAA_2005dec.pdf) contains information regarding the methodology used to perform the demand forecasts, resource adequacy assessments and transmission reliability assessments in this Outlook.

- The document entitled "Ontario Transmission System" (IESO_REP_0265) (found on the IESO web site at www.ieso.ca/imoweb/pubs/marketReports/OntTxSystem_2005jun.pdf) provides specific details on the transmission system, including the major internal transmission interfaces and interconnections with neighbouring jurisdictions.

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.

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2.0 Changes from Previous Outlook

Updates to Resources

One of the three shutdown Pickering A nuclear units was returned to service in the fourth quarter of 2005 which resulted in a capacity increase of 515 MW. The Greater Toronto Airports Authority's new 117 megawatt co-generation power plant at Pearson International Airport is being commissioned and is scheduled for commercial operation in the first quarter of 2006. This new generator is not considered to be part of the Existing Installed Generation Resources shown in Table 5.1.

One of the 10 new projects announced in November 2004 from the Request for Proposals for Renewable generation is already in-service. Seven more generation projects with the installed capacity of about 360 MW are expected to be available within the 18 month timeframe of this Outlook.

There are changes to the scheduled dates and the capacity increases to nuclear unit upratings that are scheduled to occur in the 18 month timeframe. A total of 32 MW is now expected within the next 18 months.

The Existing Resource Scenario includes a higher quantity of forecast price-responsive demand than the previous Outlook. However, the price-responsive demand reduces by 30 MW from April 2007 when the Transitional Demand Response Program (TDRP) is scheduled to end. In the Planned Resource Scenario, the price-responsive demand is forecast to reach about 430 MW by end of March 2007 and then drops to about 400 MW thereafter. This capability to reduce demand, based on dispatch signals sent from the IESO, represents an additional resource that may be deployed to maintain the balance between supply and demand.

There have been updates to the generator outages submitted by market participants.

Updates to Transmission Outlook

The list of transmission projects and planned and forced transmission outages has been updated from the previous 18-Month Outlook.

This outlook also presents a discussion of some of the transmission enhancements that are forecast to be required within the outlook period and just beyond.

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3.0 Historic Review and Preparations for Future Operation

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

3.1 Emergency Control Actions

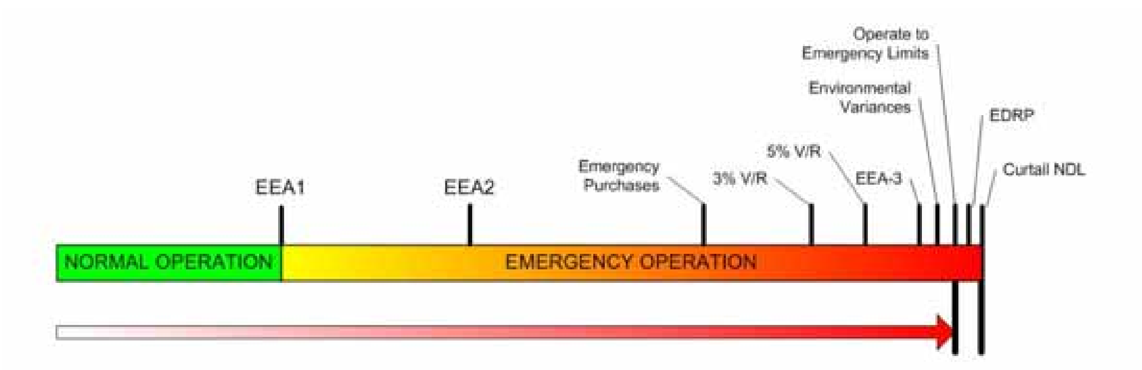
When the IESO runs out of market mechanisms to maintain the supply/demand balance, it turns to one or more of the following emergency control actions to maintain reliability. The control actions are listed in the order they are applied and represent actions with increasing impact on customers, the environment and risk to interconnected system reliability.

Emergency Control Actions

- public appeals
- emergency power purchases
- voltage reductions
- environmental variances
- operation of transmission to emergency condition limits
- activation of the Emergency Demand Response Program (EDRP)
- load shedding (also referred to as curtailing Non-Dispatchable Load (NDL))

Figure 3.1 illustrates the typical steps that IESO may take to maintain the supply/demand balance in Ontario. The figure also indicates the timing of several Energy Emergency Alerts (EEA1, EEA2 and EEA3) which provide notification to Ontario's neighbours to make them aware of the status of reliability in Ontario.

Figure 3.1 Emergency Control Actions

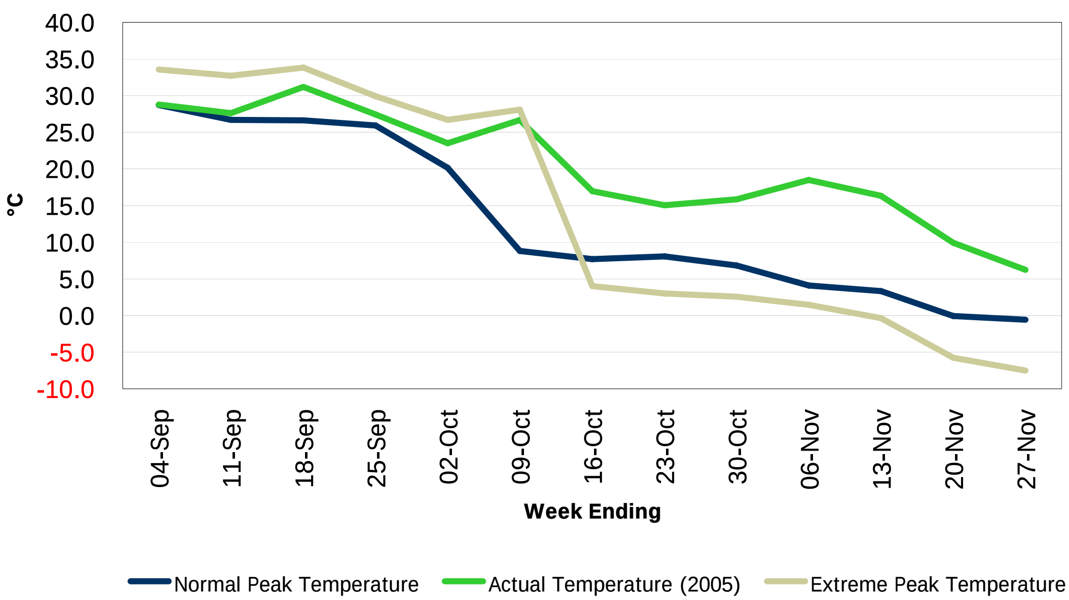


Use of these control actions was a very frequent occurrence this past summer. When emergency control actions must be initiated there is almost no room left to manoeuvre and the impact on customers, the environment and additional risk to interconnected system operation can escalate rapidly. The repeated use of these emergency actions this past summer represented a sustained challenge to Ontario's reliability.

3.2 Weather and Demand Historical Review

The actual weather for September to November 2005 was consistently warmer than Normal. The daily high (temperature) for September, October and November averaged just less than 15 °C, the 3rd warmest average for these months since 1970. Figure 3.2 compares the weekly temperatures from 2005 with the Normal and Extreme weather scenarios. The graph depicts the peak temperature for each week of the period. It is clear that it was warm – particularly in the latter half.

Figure 3.2 Weather Impact – 2005 Actuals Versus Normal and Extreme Weather



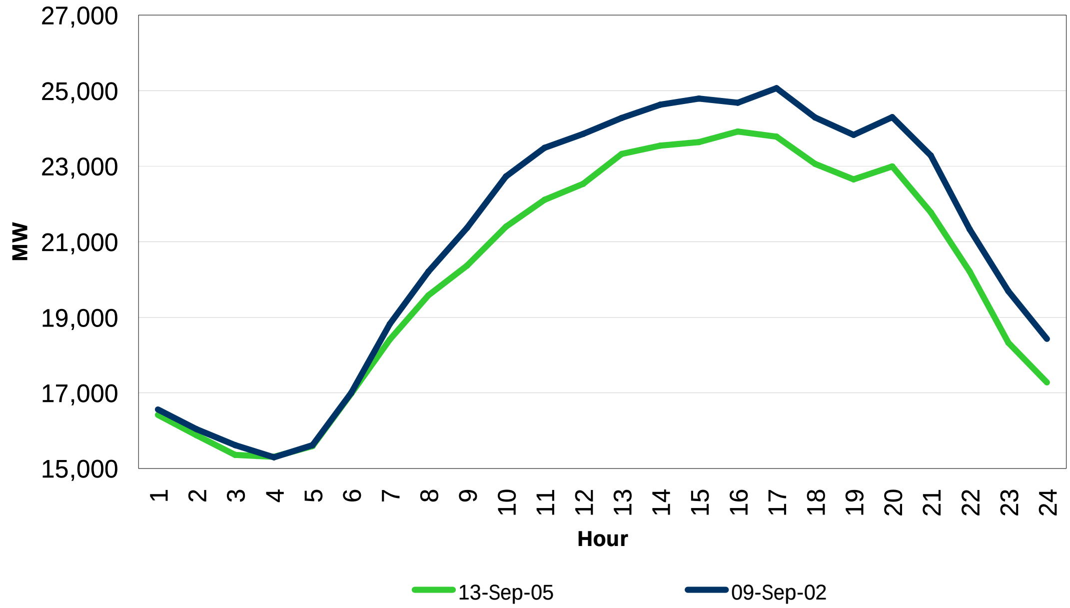
September is a "cooling load" month, while October and November are "heating load" months. With higher than average temperatures, demand was higher in September and lower in October and November. Table 3.1 compares actual weather and demand for these months of 2005 with Normal weather and the forecast of demand. Since any given month is covered by several forecasts, the forecast presented in the table is the average of all forecasts for that month.

Table 3.1 Fall 2005 Weather and Demand

Weather and Demand		November	October	September
Weather - Actual	Average Temperature (°C)	7.8	14.5	23.8
	Minimum Temperature (°C)	-6.3	6.2	13.1
	Maximum Temperature (°C)	18.9	25.8	31.6
Weather - Normal	Normal Average Temperature (°C)	6.5	13.6	21.6
	Normal Minimum Temperature (°C)	-2.0	6.8	13.1
	Normal Maximum Temperature (°C)	16.4	23.3	29.8
Demand - Actual	Peak Demand (MW)	22,564	20,752	23,914
	Energy Demand (GWh)	12,441	12,187	12,553
Demand - Weather Corrected	Peak Demand (MW)	22,475	21,307	21,901
	Energy Demand (GWh)	12,525	12,140	12,284
Demand - Blended Forecast	Peak Demand (MW)	22,726	20,822	22,171
	Energy Demand (GWh)	12,808	12,412	12,179

Figure 3.3 shows the hourly profile for the all-time fall peak (September 9th, 2002) and the 2005 fall peak (September 13th, 2005). Both the all-time and 2005 peak are driven by cooling load.

Figure 3.3 Fall Peak Day Hourly Profile



3.3 Resource and Transmission Adequacy Review of Past Season

In considering the historic review of resource adequacy, we examine the amount of generation that is made available from various generating resources. Of particular interest is the amount of self-scheduling generation in the Ontario market and the amount of generation made available from hydro generation.

The hot weather this fall resulted in numerous restrictions to thermal plant production in order to manage heat related environmental restrictions. These restrictions limited the amount of energy that could be produced from one large facility, further aggravating energy management on several days. An algae bloom in Lake Ontario forced three large thermal units from service on one occasion. Fortunately this occurred early in the morning and did not result in immediate need for emergency control actions. IESO is working with the appropriate market participants to understand the extent of the risk and to manage mitigate these risks.

Resource Additions

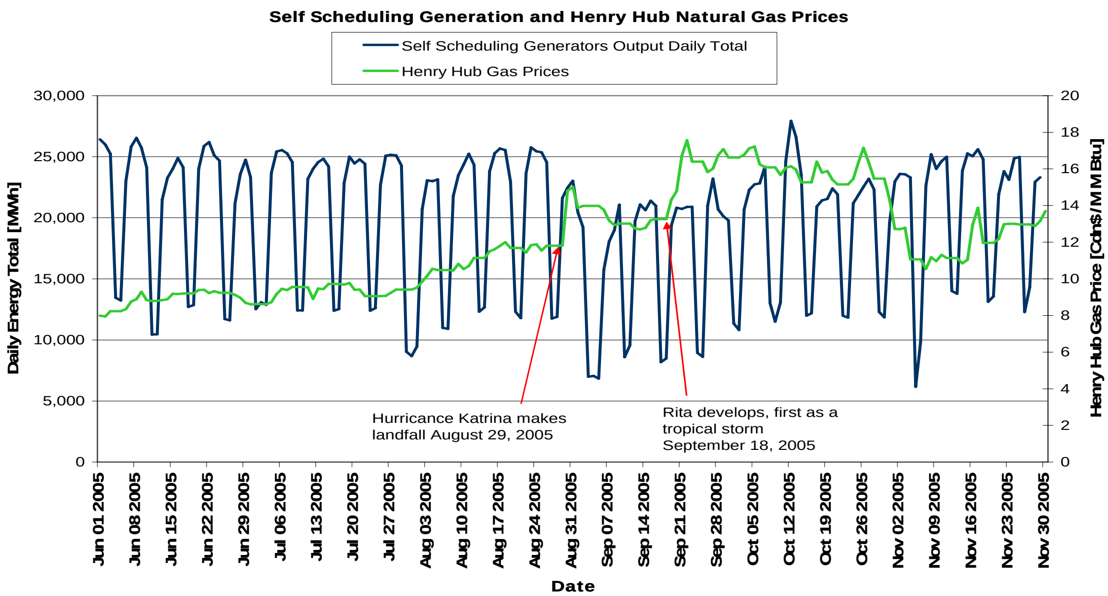
Since the last Outlook was published, Pickering Unit 1 (515 MW) came into service.

Self-Scheduled Generation

We have observed a correlation between the price for natural gas and the energy output from certain gas-fired generators operating in Ontario. We believe there could be more risk to reliability in the future, due to increased uncertainty regarding the amount of generating capacity that will be made available from some gas-fired generators. These risks are expected to be higher during periods of time when natural gas prices are expected to be volatile or high. At these times for some gas-fired generators, it is more profitable for them not to generate electricity. These conditions predominantly exist for generators that have specific fixed structures to their natural gas and electricity contracts. Fortunately, the latest Clean Energy Supply generator contracts do not have structures that are as likely to result in these conditions. The gas-fired generators that may be subject to these conditions fall into the self-scheduling generation category of resources that are operating in the IESO wholesale markets.

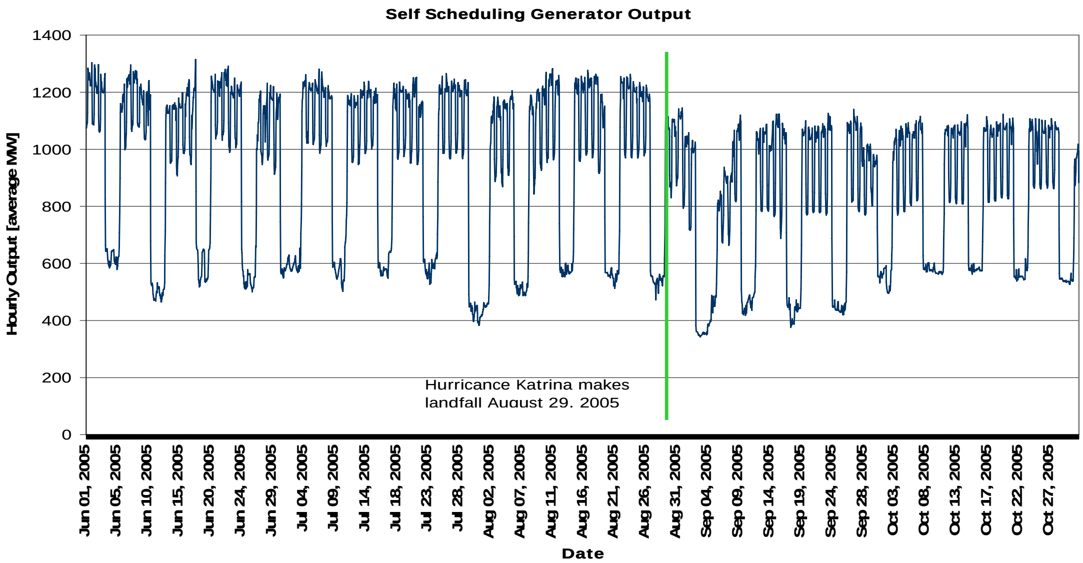
Figure 3.4 indicates the daily closing price of natural gas at the Henry Hub, and the daily energy produced from all self-scheduled generators in Ontario. For the week after hurricane Katrina made landfall, the amount of energy produced by all self scheduled generators decreased by about 4,000 MWh per day. Daily energy production quantities seemed to be restored to pre-Katrina levels once the price of natural gas reached pre-Katrina prices.

Figure 3.4 Daily Energy from Self Scheduling Generation and Gas Prices



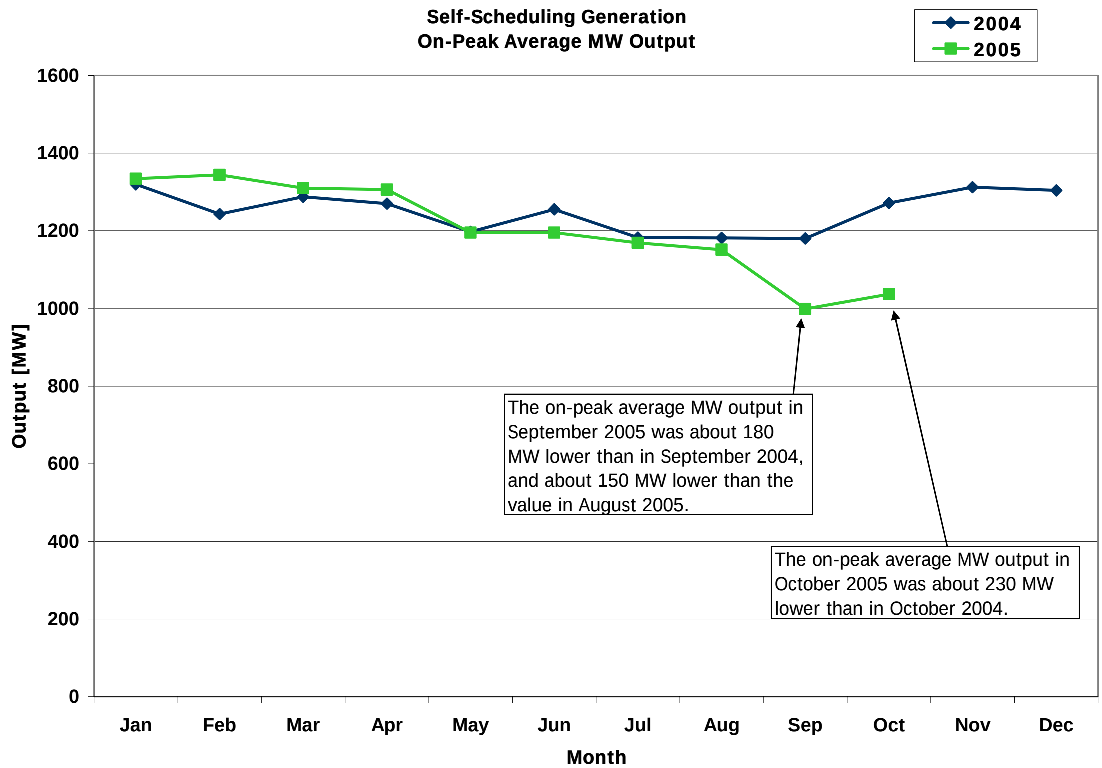
The peak MW contribution of self-scheduled generators at the time of the daily peak is correlated to the price of natural gas at the Henry Hub. This is shown in Figure 3.5 below. There appears to be a decrease of about 150 MW in the amount of production during the peak periods of each workday following Hurricane Katrina.

Figure 3.5 Hourly Output from Self Scheduling Generators



The output from self-scheduling generators is also dependent on the ambient temperature of the operating month, with higher temperatures causing some decreases to the maximum amount of output from some gas-fired self-scheduling generators. This typical monthly pattern was observed in 2004. However, in 2005, a deviation from the usual pattern is observed, as shown in Figure 3.6. The output from self-scheduling generators appears to be about 180 MW lower in September 2005, compared to September 2004,

Figure 3.6 Self-Scheduling Generation On-peak Average MW Output



Hydro Generation

Figure 3.7 illustrates that the actual monthly hydro energy produced has been lower than the forecast energy capability provided by market participants for the 18-Month Outlooks. For the 2005 summer period of June, July and August, the total hydro energy output was about 15 % less than the forecast energy capability for that time period. From a different perspective, the hydro energy production for the three summer months of June, July and August of 2005 was about 20 % lower than the hydro production in the same period in 2004.

The high demands early in the summer season also meant that water available for hydroelectric use was used up early in the summer and was never fully replaced by rainfall. For the fall time period of September, October and November the total hydro energy output was about 10 % less than the forecast energy capability for that time period. For September and October, the actual hydro energy output was about 15 % less than the forecast energy capability and for November, the actual hydro energy output was only 1 % less than the forecast energy capability.

It should be recognized that the forecast monthly energy capability is based on inputs from market participants that are submitted for 18-Month Outlooks anywhere from one to four months prior to the actual month of operation. For example, the forecast monthly energy capability for September, October and November of 2005, is based on the market participant input submissions provided on or before August 1, 2005.

Figure 3.7 Monthly Hydro Energy

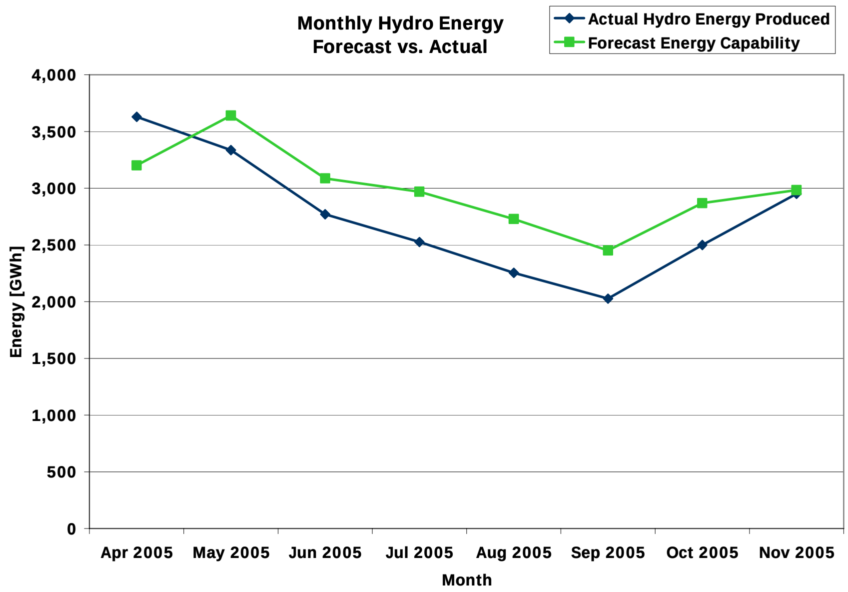
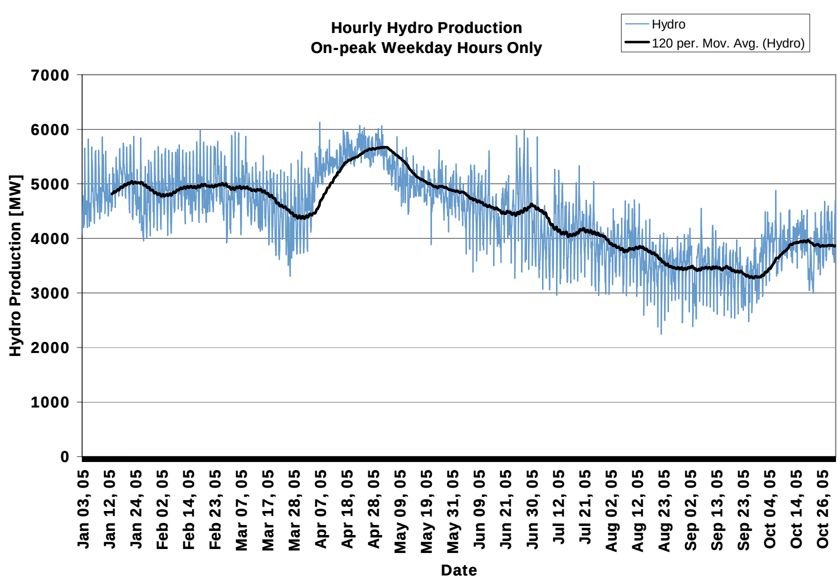


Figure 3.8 shows the hourly hydro production for the timeframe from January to October 2005, for the on-peak hours only. The moving average output for 120 on-peak hours is also shown on the graph to help illustrate the general decline in the amount of hydro production for the period from May to September of 2005.

Figure 3.8 Hourly Hydro Production



<u>Niagara Area 25Hz System</u>

There were several reliability concerns related to the 25Hz system in the Niagara area, which resulted in varying degrees of load curtailments and interruptions through October, November and December. These problems proved to be difficult to resolve in a timely manner, due to the number of different equipment failures on this aging section of the power system. These problems illustrate the growing concerns related to maintaining the reliability of the 25Hz system.

<u>Transmission</u>

The transmission system in Ontario operated very reliably in spite of the need to cancel or defer maintenance to avoid restrictions. However, the system was operated at the limit of capability on many occasions. There were a number of transmission limitations within the province that became more severe as a result of the hot weather:

- Phase shifters at interconnections with New York and Michigan
- The Niagara corridor (QFW)
- The flow into Burlington corridor
- Eastern Ontario circuits
- East-west tie

These restrictions limited the ability to move generation or imports within the province to areas of need.

In addition, throughout the summer, flows over Ontario's transmission system from transactions between parties outside Ontario limited the capability to import energy for use within the province by using up valuable transfer capability within Ontario. These flows are called parallel flow and routinely were in the range of 800 to 1000 MW.

Transmission restrictions also occurred within the west GTA. The majority of power in the GTA is supplied through a series of large transformers across the top of the GTA. During periods of high load, or during outages to equipment, these transformers are loaded very close to the maximum allowed. On two separate occasions this summer emergency voltage reductions were required in order to reduce the loading of these transformers to acceptable levels. Additional analysis of the transmission in the GTA is presented in section 7.0

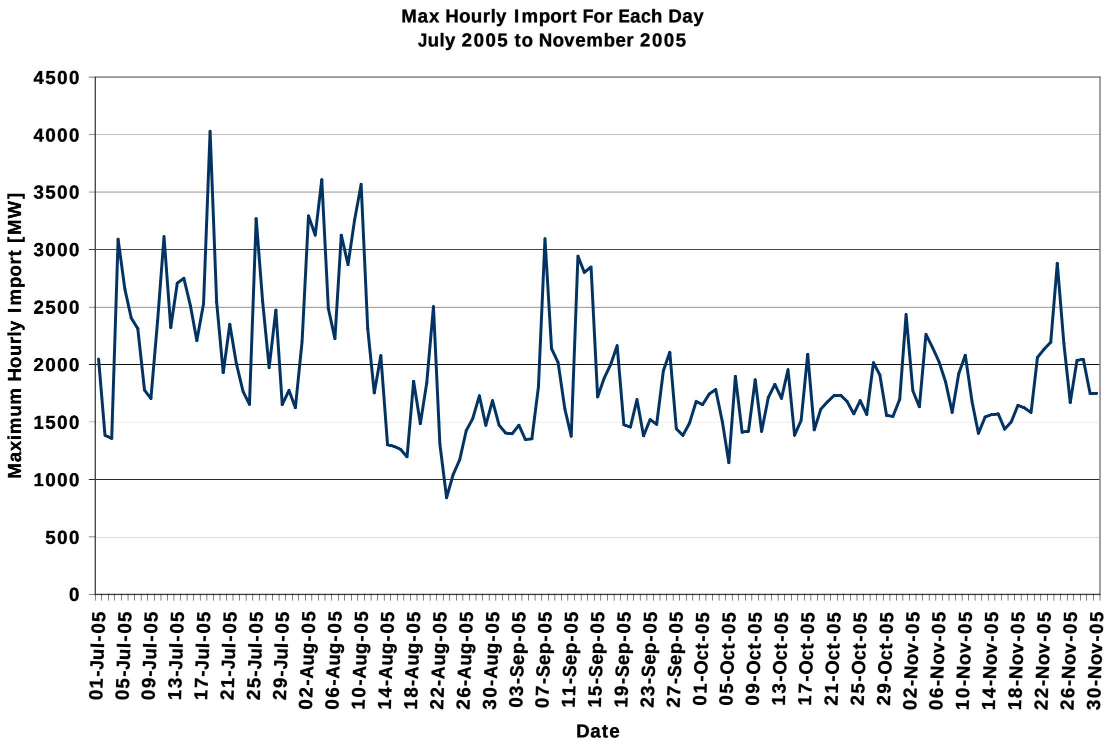
<u>Imports</u>

Throughout the summer period, Ontario relied extensively on imports from neighbouring markets. On many days the imports reached the maximum of our import capability. Due to transmission restrictions within the province, this capability was often less than the physical capability of the interties. The level of imports decreased during the fall period.

Figure 3.7 indicates the maximum hourly import for each day, for the summer and fall periods. The import levels indicated for the fall months of October and November are, on average lower than the levels for the months of July to September.

As reported in the Market Surveillance Panel report titled, "Monitoring Report on the IESO-Administered Electricity Markets for the period from May 2005 – October 2005" published in December 13, 2005, the relatively high prices in September 2005 were driven essentially by increases in natural gas prices that raised the cost of available energy, rather than by problems of relative supply.

Figure 3.9 Imports



An analysis of historical power flows on Ontario's interconnections for the five years prior to 2002 shows that, outside of summer peak demand periods, up to 1,800 MW of external generation resources has typically been imported into Ontario. During Ontario's summer peak demand periods of July and August imports are expected to be required and imports are expected to be available despite the fact that many neighbouring systems are often experiencing their peak demand. This is mainly due to the availability of spare capacity from systems that are not summer peaking. From the same analysis, up to 1,400 MW would be expected to be available based on observations during summer peak months in recent years prior to 2002.

The actual hourly import levels experienced from market opening indicates an average import level of about 1,167 MW for all hours. During the hours when Ontario demand exceeded 20,000 MW the average import level was about 1,479 MW. During the hours when Ontario demand exceeded 23,000 MW the average import level was around 2,193 MW, and occasionally reached the Ontario coincident import capability of approximately 4,000 MW.

Future levels of imports into Ontario will vary depending on several factors, including the availability and willingness of resources in external jurisdictions to supply the Ontario market, and the availability of required transmission capacity either within or outside of Ontario.

<u>Inter-tie Import Failures</u>

Given our demand for imported energy, a critical concern with supply this past summer was the frequent failure of large numbers of intertie transactions. These failures represent expected supply that is suddenly not available in real-time. The failures are especially problematic due to the timing and size of the failures.

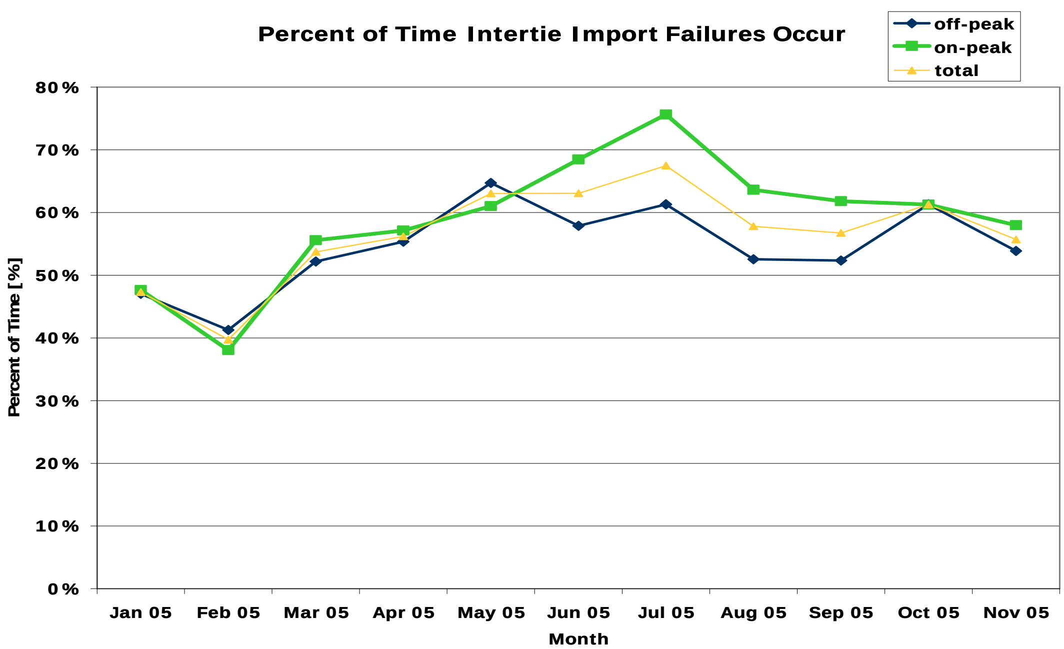
Transaction failures are equivalent to losing a generator, in their adverse impact on reliability for real-time operations. Typically, operators have about 30 minutes advance warning that a scheduled transaction has failed and that the energy must be replaced by other resources within that timeframe. Import failures can aggravate any potential energy shortage in Ontario, and can contribute to the need to use emergency control actions.

The larger the import failures are, and the more frequent the import failures are, the greater potential they have to cause reliability concerns.

The challenge to reliability that the import intertie failures present also depends on the resources that are available when the import failures occur. In the summer of 2005, when most generation was running, hydro and some thermal production was energy limited, and it was a constant challenge to balance supply and demand following these intertie failures. For the fall 2005 period, import failures were less frequent, and generally smaller in magnitude compared with summer 2005. The availability of more hydroelectric energy improved our ability to respond to the intertie failures.

During the fall months, the percent of time that intertie import failures occurred decreased compared with the summer months, but appear to be higher than the spring months of 2005. The on-peak hours of the day are the most challenging to deal with from a reliability viewpoint, and these hours, for the months of June to November, happen to have the highest percentage of import failures. For the fall months, about 60% of the time, intertie import failures occurred.

Figure 3.10: Percent of Time Import Failures Occurred



Further details on the issues regarding Intertie Import Failures can be found on the IESO web-site at: http://www.ieso.ca/imoweb/consult/intertieTrading_sub.asp

Use of Emergency Actions

An Emergency Operating State was declared on 5 occasions during the summer months of 2005. In the fall, there was one emergency operating state declared in December and the IESO purchased up to 500 MW of emergency energy.

Generators were asked to seek approval for environmental variances from the Ministry of Environment and were granted environmental variances on several occasions. These variances allowed greater amounts of energy to be used from thermal and hydroelectric facilities and were critical in ensuring there was sufficient energy to meet the demand.

In summary, there were a number of factors that contributed to the need for repeated use of emergency control actions, many of them temperature related:

- Load growth
- Extended periods of hot humid weather
- Low hydroelectric energy available
- Environmental limitations to thermal plant production
- Transmission system at its' limit
- Failure of import transactions to Ontario

3.4 Plans to Manage Reliability Risks

Reliance on Imports

The 18-Month Outlook study assumes no imports into Ontario in the available resources, or in the determination of the Reserve Above Requirement values that are presented in tabular format. However, in making an assessment of the extent to which Ontario can maintain reliability, it is recognized that Ontario may need to rely on imports to help maintain reliability. The coincident interconnection capability is normally in the range of 3,000 to 4,000 MW. Data from market opening through November 2005 reveals that, whenever demand exceeded 23,000 MW, imports averaged about 2,193 MW, and occasionally reached the 4,000 MW import capability level. In the event that Ontario experiences extreme weather conditions, or higher than expected generator forced outages, or other conditions that result in a more challenging supply-demand situation than modeled, Ontario will rely on imports to improve reliability. There are various risks to reliability listed in Section 6.3 of this document, some of which may be mitigated by imports into Ontario.

Emergency Demand Response Program

The IESO implemented an Emergency Demand Response Program (EDRP) in 2002. Approximately 400 MW of load is contracted under this program. The relief from the EDRP is not modeled in the reserve above requirement values presented in the 18-Month Outlook. Load under this program is cut as the last step before rotating load cuts. From a practical perspective, since reduction of this program load is voluntary, use of this program would likely occur at the same time as rotational load shedding. No EDRP load or rotational load shedding was required during this past summer or fall period.

Outage Planning

Every quarter, the IESO assesses the integrated generator and transmission outage plans of market participants. Periods where outages result in inadequate resource levels are identified to generators and transmitters. If market participants fail to proactively reschedule outages to mitigate concerns, the IESO may veto outages in the near-term to ensure sufficient capacity is available to meet non-dispatchable demand.

Progress on Other Action Plans

The following actions are planned to improve the capability of existing resources:

- resolution of generation dispatch issues (e.g. aggregation, frequency of dispatch)
- reaching agreement full use of phase shifters with Michigan to control parallel flows
- review of the use of environmental variances within the list of emergency control actions
- development of incremental additions to the transmission system to increase capabilities as described in the transmission adequacy section of this report

Additional actions are planned to increase the certainty of market mechanisms:

- mechanisms for imports to be scheduled day ahead similar to markets around Ontario
- mechanisms for committing generating units day ahead, similar to markets surrounding Ontario
- Implement a Demand Response Program like the markets around Ontario

In addition, we are reviewing IESO's operations and planning processes and criteria to ensure forecast risks are adequately recognized and that appropriate standards are in place.

Generation Dispatch Issues

In response to participant concerns, the IESO is addressing generation dispatch volatility issues that arise due to the number of dispatch instructions and dispatch reversals. The ability to manage plant operational requirements is also being addressed. Improving the reliability and capability of existing resources by resolving ongoing dispatch issues is also one of the areas that the IESO is addressing as part of its goal of enhancing the reliability of the power system in advance of the summer 2006. Initially, the IESO will work with affected and interested stakeholders to identify measures to address dispatch issues that can be implemented by June 2006. After implementing these measures, the IESO will continue to work with stakeholders in addressing dispatch issues requiring solutions with longer term implementation periods, such as those requiring significant tool changes.

Additional information can be found on the IESO web-site at:
http://www.ieso.ca/imoweb/consult/consult_dispatch-issues.asp

Phase Shifters between Michigan and Ontario

The Ontario-Michigan phase shifters can be used to control loop flows around Lake Erie, provided the necessary equipment and operating agreements are in place. High loop flows have often contributed to heavy loading on the QFW interface, and in doing so can limit the amount of imports into Ontario. Agreement of the involved transmission owners, Hydro One and International Transmission Company, is critical in achieving full control on the Ontario-Michigan interconnections. Until the remainder of the necessary agreements are in place, PS4 and PS51 will only be operated off neutral tap to prevent 5% voltage reduction in Ontario or Michigan, to prevent shedding firm load, or for testing. Hydro One and the International Transmission Company in Michigan must resolve outstanding issues and complete their agreements before the IESO market can use the Michigan-Ontario phase shifters to control loop flows through Ontario.

Reliability Demand Response Program

The creation of a new demand response reliability program is underway as a way of addressing measures to enhance the reliability of the power system in advance of summer 2006. The current Emergency Demand Response Program (EDRP) described earlier in this Section forms part of the IESO control action list for responding to emergency situations and is the last control action available to the IESO before the shedding of non-dispatchable load.

An additional and separate demand response program is referred to as the Reliability Demand Response Program (RDRP), which is similar to those of neighbouring markets. This program is being developed to give more certainty that an IESO request for response will be followed and to allow activation earlier than the EDRP in the list of control actions. A proposed program design was developed in November and an IESO open stakeholder workshop reviewed the proposed program. Further details on this proposal can be found on the IESO web-site at:

http://www.ieso.ca/imoweb/consult/consult_drrp.asp

Day-Ahead Commitment Processes

The IESO has initiated development of day-ahead commitment processes that are intended to allow imports to be scheduled day-ahead in order to address chronic transaction failures near real time that leave insufficient time to respond reliably; and to commit generation units day ahead to increase reliability in the operational time frame.

The design of the day-ahead commitment processes will take into consideration the following context:

- The need to design and implement these measures with a view to minimizing costs and changes to market participant business processes and systems;
- The need to design and implement these measures with consideration to the impacts on market clearing prices and uplift; and
- The need to design and implement these measures by the summer of 2006.

Further details on this initiative can be found on the IESO web-site at:

http://www.ieso.ca/imoweb/consult/consult_isr.asp and at

http://www.ieso.ca/imoweb/pubs/consult/dayAhead/da_20051125_stakeholder_plans.pdf

- End of Section -

4.0 Demand Forecast

The forecast of demand has been updated to reflect the most recent information. As part of the regular updating process, the forecasting models' equations are re-estimated based on recent economic, weather and demand data. We have also updated the Weather scenarios for the most recent weather data.

The economic outlook has been updated but does not differ significantly from the previous forecast. High oil prices and a high dollar will continue to negatively impact Ontario's exporters. Low interest rates will continue to fuel consumption, business investment and construction. Combined, the province will experience moderate growth over the forecast.

The government has set targets for energy conservation to reduce peak electricity consumption by 5 per cent by 2007. Since we have few details on how these conservation targets are to be met, they are not reflected in the demand forecast.

With no significant changes, the forecast results are very similar to the last forecast. Annual energy demand is expected to grow by 0.9% and 1.3% in 2005 and 2006. The weekly peak demands are, on average, 35 MW higher than in the previous forecast. The growth in energy and peak demands varies across the zones due to local demographic and economic factors that influence demand.

- End of Section -

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5.0 Resources

This section describes the generation resources that were considered in this Outlook based on information available to the IESO.

5.1 Existing Generation Resources Included in this Assessment

The existing installed generating capacity within Ontario is summarized in Table 5.1. This includes nuclear, coal, oil, gas, hydroelectric, wood, land fill gas and waste-fuelled generation, and results in a total capacity of 30,631 MW.

The capacity of installed generation resources in Table 5.1 does not include Bruce Units 1 and 2 and the Greater Toronto Airports Authority's new co-generation power plant.

Table 5.1 Existing Installed Generation Resources

Fuel Type	Total Capacity (MW)	Number of Stations
Nuclear	11,397	5
Coal	6,434	4
Oil / Gas	4,976	20
Hydroelectric	7,756	67
Miscellaneous	68	3
Total	30,631	99

The number of stations is unchanged from the last Outlook. However, the total capacity from nuclear generation has increased by 515 MW with the addition of Pickering A Unit 1 in the last quarter of 2005.

For purposes of determining a station count by fuel type, each generating station has been assigned a single fuel type based on the primary fuel consumed at the station. The category "Miscellaneous" includes land-fill gas, wood and waste-fuelled generating stations.

5.2 Potential Generation Resource Additions

Table 5.2 summarizes the significant new generation facilities that are scheduled to come into service within the 18 month study period. This includes projects in the IESO's Connection Assessment and Approval (CAA) process that are under construction, embedded generators that are registered to participate in the market and projects selected under the RFP process which are scheduled to be placed in-service within the 18 month study period. Generator owners or operators have provided the information regarding the status of their projects and the in-service dates listed in Table 5.2.

Table 5.2 Committed and Contracted Generation Resources and Demand Side Projects

Proponent/Project Name	Zone	Fuel Type	Capacity MW	Connection Applicant's Estimated I/S Date
Essex Power	West	Oil	3	2006-Q1
Greater Toronto Airports Authority	Toronto	Gas	117	2006-Q1
Melancthon Grey Wind Project	Southwest	Wind	68	2006-Q1
Kingsbridge Wind Power Project	Southwest	Wind	40	2006-Q1
Erie Shores Wind Farm	Southwest	Wind	99	2006-Q2
Loblaws Properties	distributed	Demand	10	2006-Q2
Nuclear Uprate	N/A	Nuclear	16	2006-Q3
Prince Wind Farm	Northeast	Wind	99	2006-Q3
Nuclear Uprate	N/A	Nuclear	16	2006-Q4
Blue Highlands Wind Farm	Southwest	Wind	50	2007-Q1
Total			**518**	

The Ontario Government's RFP for 300 MW of renewable resources resulted in a total of 10 successful projects that add up to 395 MW of installed capacity. One of these 10 new projects is already in-service. Of the rest, seven projects with a total installed capacity of about 360 MW comprised of wind and biomass projects are expected to be available within the 18 month timeframe of this Outlook. Wind capacity is intermittent and may not be fully available to meet demand when capacity is needed. For each of the renewable generation projects, the amount of dependable capacity that can be relied on to meet peak demand will need to be determined.

A study with several members of the Canadian Wind Energy Association, CanWEA, released in the spring of 2005 concluded that the median capacity contribution which can be expected from wind generation would range from about 47% in the winter to 19% in the summer. Other areas in North America typically rely on 2% to 30% of the installed capacity of intermittent wind powered generation, but this amount varies depending on the prevailing wind patterns, and how the resulting generation pattern coincides with peak demand. Until actual wind generation information from provincial resources is available, the capacity and energy contributions from these projects are assumed to be 10% and 30% respectively.

Four of the 10 renewable generators that are embedded in the distribution network or are displacing a wholesale market load have the option of participating directly in the wholesale market, or of reducing the wholesale market load of the consumer that is directly participating in the wholesale market. The one renewable generator already in-service chose to participate directly in the wholesale market.

Details regarding the IESO's CAA process and the status of all projects in the CAA queue, including copies of available Preliminary Assessment and System Impact Assessment Reports, can be found on the IESO's web site www.ieso.ca under the "Services - Connection Assessments" link. There are also a number of smaller generation capacity changes that may occur during the forecast timeframe. For this Outlook timeframe, the combined result of these generator capacity changes is about 30 MW. Some of the smaller capacity changes may not be significant enough to require the formal CAA process, and therefore not all of the capacity additions may have a project listed on the CAA Web-site.

5.3 Summary of Resource Scenarios

In assessing future resource adequacy, it is necessary to make a number of assumptions regarding the magnitude of resources expected to be available for operation. Two resource scenarios were considered in this Outlook: an Existing Resource Scenario and a Planned Resource Scenario. Both resource scenarios were established starting from the existing installed resources shown in Table 5.1.

Under the **Existing Resource Scenario,** Ontario generation resources identified in Table 5.1 were assumed to be in-service for the entire duration of the study period, except for periods of time that the generator owner/operator has submitted planned outages for their generating units. In addition, this resource scenario assumed 32 MW of generation capacity increases to existing nuclear generation facilities, as listed in Table 5.2. The existing resource scenario includes 372 MW of price-responsive demand capability up until April 1, 2007 and 347 MW thereafter. This value is based on the existing capability of price-responsive demands to reduce consumption based on signals from the IESO. Such decreases to demand are not factored into the published demand forecast values.

Under the **Planned Resource Scenario** existing Ontario generation resources were assumed to be in-service for the entire duration of the study period, except for periods of time that the generator owner/operator has submitted planned outages for their generating units. Additionally, all potential resource changes listed in Table 5.2 were included in this scenario. Price-responsive demand capability is forecast to be higher than under the Existing Resource Scenario. The price-responsive demand is forecast to reach 427 MW by end of March 2007, due to continuing increases in the amount expected to be offered into the IESO-administered markets. It drops to 398 MW for the rest of the Outlook period when the Transitional Demand Response Program (TDRP) is scheduled to end.

Forecasts of available resources were derived for each of the two resource scenarios described above, using information regarding generator output capabilities, planned outages, allowances for hydroelectric generation production below rated capacity, assumptions for the amount of price-responsive demand, and major transmission interface limitations.

Table 5.3 shows a snapshot of the forecast available resources, under the two scenarios, at the time of the seasonal peak demands over the study period. The installed resources in Table 5.3 start with the values listed in Table 5.1. The installed resources in Table 5.3 increase over the study timeframe, due to some increases in the forecast net installed capacity of existing generation facilities. For the Planned Resource Scenario only, resources are also increased by the generation additions listed in Table 5.2. The total reductions to resources include generator deratings, generator planned outages under each resource scenario, capacity limitations due to transmission interface constraints and allowances for hydroelectric generation production below rated capacity. The total reductions were subtracted and the price-responsive demand was added to the total resources, to obtain the available resources. In this Outlook, price- responsive demand ranges from 376 MW to a maximum of 427 MW under the Planned Resource Scenario, as shown in Table 5.3.

Table 5.3 Summary of Available Resources

Notes	Description \ Year	Winter Peak 2006		Summer Peak 2006		Winter Peak 2007	
		Existing Resource Scenario	Planned Resource Scenario	Existing Resource Scenario	Planned Resource Scenario	Existing Resource Scenario	Planned Resource Scenario
1	Installed Resources (MW)	30,631	30,751	30,631	30,957	30,663	31,088
2	Imports (MW)	0	0	0	0	0	0
3	Total Resources (MW)	30,631	30,751	30,631	30,957	30,663	31,088
4	Total Reductions in Resources (MW)	2,852	2,855	1,617	1,826	1,383	1,701
5	Price-responsive Demand (MW)	372	376	372	427	372	427
6	Available Resources (MW)	28,151	28,272	29,386	29,558	29,652	29,814

Notes to Table 5.3:

1. Installed Resources (MW): This is the total capacity of the generation resources in Ontario assumed to be installed at the time of the summer and winter peaks in the 18 month time span. Initially, this value includes all generators registered to participate in the IESO-administered markets at the beginning of the 18 month study period. It also reflects any minor unit re-ratings resulting from equipment changes that may have been completed prior to the publication of this Outlook. Two of the four Pickering A nuclear units are included in the existing installed generation resources. Additional generation capacity that was assumed under the applicable resource scenario is progressively included, according to the estimated in-service dates.

2. Imports (MW): Represents the amount of external capacity considered to be delivered to Ontario.

3. Total Resources (MW): This is the sum of Installed Resources (line 1) and Imports (line 2).

4. Total Reductions in Resources (MW): These reductions represent, under each of the two scenarios, the sum of generator deratings, generator planned outages under each resource scenario, generation limitations due to transmission interface constraints and allowances for hydroelectric generation production below rated capacity.

5. Price-responsive Demand: This is the amount of demand which is assumed to respond to changes in the market clearing price by reducing consumption, under each resource scenario.

6. Available Resources (MW): This equals Total Resources (line 3) minus Total Reductions in Resources (line 4) plus Price-responsive Demand (line 5).

5.4 Monthly Energy Production Capability Forecast

The monthly forecast of energy production capability, as provided by market participants, is included in Appendix A, Table A6.

- End of Section -

6.0 Resource Adequacy Assessment

This section provides an assessment of the adequacy of the resources described in Section 5 to meet the forecast demand. The purpose of the two resource scenarios described in Section 5.3 is to present a range of possible outcomes, in recognition of the uncertainty which exists regarding the future availability of resources. The Existing Resource Scenario, which assumes capacity increases to the existing generation facilities and a base amount of price-responsive demand, represents the lower boundary of the range, considering the potential for delays to the in-service dates of additional generation capacity, and additional price responsive demand capability. The Planned Resource Scenario assumes additional quantities of price-responsive demand and generation capacity additions based on project status and in-service date estimates. This scenario represents the higher boundary of the outcome range.

Results of the adequacy assessment, as well as an analysis of risk factors, are described in Sections 6.1 through 6.5. Observations, findings and conclusions are provided in Section 8, and detailed tables of results can be found in Appendix A of this document.

6.1 Weekly Adequacy Assessment

The assessment of weekly adequacy takes into consideration a range of forecast demands based on a probability distribution of historical weather data. Reserve Above Requirement levels have been calculated assuming both normal weather (with an allowance for the probability of experiencing extreme weather) and assuming extreme weather (with no further allowance for weather uncertainty). Figure 6.1 shows the normal and extreme weather demands assumed for each week in the study period.

Figure 6.1 Demand Forecast Range

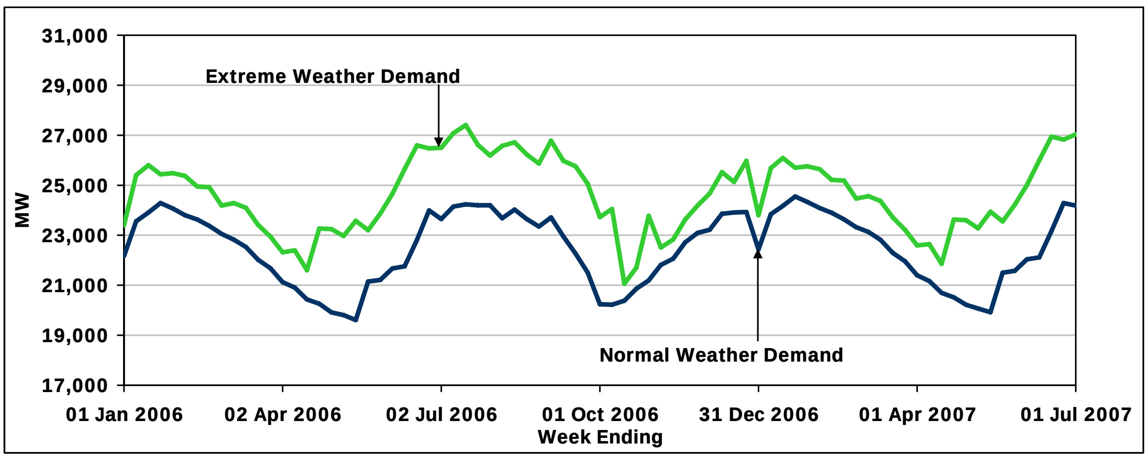


Figure 6.2 shows the Total Reductions in Resources used in the calculation of the Available Resources (as described in Section 5.3).

Figure 6.2 Total Reductions in Resources

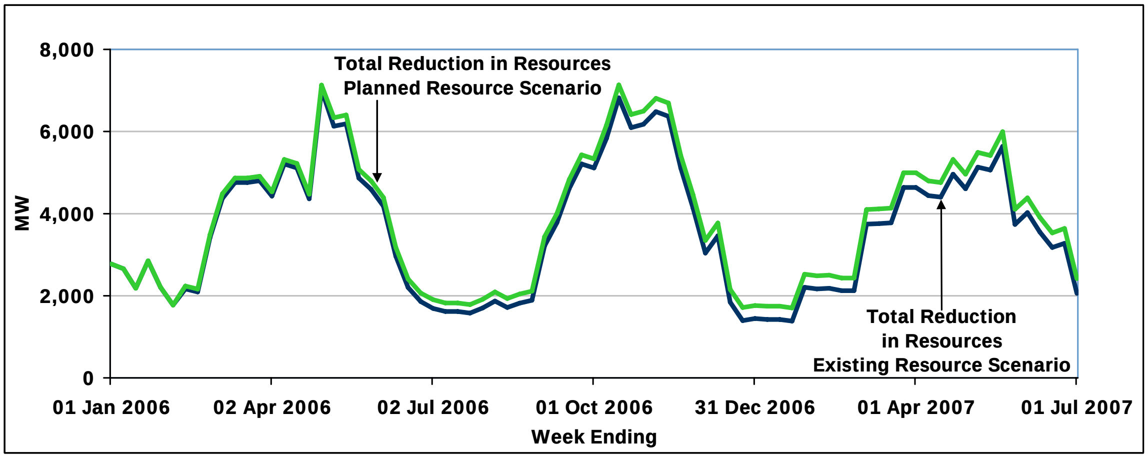


Figure 6.3 provides a comparison between Available Resources, and Required Resources for each week, for the Existing Resource Scenario. The latter quantity is the sum of Demand and Required Reserve, and is based on a probabilistic calculation, which takes into account load forecast uncertainty due to weather and random generator forced outages. Figure 6.4 provides a similar comparison for the Planned Resource Scenario.

Figure 6.3 Available vs. Required Resources: Existing Resource Scenario

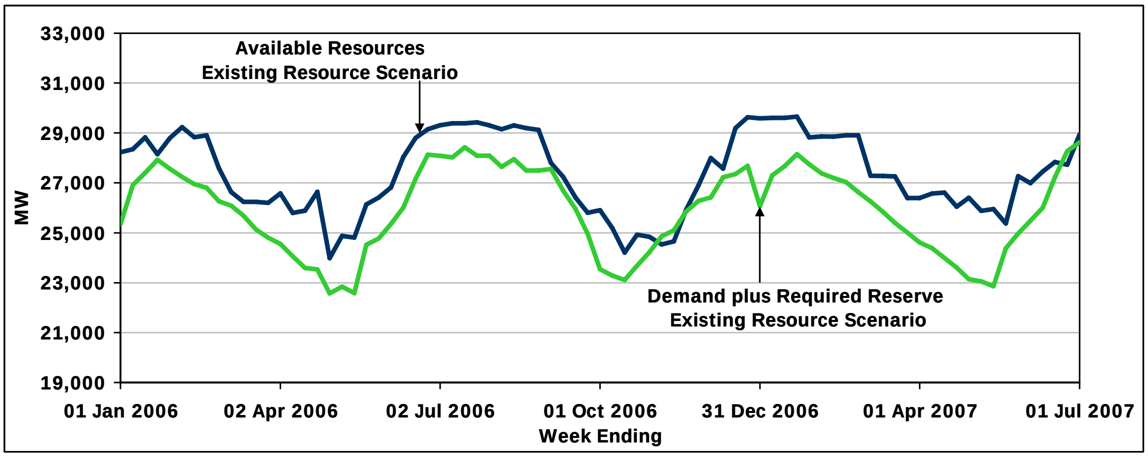
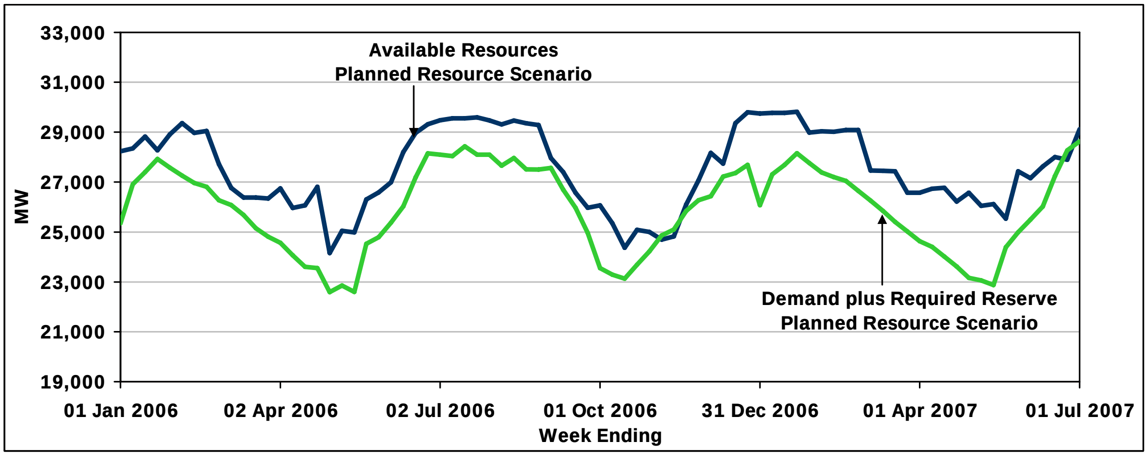
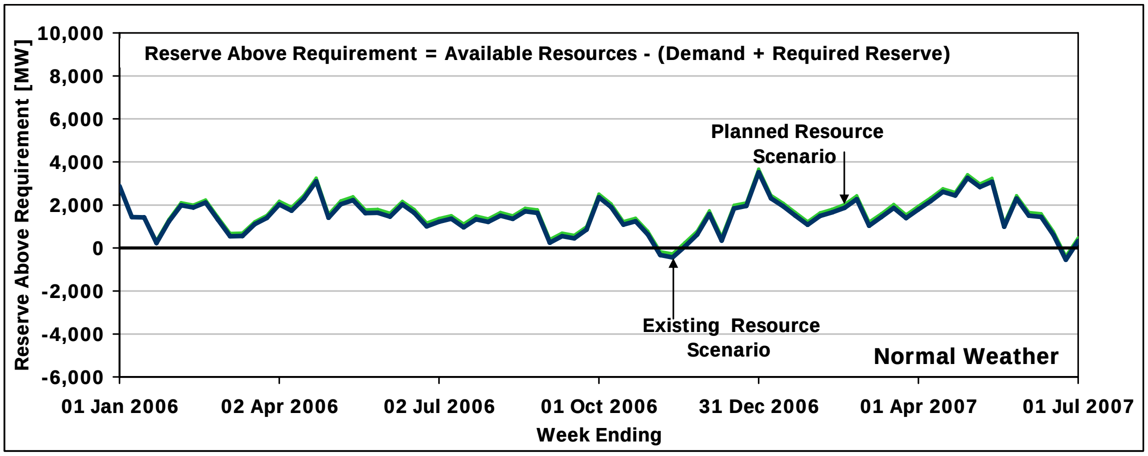


Figure 6.4 Available vs. Required Resources: Planned Resource Scenario



Reserve Above Requirement levels, which represent the difference between Available Resources and Required Resources, are shown in Figure 6.5 for each resource scenario studied.

Figure 6.5 Reserve Above Requirement: Existing Resource Scenario and Planned Resource Scenario



Under the **Existing Resource Scenario**, the forecast reserves are generally adequate for the study period. Reserves are forecast to be below requirements for three weeks of the 18 month study period. During these weeks some planned generator outages are at risk of cancellation or deferral by the IESO for reliability purposes depending on their priority and the resource adequacy situation at the time outage approval is being sought. Opportunities will exist for additional planned generator maintenance and exports in the other weeks of this Outlook period.

The results above must be assessed considering the risk factors described in Section 6.3 and the probability of this scenario occurring. During most of the study period, a combination of high demand levels under extreme weather conditions and lower than forecast levels of available resources would lead to reliance on imports and upward pressure on the wholesale market prices.

Under the **Planned Resource Scenario**, the resource adequacy situation is similar to the Existing Resource Scenario with an average improvement of only about 150 MW in the Reserve Above Requirement. For all but three weeks of the Outlook timeframe, the forecast available resources exceed the planning requirements. If we look ahead to next summer, we appear to be slightly better off than we forecast in December 2004 for the summer of 2005.

Figures 6.6 and 6.7 provide 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 October 24, 2005. Under both the Existing Resource Scenario and the Planned Resource Scenario, the combined changes in forecast demands, price-responsive demand and generator planned outages yield generally the same resource outlook for the overlapping period when compared to the previous 18-Month Outlook.

Figure 6.6 Reserve Above Requirement: Existing Resource Scenario vs. Previous Existing Resource Scenario

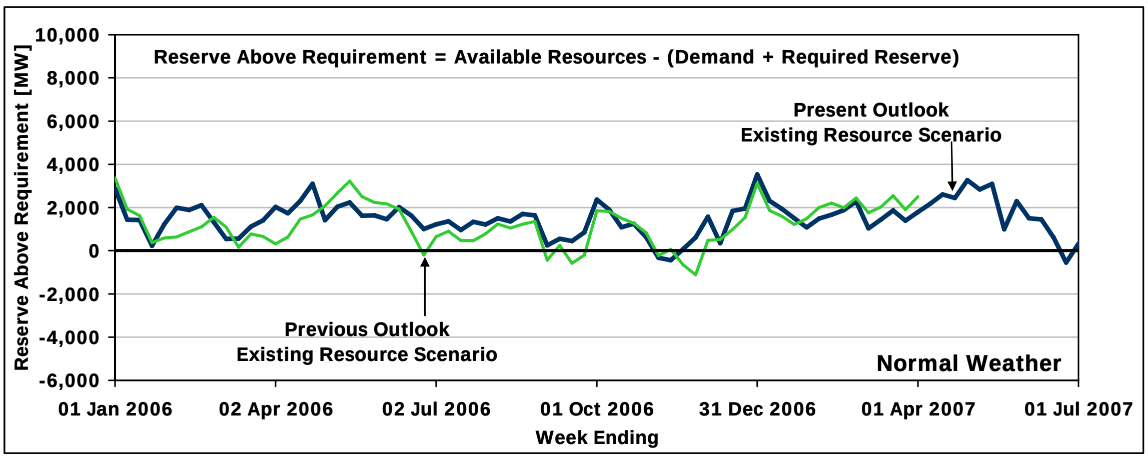
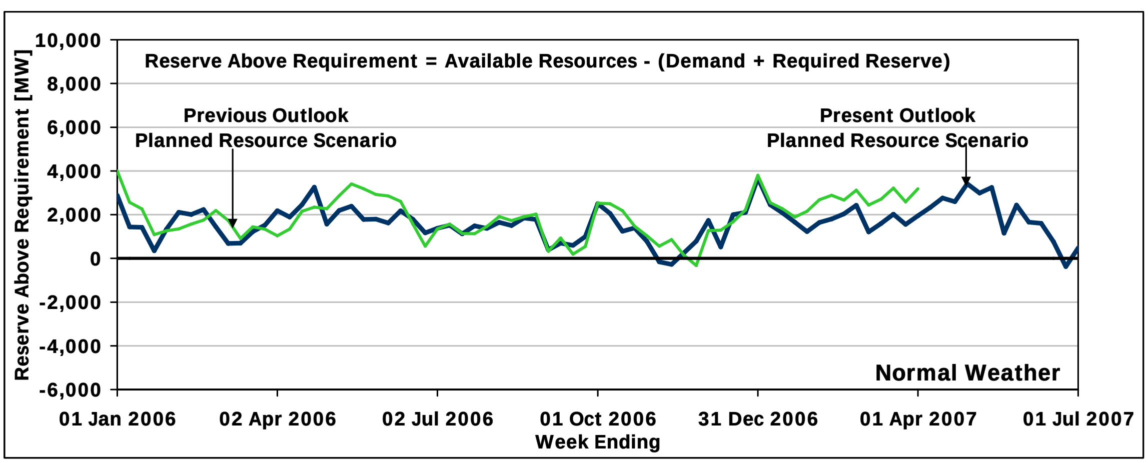


Figure 6.7 Reserve Above Requirement: Planned Resource Scenario vs. Previous Planned Resource Scenario



6.2 Loss of Load Expectation

Loss of Load Expectation (LOLE) simulation results indicate that, in order to achieve the NPCC target LOLE, additional resources would be required, sufficient to offset the reserve deficiencies under the existing resource scenario shown in Table A1 in Appendix A.

6.3 Resource Adequacy Risks

The forecast reserve levels for both the Existing Resource Scenario and the Planned Resource Scenario should be assessed bearing in mind the risks discussed below. Each of these risks, whether considered alone or in combination with the others, could result in lower than forecast reserve levels and the need for higher levels of imports or curtailment of planned outages.

6.3.1 Extreme Weather

The Existing Resource Scenario and the Planned Resource Scenario are based on the assumption of normal (average) weather. However, peak demands in both summer and winter typically occur during periods of extreme weather. Unfortunately, the occurrence and timing of extreme weather is impossible to accurately forecast far in advance. As a result, the impact of extreme weather is modeled probabilistically in the calculation of the required resources for each week of the study period. The impact of extreme weather was demonstrated in July 2005, when Ontario established an all-time record demand of 26,160 MW. Approximately 1,600 MW of this demand was due to the higher than average heat and humidity.

In order to illustrate the impact of extreme weather on forecast reserve levels during the Outlook period, both the Existing Resource Scenario and the Planned Resource Scenario were re-calculated assuming extreme weather in each week instead of normal weather. The probability of this occurring in every week is very small; however the probability of an occurrence in any given week is greater (about 2.5 percent). Over the course of the Outlook period (18-Months) you will observe at least one day of extreme weather. When one looks at the entire summer or winter periods, the expectation of at least one period of extreme weather becomes very likely. Results for extreme weather are shown in Figures 6.8, 6.9, and 6.10.

The magnitude of resource deficiencies, under extreme weather, clearly illustrates there are circumstances under which reliance on interconnected supply is likely. This emphasizes the continued need for reliable supply and demand response within Ontario.

Figure 6.8 Available vs. Required Resources: Existing Resource Scenario <u>Extreme Weather Demand</u>

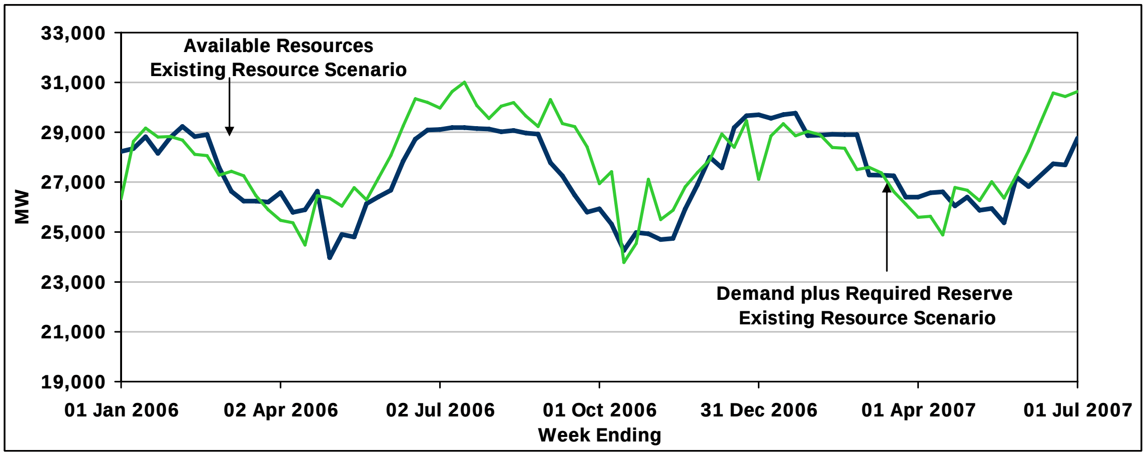


Figure 6.9 Available vs. Required Resources: Planned Resource Scenario <u>Extreme Weather Demand</u>

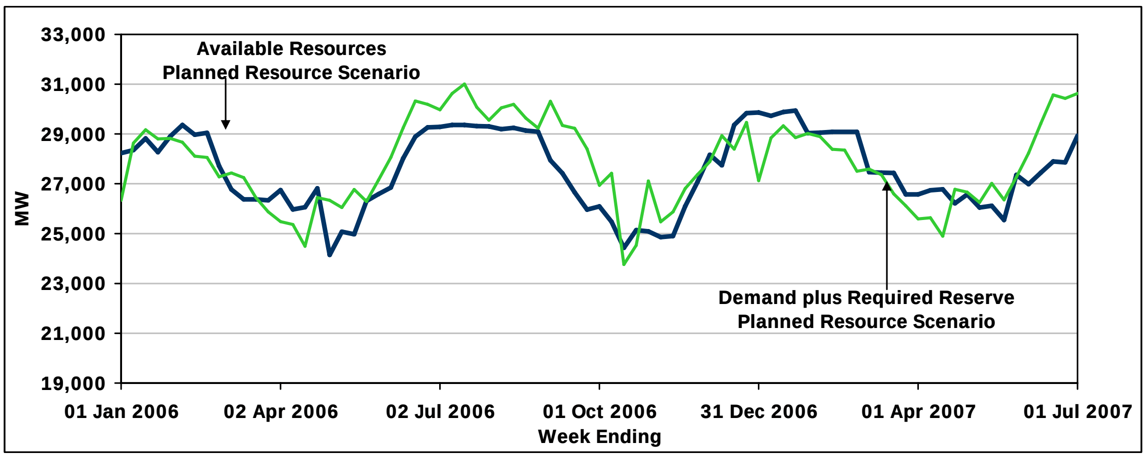
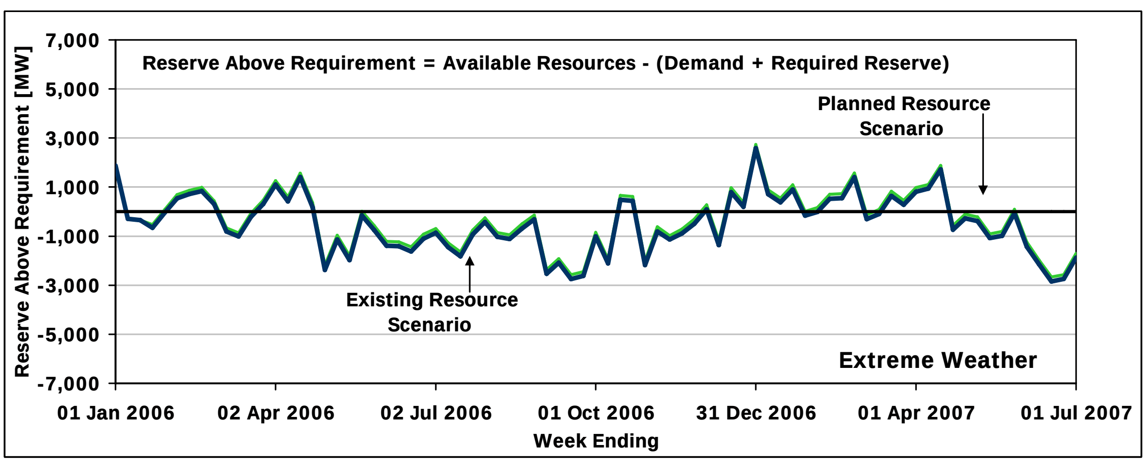


Figure 6.10 Reserve Above Requirement: Existing Resource Scenario and Planned Resource Scenario, <u>Extreme Weather Demand</u>



6.3.2 New Resource Risks

For the 18 month period under study, the improved demand-supply situation for the Planned Resource Scenario is dependent on the additional generation and price-responsive demand coming into service as forecast. Given the amount of new supply and transmission enhancements required in such a short period of time, timely regulatory approvals processes are required. Serious consideration needs to be given to developing expedited, but thorough, approvals processes to ensure timely implementation of the new facilities.

6.3.3 Extensions to Generator Planned Outages

A number of large generating units are scheduled to return to service from outage prior to winter 2006/2007 and summer 2006. Meeting these schedules is critical to maintaining adequate reserve levels. Delays in returning generators to service from maintenance outages could lead to reliance on imports and/or cancellation of planned generator outages.

In the event that generator outages must be delayed due to reliability concerns, it will be necessary for outages to be rescheduled to a more suitable time period. However outage rescheduling could stretch the ability of generator owners/operators to accommodate larger amounts of outages over shorter time periods and may increase forced outage occurrences. Operational experience so far indicates generator owners are usually able to adapt their outage plans. However, the dual peaking nature of the Ontario system (roughly equivalent peaks in winter and summer) means that outages must be scheduled in shorter spring and fall periods. Inevitably this means that some long duration outages have to be scheduled into the start of the peak seasons, creating the potential that any extensions of these outages occur when the generation is most needed.

6.3.4 Higher than Forecast Generator Unavailability

IESO resource adequacy assessments include a probabilistic allowance for random generator forced outages based on generator reliability information provided by market participants, or on industry-wide data for similar facilities. Along with weather-related demand impacts, the impact of generator forced outages is included in the determination of required resources.

6.3.5 Lower than Forecast Hydroelectric Resources

IESO resource adequacy assessments include forecast amounts of hydroelectric generation provided by market participants. The amount of available hydroelectric generation is greatly influenced both by water-flow conditions on the respective river systems and by the way in which water is utilized.

Water-flow conditions are primarily influenced by the amount of precipitation received. To accurately forecast precipitation amounts far in advance is little better than chance. Drought conditions over some or all of the study period would lower the amount of generation available from hydroelectric resources.

6.3.6 Capacity Limitations

There is a risk that any given generator may not be capable of producing the maximum capacity that the market participant has forecast to be available at the time of peak demand. There may be several reasons for these differences.

Forecast models include an equivalent forced outage rate, that is intended to capture the random nature of generator capacity limitations, deratings, and forced outages. There is a risk that actual outages and deratings may be higher than forecast, and there is also a risk that certain types of deratings or outages may not be completely random. Some outages and deratings, such as environmental limitations, may be more likely to occur at roughly the same time as the extreme weather conditions which drive peaks in demand.

In addition, the forecast models assume that the maximum capacity of any given generator may be utilized fully at the time of the Ontario peak demand, although there are risks that the maximum capability of all generating resources may not be available in the same peak hour, due to interrelationships between generating resource fuel availability. We have already discussed the risk of gas arbitrage for some generation facilities in Section 3.3. Similarly, there is uncertainty in the amount of capacity that may be available from intermittent generating sources due to their uncertain fuel supply. As the penetration of wind generation grows the range of fluctuations will change. The potential change will increase, offset somewhat by geographic diversity.

6.3.7 Transmission Constraining Resource Utilization

There is a risk, as experienced this past summer, that transmission constraints occur more often than expected, or have greater impact than expected on the ability to deliver generation to load centres. A limited number of transmission limitations are modeled without all probabilities of failure included. There is a risk that certain transmission limitations, which are not modeled, may have a greater impact than forecast and/or failures could occur to significantly impact the utilization of resources, until such equipment is repaired or replaced. This can affect the utilization of internal generation and imports from neighbouring systems.

6.3.8 Failure of Import Transactions

There is a risk, as experienced this past summer, that import transactions scheduled with neighbouring markets frequently fail to be delivered. These failures represent expected supply that is suddenly not available in real-time. The failures are especially problematic due to the timing and size of the failures.

6.4 Energy Conservation and Peak Reduction through Demand Response

The IESO has been identifying the suitability of demand-side initiatives as part of the supply picture for several years and believes demand reductions and demand shifting should be vigorously pursued in Ontario, as clean and potentially less expensive ways to reduce future supply requirements. The application of such conservation measures is virtually unrestricted in location.

Programs would improve the supply-demand balance in two main ways:

- Demand reduction through technological or process efficiency improvements would have beneficial effects on the environment and reduce the need for generation capacity additions.
- Shifting the time of use from peak to off-peak periods through demand-response programs would achieve peak demand reductions, influencing electricity prices downward and improving utilization rates of generation resources.

6.5 Hourly Resource Allocation Analysis

The 18-Month Outlook assessment of reliable electrical supply has routinely included a weekly adequacy assessment which provides an analysis of the peak hour of each week of the Outlook timeframe. Under this peak hour analysis, a range of possible demand levels are considered. This includes demands which result from very mild to extreme weather, and several steps in between. Each demand level is considered with an appropriate probability of occurrence. A peak hour analysis is also completed assuming the most extreme weather is experienced. It is noted that Ontario does not expect to experience the most extreme weather of all time for any extended period of time, but each year we average ten days of extreme weather conditions.

Based on the actual experiences during the summer of 2005 it has become apparent that only performing an assessment of a one hour peak period, with the established methods of accounting for peak hour capability of generators may not reveal energy constraints that can impact reliable electricity supply.

To better assess potential future energy constraints, an approximate hour by hour resource allocation analysis is performed for this Outlook assessment. To undertake this hour by hour analysis, consideration is given to the demand that should be used. For any given weekly period, Ontario would not typically have a reliability challenge in meeting overall weekly or daily energy demand if Ontario were to experience only normal weather conditions for each hour of the entire week. On the other hand, it is not realistic to expect that Ontario would experience the most extreme weather conditions of all time in each hour of the entire weekly period.

To determine an hour by hour demand profile, a challenging week of weather from history was identified, and then that challenging week of weather was used as the input to the latest demand forecast model. The demand forecast model will consider the appropriate future load shape and include the appropriate load growth rates, together with the historic weather pattern. This process reveals an hourly Ontario demand forecast, for a weekly period, assuming that Ontario experiences a repeat of the challenging weather pattern from history.

Historic weather was examined for each one week period in the winter, from the years 1970 to 2005, and a week was selected which had very challenging weather, from the perspective of soliciting relatively high electricity demand. IESO uses the concept of a weather factor, measured in MWs, to provide a measure of how much the weather influences the electricity demand. In selecting the challenging week, consideration was given to the combination of a high rank for the one hour peak demand impact, and a high rank for the overall weekly energy impact. The process was also repeated for each one week period in the summer, from the years 1970 to 2005.

To create a forecast of a challenging winter week, the actual weather factors for the second week of January, 1982 was assumed to occur in the second week of January 2006.

To create the forecast of a challenging summer week, the actual weather factors for the week from August 1973 was assumed to occur in the second week of August 2006.

An allocation of resources to meet the hour by hour demand is estimated based on a combination of actual hourly historic patterns, and any appropriate adjustments.

The allocation process provides a rough estimate of the extent to which the future challenging demand profiles present resource adequacy concerns.

The winter analysis indicates that if Ontario were to experience the challenging weather of 1982 in the second week in January 2006, the resulting demand would likely be met with the expected level of resources that are forecast to be available. Actual reliability could be impacted if gas-fired self scheduled generators choose to contribute less towards meeting the energy demand.

The summer analysis indicates that if Ontario were to experience the challenging weather of 1973, in the second week of August 2006, the resulting demand would be even harder to meet than in the summer of 2005. The outcome depends on the amount of hydroelectric energy that is available and the allocation profile of hydroelectric resources that are assumed and will also depend on the extent to which imports are available and utilized. We expect reliability will also be impacted by the available mechanisms that may be used to manage the challenging periods, including the extent to which initiatives that are underway now to improve reliability, can be implemented and be effective before the summer of 2006.

- End of Section -

7.0 Transmission Reliability Assessment

This section provides an assessment of the reliability of the Ontario transmission system.

7.1 Transmission Projects

Planned transmission projects, that are identified by transmitters and that have a significant impact and that have an estimated in-service date within the 18 month period under study are listed in Appendix B by transmission zone. These transmission projects do not include all transmission projects submitted to the IESO for Connection Assessments and Approval. Only those projects that are considered significant are included. To make cross referencing easier, the CAA-ID number of each project has been included where available. In general, the work listed represents some or all of the work associated with the CAA-ID.

There is also a list of transmission projects that are listed in Table 7.3, in Section 7.12, which identifies the projects that are required to maintain reliability. However, only the projects that have been identified by transmitters to the IESO via submissions to the 18-Month Outlook process are listed in Appendix B.

Additional information regarding each of the transmission projects in the CAA queue can be found at the IESO's Connection Assessments web-page, at the following location:

http://www.ieso.ca/imoweb/connAssess/ca.asp.

7.2 Adequacy of the Existing Transmission System

Recent IESO Outlooks (2005-Q3 18-Month Outlook and the 2005 10-Year Outlook) identified various areas of the IESO-controlled grid where the projected loading is expected to approach or exceed the capability of the transmission facilities in the planning period. In some cases this is expected to result in congestion of low-priced resources that must be replaced by higher priced resources, and will increase costs to market loads. In other, more critical cases, where the loading is projected to exceed the capability of the transmission facilities, there is an increased risk of load interruptions.

IESO has been working with Hydro One, 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 summer 2006. IESO has also been working closely with the Ontario Power Authority to specify the locations, timing and minimum generation requirements to satisfy reliability standards.

Previous outlooks included a discussion of the reliability issue and a proposed transmission or generation enhancement to address the issues in the following areas:

- Western GTA
- Downtown Toronto
- Windsor Area
- Beck-Middleport-Hamilton/Burlington circuits (QFW)
- St. Lawrence to Hinchinbrooke

- Burlington Autotransformers
- Additional Low Voltage Capacitors in the GTA
- Porcupine TS Shunt Reactors
- Great Lakes Power

7.3 City of Toronto and Western GTA

The transmission capability to supply the city of Toronto and the western GTA is provided by several transformer stations that deliver power from the 500 kV transmission system to the 230 kV local transmission and eventually to the distribution stations in and around the city of Toronto. Except for Parkway, these transformer stations operated above their post-contingency continuous capability, and in the case of Trafalgar, above its post-contingency long-term emergency (LTE) capability in summer 2005. The need for transmission enhancements and new supply to unload these transformers continues to be a priority requirement for this part of the IESO-controlled grid.

The actual summer 2005 loading for the 500 kV transformer stations in the GTA and central Ontario, and their respective transfer capabilities, are summarized in the table below:

Table 7.1 Loading of GTA 500/230 kV autotransformers

Station, # transformers, Continuous, 10-day, 15 min. rating	Maximum Summer 2005 Loading MVA	Planned 2006 Post-Contingency Continuous[1] Capability MVA	Planned 2006 Post-Contingency LTE[2] Capability MVA	Projected 2006 Loadings[3] MVA
Claireville (4) 774, 1019, 1440	3160	2566	3376	3211
Trafalgar (2) 837, 986, 1500	1458	1166	1372	1497
Parkway (2) 953, 1141, 1500	602	1320	1581	989
Cherrywood (4) 750, 1016, 1362	3089	2306	3124	3063
Middleport (2) 713, 840, 1107	1176	1054	1242	1236

Summer 2005 demands were high as a result of the hot, humid weather, but not "extreme". Statistically extreme weather could have increased demands by an additional 3%. The last column estimates the loading for 2006 by adjusting the 2005 loading by 3% for extreme weather and an additional 2% (typical) for load growth, and then for the effect of adding the 2nd Parkway transformer, which will tend to unload the other stations. An additional unit at Pickering, returned to service after the 2005 summer peak demand, will further reduce the loadings at these stations, particularly Cherrywood and Parkway; the effect on Claireville and Trafalgar will be much less, and is expected to be offset by the expected operation of 6 units at Bruce for summer 2006—there were 5 units operating during summer 2005.

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[1] The Post-Contingency Continuous Capability of the station is the maximum pre-contingency loading that can be planned to be supplied by the station such that, following a permanent failure of one transformer, load can continue to be supplied continuously without exceeding the continuous ratings of the remaining transformers. For network stations this number will be larger than the sum of the continuous ratings, as some of the initial loading of the station will redistribute on the remaining transformers at the station, and also onto other stations, according to the configuration of the grid and the laws of physics. The transformer distribution factors can be found in Appendix D.

[2] The Post-Contingency LTE is the Long-Term Emergency capability of the station. It is the maximum pre-contingency loading that can be planned to be supplied by the station such that, following a permanent failure of one transformer, load can continue to be supplied for an extended period, without interruption. This relies on the long-term limited time rating of the remaining transformers, generally their 10-day rating, and also recognizes that, following a contingency, the initial loading of the station will redistribute on the remaining transformers at the station, and also onto other stations, according to the configuration of the grid and the laws of physics. The transformer distribution factors can be found in Appendix D.

[3] Assumes a 3% increase for extreme weather, a 2% (typical) increase for load growth, and includes the effect of the second Parkway transformer.

Table 7.1 above compares the loading on these transformer stations to their expected capability for summer 2006. Except for Parkway, these transformer stations operated above their post-contingency continuous capability, and in the case of Trafalgar, above its post-contingency long-term emergency (LTE) capability in summer 2005. The post-contingency continuous capability is the pre-contingency loading level that could be sustained continuously, even following the failure of one transformer. This would allow time for a failed transformer to be replaced. If the loading of the station increases above its post-contingency continuous capability, the transformers can be operated, for a limited time, up to their long-time emergency ratings, generally a 10-day rating. Operation above the continuous rating cannot be sustained beyond the time a 10-day rating will afford, without loss of life to the transformers. Past experience has shown that a transformer replacement generally may take about a month. Where the loading exceeds the post-contingency continuous capability for a significant number of hours, there is an increased risk of transformer ageing, and a risk that load interruptions would be required before a transformer can be replaced.

Table 7.1, and figures 7.1, 7.2, and 7.3 below, show that Trafalgar, Claireville, and Cherrywood loading was very high in summer 2005, and exceeded the post-contingency continuous capability for approximately 400 hours, far in excess of the time afforded by the 10-day ratings. To avoid load interruptions following a transformer contingency would require a transformer replacement to be completed within the time allotted by the 10-day ratings.

Figure 7.1 Trafalgar TS Loading for 2005 and Capability for 2006

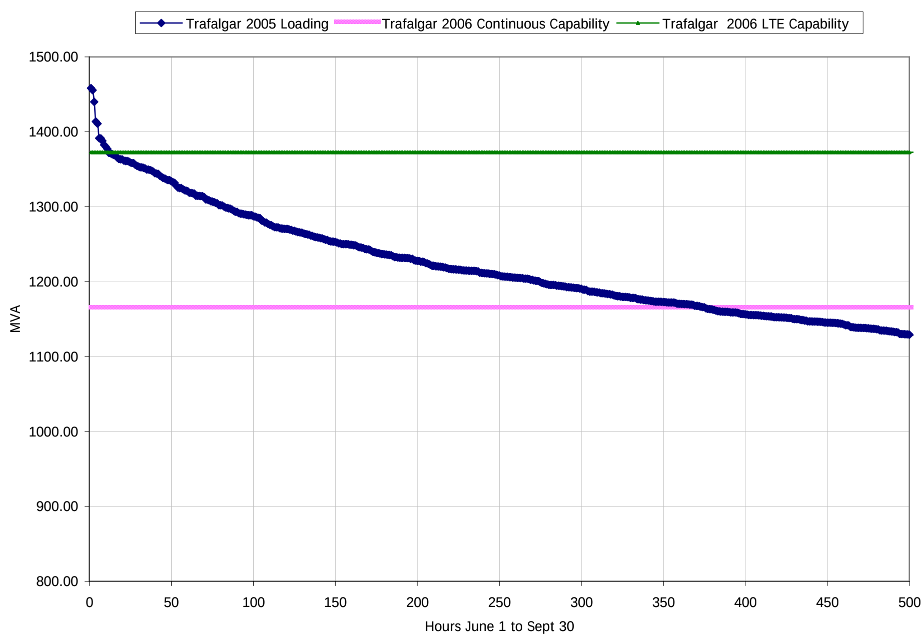
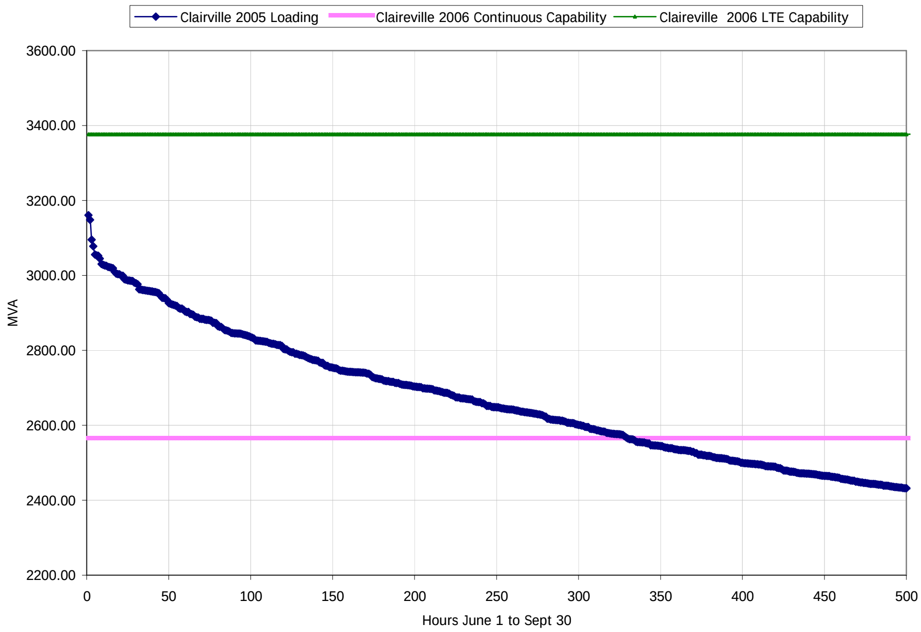


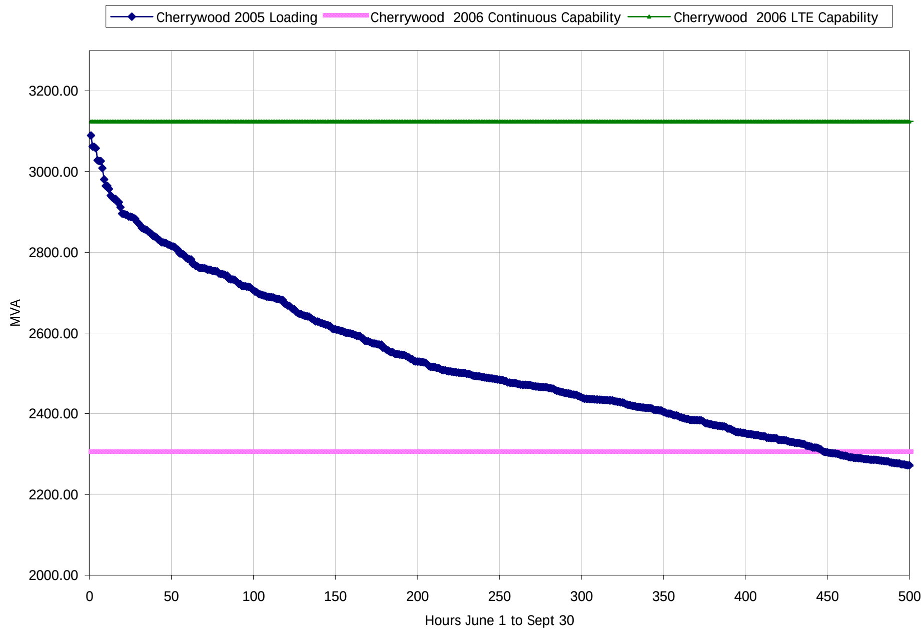
Figure 7.2 Claireville TS Loading for 2005 and Capability for 2006



For summer 2006, IESO has identified several critical short-term requirements to reduce the risk of load interruptions in the Toronto area. The most important of these is the completion of the Parkway transformer station. Hydro One has reported that the Parkway work is on schedule to be completed before summer 2006. Also included in IESO's priority items for summer 2006 is the completion of Cooksville TS, and the availability of a spare 500/230 kV autotransformer, to reduce the potential replacement time in the event of a transformer failure. Hydro One has reported that these will also be ready before summer 2006.

Transmission enhancements or new resources will be critical to an uninterrupted supply to the GTA loads in the future. There is a significant risk that new transmission and generation facilities will not be available for the earliest required in-service date, due to the expected time required for regulatory approvals and construction.

Figure 7.3 Cherrywood TS Loading for 2005 and Capability for 2006



The IESO's specific capacity requirements for new supply in the western GTA are described in the documents linked below. Many of these requirements fall into the period of this outlook.

http://www.ieso.ca/imoweb/pubs/rfp/IESO_Requirements-Western_GTA_Supply.pdf

http://www.ieso.ca/imoweb/pubs/rfp/IESO_Requirements-Western_GTA_addendum.pdf

To address the issues in the western GTA and central Toronto, the IESO will continue to work with stakeholders to assess needs and develop options.

For additional detail, IESO's 2005 10 year outlook provides the rationale and statement of need. Section 4.1 and the Greater Toronto Area section of the Conclusions address these areas specifically: http://www.ieso.ca/imoweb/pubs/marketReports/10YearOutlook_2005jul.pdf

Additional information can also be found in the 2005-Q3 18-month outlook at

http://www.ieso.ca/imoweb/pubs/marketReports/18MonthOutlook_2005sep.pdf

7.4 Toronto and Central Ontario 230/115 kV transformer stations

Table 7.2 Loading of Toronto and Central Ontario 230/115 kV autotransformers

Station, # transformers, Continuous, 10-day, 15 min. rating	Maximum Summer 2005 Loading MVA	Planned 2006 Post-Contingency Continuous[4] Capability MVA	Planned 2006 Post-Contingency LTE Capability MVA[5]	Projected 2006 Loadings[6] MVA
Leaside (6) 281, 332, 332	1289	1405	1660	1354
Manby E (3) 250, 307, 386	697	500	614	732
Manby W (3) 250, 296, 353	395	500	593	415
Burlington (4) 215, 256, 275	744	645	769	781
Beach (3) 250, 291, 348	440	500	583	462
Detweiler (3) 226, 283, 377	443	453	567	466
Allanburg (4) 225, 229, 303	770	677	688	809
Buchanan (3) 245, 300, 389	483	491	601	508

Table 7.2 shows that the autotransformers in the Toronto area and south-central Ontario were highly loaded in summer 2005, and at Manby East, Burlington, and Allanburg, exceeded both their post-contingency continuous capability, and their post-contingency long-term emergency (LTE) capability in summer 2005

Manby East loading was highest in September, when some load transfer took place. When all the available loads are transferred from Leaside, (Bridgman and Dufferin TS, approximately 250 MVA) the Manby East capability can be exceeded (Figure 7.4). As load continues to grow, it may not be possible to continue to transfer these specific loads to Manby East, while maintaining the existing level of reliability to these loads. This would reduce the flexibility to control loading at

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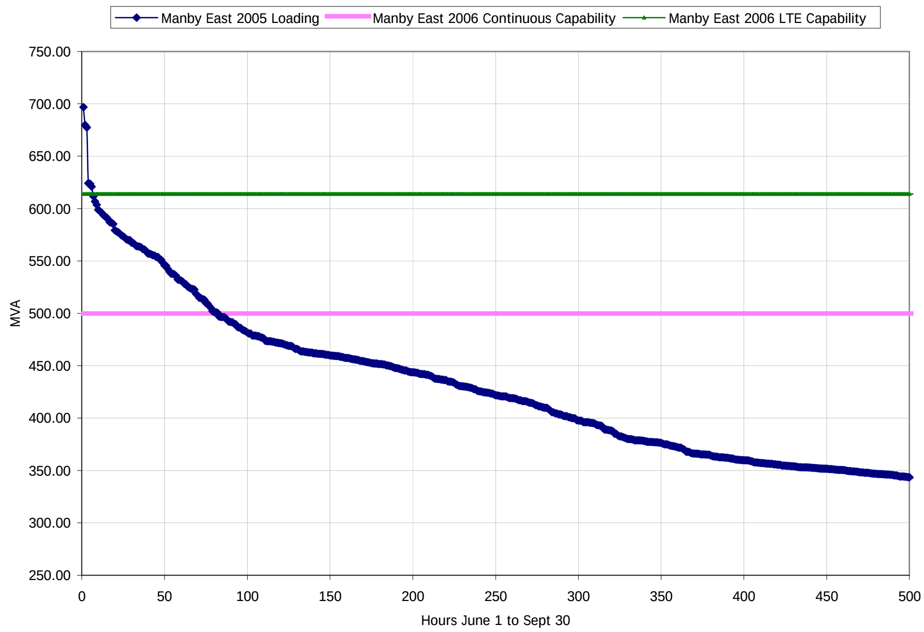
[4] The Post-Contingency Continuous Capability of the station is the maximum pre-contingency loading that can be planned to be supplied by the station such that, following a permanent failure of one transformer, load can continue to be supplied continuously without exceeding the continuous ratings of the remaining transformers. For these stations this number will be the sum of the continuous ratings of the remaining transformers at the station.

[5] The Post-Contingency LTE is the Long-Term Emergency capability of the station. It is the maximum pre-contingency loading that can be planned to be supplied by the station such that, following a permanent failure of one transformer, load can continue to be supplied for an extended period, without interruption. This relies on the long-term limited time rating of the remaining transformers, generally their 10-day rating, and also recognized that, following a contingency, the initial loading of the station will redistribute on the remaining transformers at the station.

[6] Assumes a 3% increase for extreme weather, and a 2% (typical)increase for load growth

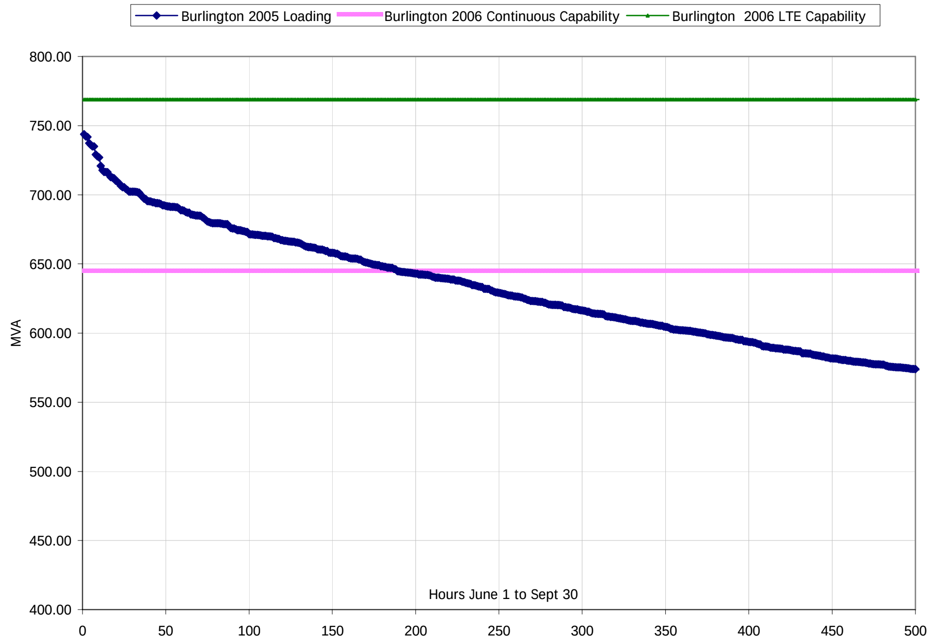
Leaside TS, although there is still spare capability at Leaside. Manby West appears to have sufficient spare capability to allow for load growth and to transfer loads from Leaside when the John-to-Esplanade link becomes available.

Figure 7.4 Manby East TS Loading for 2005 and Capability for 2006



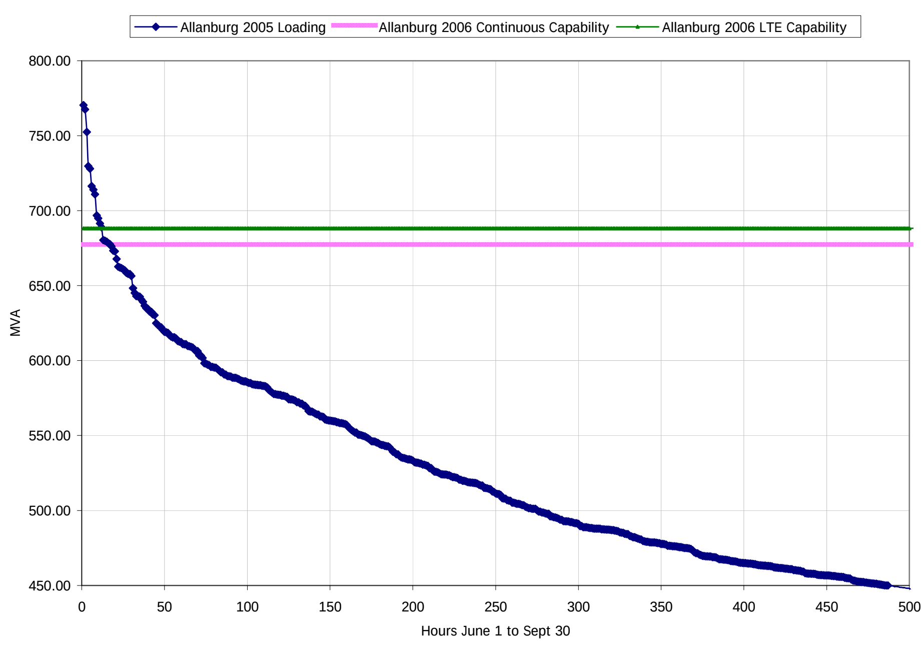
Burlington TS exceeded its post-contingency continuous capability, was very close to its LTE capability in 2005 (Figure. 7.5), and could exceed it in 2006. The IESO has asked Hydro One to ensure that overload protection is installed on these transformers, to avoid a multiple failure. IESO has also requested Hydro One to review the rating of these transformers to correct or remove any restrictions that can be accomplished before summer 2006.

Figure 7.5 Burlington TS Loading for 2005 and Capability for 2006



The loading at Allanburg TS also exceeded its LTE capability in summer 2005 (Figure 7.6) although only for less than 20 hours. In a post-contingency state it may be possible to re-dispatch Niagara area generation to control flows for a short period of time. The ratings of these transformers are unusually low for their size and IESO has requested Hydro One to review the rating of these transformers to correct or remove any restrictions that can be accomplished before summer 2006.

Figure 7.6 Allanburg TS Loading for 2005 and Capability for 2006



7.5 Significant Transmission Circuit Loadings in the GTA

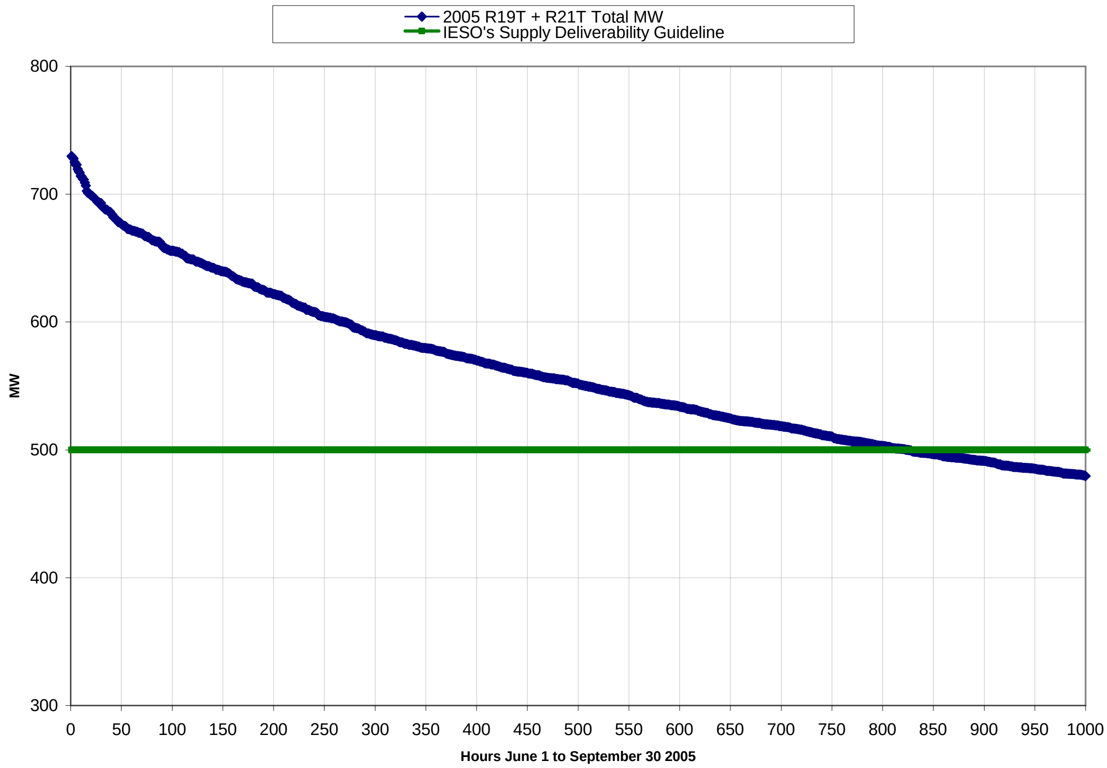
In addition to the critical loading level of the transformer stations in the GTA, there is one notable area where transmission circuits are heavily loaded and are a reliability issue that requires urgent attention.

The loading on the 230 kV double-circuit line between Trafalgar and Richview (circuits R19T and R21T) currently violates the IESO Supply Deliverability guideline for double-circuit lines (Figure 7.7). The guideline states that "for loads greater than 500 MW: with all transmission elements in service, any single element or double-circuit contingency should not result in an interruption of supply to a load level of 500 MW or more."

In summer 2005 the total load supplied by this double-circuit line was greater than 700 MW, and exceeded the IESO deliverability guideline for more than 800 hours. There is also an increased risk that load would need to be interrupted if one of the circuits were to be permanently faulted, as the load supplied exceeds the continuous rating of a single circuit (approx 650 MVA).

This has been identified as a part of the grid that requires transmission enhancements and new supply. The IESO's 2005 10-Year Outlook, and previous outlooks, have proposed transmission enhancements, including new 500/230 kV autotransformers at Milton SS or Trafalgar TS, a re-termination of connections to Halton TS and Meadowvale TS onto the new 230 kV busbar at Milton, and an extension of the connection eastward to Cardiff TS and Bramalea TS. This would allow the loads at Pleasant TS and Jim Yarrow TS (about 360 MW total) to be transferred off circuits R19T and R21T. IESO will continue to work with Hydro One and the OPA to assess available options and to advance a transmission option, in conjunction with new supply, to address this violation of guidelines. There is a significant risk that these transmission enhancements, or new supply, will not be available for the earliest required in-service date, due to the expected time for regulatory approvals and construction.

Figure 7.7 Richview to Trafalgar R19T and R21T Loading for 2005 and IESO's Deliverability Guideline Level



7.6 Windsor Area

The Windsor area is expected to continue to require the full use of operational procedures and special protection systems to reduce congestion and to mitigate the risk of interruptions to loads in the area. Thermal ratings of the 115 kV circuits and the two 230/115 kV autotransformers at Keith TS often restricted local generation, limited imports from Michigan and relied on the arming of local special protection systems for extended periods of time. For summer 2005 operation, the loading on 115 kV circuit J4E exceeded the summer design rating for about 150 hours, requiring extensive arming of the local special protection system, and restricting imports over J5D.

Upgrades for the area have been identified as a priority requirement by the IESO and IESO is working with Hydro One to advance the work to reconfigure the 115 kV circuits at Essex and to modify the Windsor Area SPS for summer 2006. Additional new transmission will require more time, and is at risk of delays due to the time required for regulatory approvals and construction.

7.7 Beck-Middleport-Hamilton/Burlington circuits (QFW)

Hydro One has completed the work to bring the rating of the circuit sections into Burlington and Hamilton up to their design capability, and for conditions similar to summer 2005, this should provide at least 200 MW of increased transfer capability into the Hamilton and Burlington area from the southwest and Niagara area.

The Niagara expansion project will also expand the thermal capability of the QFW transmission path out of Beck by adding two 230kV circuits from Allanburg to Middleport, effectively adding two circuits to the QFW interface, and increasing the transfer capability by up to 800 MW. This work is planned to be completed in the third quarter of 2006.

7.8 St. Lawrence to Hinchinbrooke

Summer 2005 operation exhibited very heavy loading on the 230 kV circuits westward from St. Lawrence TS to Hinchinbrooke TS. As two of the circuits share common towers, a tower fault would leave only one circuit to carry most of the power, and overload it beyond its limited time rating. These conditions prevailed during the heaviest demand days, and limited imports into Ontario from Quebec and New York, and required the use of emergency control actions including emergency transfer limits for some of these days.

IESO has proposed enhancements to an existing special protection system to reduce generation in the event of a tower contingency, thereby relieving the limitation in the short-term. IESO has asked Hydro One to make this available before summer 2006.

7.9 Additional Low Voltage Capacitors in the GTA

The high and growing demands experienced in summer 2005 continued to exhibit poor power factor, tending to lower voltage and increasing the need for reactive power from the generators in southern Ontario. Such a trend, if not corrected will require increasing amounts of reactive injection from the generating units, and leave insufficient spare reactive capability to control voltages following contingencies. Such a situation is unreliable and cannot be permitted to occur on the grid.

To correct this, and maintain sufficient spare reactive capability on the generators, IESO is reviewing the actual summer 2005 power factor at various stations in the Toronto area, and will be exploring, with Hydro One and the applicable distributors, options to install low voltage capacitor banks or to take equivalent power factor corrective actions, before summer 2006 where possible, at Halton TS, Meadowvale TS, Palermo TS, Jim Yarrow TS, Cambridge-Preston TS, Whitby TS, and Otonabee TS.

7.10 Porcupine TS Shunt Reactors

The recent 10-Year Outlook identified various enhancements for northeastern Ontario. Summer 2005 operation also reinforced the potential for high voltages at Porcupine and Pinard TS following 500 kV circuit contingencies. These voltages could exceed equipment capability and expose transmission customers to damaging high voltages. To reduce the risk to equipment, and reduce the exposure to customer interruptions, additional shunt reactors at Porcupine and/or Pinard TS may be required. These reactors must be included in the post-contingency switching capability of the north-east LGR scheme to effectively control voltages. Hydro One has scheduled this work to be completed before the end of 2006.

7.11 Great Lakes Power

Great Lakes Power will be completing a 230 kV transmission line between the northern part of their system near Wawa and the southern part near Sault St. Marie. The circuit will improve reliability to loads in the Sault St. Marie area and reduce restrictions to generation in the Great Lakes Power system.

7.12 Summary of Transmission Requirements for the Outlook Period

The following table summarizes the projects described above and various others that IESO has previously identified to maintain the reliability of the IESO controlled grid, and that fall into this outlook period. Most of these projects have been identified in the IESO's recent 10-Year Outlook; additional details are available in that report. Others have been identified as a result of the summer 2005 operation, or from analysis since the publishing of the 10-year outlook, and their dates modified as a result.

Of all the transmission projects listed in table 7.3, only some of these projects that have been identified by transmitters to the IESO via submissions to the 18-Month Outlook process. Those projects that have been identified by the transmitter are listed in Appendix B.

Table 7.3 Transmission Projects Priorities

Priority Transmission Project - Description of Facilities	*Comments, Expected Completion Date*	*Required Completion Date*
1. Complete the on-going work at Cooksville TS to eliminate the need for a 230kV busbar at Lakeview SS		Spring-2006
2. Complete the 2nd Phase of the development of Parkway TS including the installation of a 2nd 500/230kV auto-transformer		
3. Complete the replacement of the 500kV and 115kV breakers at Porcupine TS, including the reconfiguration of the 500kV terminations and the related changes to the North-east SPS.	October 2006	
4. Reconfigure the 115kV circuit terminations at Essex TS; Modify the Windsor Area SPS; & Re-conductor 115kV circuits J3E & J4E. Confirm OEB S92 not required.	October 2006 for reconfiguring. Need for re-conductoring under review. Not before Q2 2007.	
5. Replace the two 215MVA 230/115kV auto-transformers at Burlington TS with higher-rated units. Install 2 pu over-current protection before 2006.	Need for transformers under review. Not before 2007.	
6. Install LV capacitor banks at, Hydro One: Halton TS, Meadowvale Customers: TS, Palermo TS, Jim Yarrow TS, Cambridge-Preston TS, Whitby TS & Otonabee TS and Oakville TS.	Need for capacitors under review. Target spring 2007.	
7. Uprate existing 230kV circuits into Burlington TS. All rated to operate up to 131'C.	Done.	
8. Install additional shunt reactors at Porcupine TS (& possibly at Pinard TS) and incorporate a post-contingency switching capability into the North-east LGR Scheme.	Earliest by October 2006	
9. Enhance the Beauharnois-Saunders G/R Scheme to respond to double-circuit contingencies.	Needed by spring 2006. October 2006	
10. Uprate 115kV circuits H9A & A2 between Hawthorne TS & Bilberry Creek TS.	Rely on operating measures in the short-term. Since the long-term solution is a subset of the 1250 MW interconnection with Quebec, it can not be implemented independently.	

Priority Transmission Project - Description of Facilities	*Comments, Expected Completion Date*	*Required Completion Date*
11. Maintain a minimum of one 750MVA 500/230kV auto-transformer available as a system spare.	First-planned end May 2006. Second-after summer 2006. Third-on order, as early as Q2 2006.	
12. Reinforce the 230kV system between Allanburg TS & Middleport TS	End of July 2006	Summer-2006
13. Replace the 230/115kV auto-transformers at Keith TS with higher-rated units	Under review. Co-ordinate with item 4, re-conductoring J3E, J4E.	Fall-2006
14. Install two 250MVA 230/115kV auto-transformers at Cambridge-Preston TS	Possibly installed in phases, one transformer initially. First transformer target date spring 2007.	
15. Install shunt capacitors at Fort Frances TS or Mackenzie TS.	Review need for Mackenzie, and in light of Manitoba contract plans. Fort Frances as early as Spring 2006.	
16. Transfer Tilbury load to a dedicated circuit from Lauzon. Delete - install a 230/115kV auto-transformer at Kent TS.	late 2007, early 2008	Spring-2007
17. Install a 245MVA 250kV capacitor bank at Detweiler TS		
18. Install a 245MVA 250kV capacitor bank at Orangeville TS		
19. Install a 245MVA 250kV capacitor bank at Beach	As early as spring 2006	
20. Install two 412MVAr 250kV shunt capacitor banks at Middleport TS	Earliest spring 2007.	Spring-2007

7.13 Planned Transmission Outages

A principal purpose of the transmission reliability assessment is 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. Another purpose of the transmission reliability assessment is to identify the possibility of any security-related events on the IESO-controlled grid that could require contingency planning by market participants or by the IESO. As a result, the transmission outages are reviewed to identify transmission system reliability concerns and to highlight those outages that should be rescheduled or changed. As an example, a change to an outage may include reducing the scheduled duration or recall time.

The assessment of transmission outages will also identify any resources that are forecast to be constrained due to transmission outage conditions. The identification of a constrained resource is generally not reflected in the assessment of weekly resource adequacy, which is detailed in Section 6.1, since there is typically sufficient outage scheduling flexibility to avoid constraining off resources when such resources are needed for reliability. 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 the forecast of reserve is deficient. Under the Market Rules, where the scheduling of planned outages by different market participant's 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 shall 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.

For this Outlook, transmission outage plans submitted to the IESO's Integrated Outage Management System (IOMS) as of November 2005 were used.

The IESO's assessment of the impact 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/or interconnection limits. 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).

A few of the transmission outages planned within the timeframe of this Outlook are judged to have a material impact on the overall reliability of the IESO-controlled grid.

The assessment of transmission outages for this Outlook has been limited to those outages with a scheduled duration of greater than five days or to those outages associated with a project where at least one outage has a scheduled duration of greater than five days. The IESO recognizes that there are expected to be additional outage requirements and/or changes as time approaches the Outlook study period and that transmission capacity will be impacted by outages with a scheduled duration of five days or less. 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 large number of system changes identified to be completed in the 10-Year Outlook and this 18-Month assessment will require a substantial number of planned outages to incorporate the new facilities. It is too early in the development of most of these plans to identify specific outage requirements. These will be identified in future Outlooks.

- End of Section -

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8.0 Overall Observations, Findings and Conclusions

The following findings and conclusions are based on the results of the assessment carried out for this Outlook.

Resource Adequacy

- Under the Existing Resource-Normal Weather Scenario, forecast reserves are generally adequate for the study period. Reserves are forecast to be above requirements for all but three weeks of the Outlook timeframe. During these weeks some planned generator outages are at risk of cancellation by the IESO for reliability purposes depending on their priority and the resource adequacy situation at the time their approval is being sought. Opportunities will exist for additional planned generator maintenance and exports in the other weeks of the Outlook period.
- Under the Planned Resource-Normal Weather Scenario, the resource adequacy situation is somewhat similar to the Existing Resource Scenario, with an improvement of about 150 MW on average in the Reserve Above Requirement.
- Extreme weather during the peak periods will result in significantly increased reliance on imports to supplement Ontario generation and higher potential for emergency operating procedures.
- Results of the resource adequacy assessment are summarized in the matrix below. The different shadings are intended to suggest the degree of concern regarding the supply/demand situation under each resource-weather scenario combination.

	Normal Weather Scenario	Extreme Weather Scenario
Existing Resource Scenario	- opportunities for additional outages/exports exist in most weeks - there are three weeks when reserves are lower than required (planned outages at risk or imports potentially required)	- many planned outages at risk - imports required during some peak periods - higher risk of requiring emergency operating procedures up to and including rotational load shedding
Planned Resource Scenario	- opportunities for additional outages/exports exist in most weeks - there are three weeks when reserves are lower than required (planned outages at risk or imports potentially required)	- many planned outages at risk - imports required during some peak periods - higher risk of requiring emergency operating procedures up to and including rotational load shedding

- The magnitude of resource deficiencies under extreme weather emphasizes the continued need for reliable supply and demand response within Ontario.

- For the 18 month period under study, the improved demand-supply situation for the Planned Resource Scenario is dependent on the additional generation and price-responsive demand coming into the market as forecast. Seven of the ten new projects from the recent Request for Proposals for Renewable generation are expected to be available within the 18 month timeframe of this Outlook. One of the ten is already in service.
- A number of large generating units are scheduled to return to service from outage prior to the winter 2006/2007 and summer 2006. Meeting these planned outage schedules is critical to maintaining adequate reserve levels over the peak seasons.
- High generator unavailability, whether caused by higher forced outage rates or delays in returning generators to service, could lead to reliance on imports. Under these circumstances, opportunities for planned outages, especially during the peak summer period, would be limited.
- Over the 18 month period under study, the Northeast Power Coordinating Council resource adequacy criterion is expected to be met.
- Extreme weather during peak periods places increased emphasis on reliable Ontario resources and energy imported from neighbouring systems. To maximize the ability to respond to these peak period requirements the following actions are planned:

  Maximize the capability of existing resources:

  - Resolve generation dispatch issues (e.g. aggregation, frequency of dispatch)
  - Review the use of environmental variances within the list of emergency control actions

  Increase the certainty of market mechanisms:

  - Allow imports to be scheduled day ahead like the markets surrounding Ontario
  - Commit units day ahead like the markets surrounding Ontario
  - Implement an Emergency Demand Response Program like the markets surrounding Ontario

  IESO operations and planning:

  - Processes and criteria are under review to ensure forecast risks are adequately recognized and that appropriate standards are in place.

Transmission Adequacy

- The transmission capability to supply the city of Toronto and the western GTA is provided by several transformer stations that deliver power from the 500 kV transmission system to the 230 kV local transmission and eventually to the distribution stations in and around the city of Toronto. Except for Parkway, these transformer stations operated above their post-contingency continuous capability, and in the case of Trafalgar, above its post-contingency long-term emergency (LTE) capability in summer 2005. The need for transmission enhancements and new supply to unload these transformers continues to be a priority requirement for this part of the IESO-controlled grid.
- For summer 2006, IESO has identified several critical short-term requirements to reduce the risk of load interruptions in the Toronto area. The most important of these is the completion

of the Parkway transformer station. Hydro One has reported that the Parkway work is on schedule to be completed before summer 2006. Also included in IESO's priority items for summer 2006 is the completion of Cooksville TS, and the availability of a spare 500/230 kV autotransformer, to reduce the potential replacement time in the event of a transformer failure. Hydro One has reported that these will also be ready before summer 2006.

- The loading on the 230 kV double-circuit line between Trafalgar and Richview (circuits R19T and R21T) currently violates the IESO Supply Deliverability guideline for double-circuit lines (Figure 7.7). The guideline states that "for loads greater than 500MW: with all transmission elements in service, any single element or double-circuit contingency should not result in an interruption of supply to a load level of 500MW or more." In summer 2005 the loading on this double-circuit line exceeded 700 MW, and exceeded the IESO deliverability guideline for more than 800 hours. IESO is working with Hydro One to advance transmission options to solve this issue.
- Upgrades for the Windsor area have been identified as a priority requirement by the IESO and IESO is working with Hydro One to advance the work to reconfigure the 115 kV circuits at Essex and to modify the Windsor Area SPS for summer 2006. Additional new transmission will require more time, and is at risk of delays due to the time required for regulatory approvals and construction
- Hydro One has completed the work to bring the rating of the circuit sections into Burlington and Hamilton up to their design capability, and for conditions similar to summer 2005, this should provide at least 200 MW of increased transfer capability into the Hamilton and Burlington are from the southwest and Niagara.
- The Niagara expansion project will also expand the thermal capability of the QFW transmission path out of Beck by adding two 230kV circuits from Allanburg to Middleport, effectively adding two circuits to the QFW interface, and increasing the transfer capability by up to 800 MW. This work is planned to be completed in the third quarter of 2006
- Burlington TS was very close to its LTE capability in 2005 (Figure. 7.5), and could exceed it in 2006. The IESO has asked Hydro One to ensure that overload protection is installed on these transformers, to avoid a multiple failure. IESO has also requested Hydro One to review the rating of these transformers to correct or remove any restrictions that can be accomplished before summer 2006.
- Summer 2005 operation exhibited very heavy loading on the 230 kV circuits westward from St. Lawrence TS to Hinchinbrooke TS. As two of the circuits share common towers, a tower fault would leave only one circuit to carry most of the power, and overload it beyond its limited time rating. These conditions prevailed during the heaviest demand days, and limited imports into Ontario from Quebec and New York, and required the use of emergency control actions including emergency transfer limits for some of these days

  IESO has proposed enhancements to an existing special protection system to reduce generation in the event of a tower contingency, thereby relieving the limitation in the short-term. IESO has asked Hydro One to make this available before summer 2006.

- End of Section -

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Appendix A Resource Adequacy Assessment Details

Table A1 Assessment of Resource Adequacy: Existing Resource Scenario

Week Ending Day	Total Resources MW	Total Reductions in Resources MW	Price-responsive Demand MW	Available Resources MW	Required Resources MW	Available Reserve %	Available Reserve MW	Required Reserve %	Required Reserve MW	Reserve Above Requirement MW
01-Jan-06	30,631	2,776	372	28,227	25,345	27.4	6,063	14.4	3,181	2,882
08-Jan-06	30,631	2,655	372	28,348	26,914	20.3	4,790	14.3	3,356	1,434
15-Jan-06	30,631	2,180	372	28,823	27,402	20.5	4,909	14.6	3,488	1,421
22-Jan-06	30,631	2,852	372	28,151	27,926	15.9	3,866	15.0	3,641	225
29-Jan-06	30,631	2,212	372	28,791	27,567	19.6	4,718	14.5	3,494	1,224
05-Feb-06	30,631	1,772	372	29,231	27,244	22.8	5,430	14.5	3,443	1,987
12-Feb-06	30,631	2,167	372	28,836	26,953	22.0	5,206	14.1	3,323	1,883
19-Feb-06	30,631	2,093	372	28,910	26,801	23.7	5,537	14.7	3,428	2,109
26-Feb-06	30,631	3,417	372	27,586	26,263	19.7	4,531	13.9	3,208	1,323
05-Mar-06	30,631	4,371	372	26,632	26,087	16.7	3,811	14.3	3,266	545
12-Mar-06	30,631	4,760	372	26,243	25,683	16.5	3,707	14.0	3,147	560
19-Mar-06	30,631	4,760	372	26,243	25,135	19.2	4,224	14.2	3,116	1,108
26-Mar-06	30,631	4,800	372	26,203	24,801	20.9	4,521	14.4	3,119	1,402
02-Apr-06	30,631	4,426	372	26,577	24,551	25.8	5,451	16.2	3,425	2,026
09-Apr-06	30,631	5,209	372	25,794	24,058	23.4	4,884	15.1	3,148	1,736
16-Apr-06	30,631	5,111	372	25,892	23,592	26.7	5,456	15.4	3,156	2,300
23-Apr-06	30,631	4,361	372	26,642	23,537	31.5	6,387	16.2	3,282	3,105
30-Apr-06	30,631	7,019	372	23,984	22,574	20.4	4,070	13.4	2,660	1,410
07-May-06	30,631	6,127	372	24,876	22,842	25.6	5,074	15.4	3,040	2,034
14-May-06	30,631	6,191	372	24,812	22,584	26.6	5,207	15.2	2,979	2,228
21-May-06	30,631	4,869	372	26,134	24,517	23.6	4,991	16.0	3,374	1,617
28-May-06	30,631	4,589	372	26,414	24,776	24.5	5,202	16.8	3,564	1,638
04-Jun-06	30,631	4,183	372	26,820	25,360	23.7	5,142	17.0	3,682	1,460
11-Jun-06	30,631	2,970	372	28,033	26,015	28.9	6,276	19.6	4,258	2,018
18-Jun-06	30,631	2,201	372	28,802	27,176	26.3	5,996	19.2	4,370	1,626
25-Jun-06	30,631	1,858	372	29,145	28,136	21.4	5,146	17.2	4,137	1,009
02-Jul-06	30,631	1,695	372	29,308	28,091	23.9	5,654	18.8	4,437	1,217
09-Jul-06	30,631	1,617	372	29,386	28,028	21.7	5,237	16.1	3,879	1,358
16-Jul-06	30,631	1,617	372	29,386	28,425	21.3	5,154	17.3	4,193	961
23-Jul-06	30,631	1,579	372	29,424	28,091	21.6	5,227	16.1	3,894	1,333
30-Jul-06	30,631	1,704	372	29,299	28,092	21.1	5,105	16.1	3,898	1,207
06-Aug-06	30,647	1,873	372	29,146	27,642	23.1	5,461	16.7	3,957	1,504
13-Aug-06	30,647	1,716	372	29,303	27,952	22.0	5,276	16.3	3,925	1,351
20-Aug-06	30,647	1,822	372	29,197	27,498	23.5	5,546	16.3	3,847	1,699
27-Aug-06	30,647	1,893	372	29,126	27,493	24.8	5,782	17.8	4,149	1,633
03-Sep-06	30,647	3,217	372	27,802	27,554	17.3	4,093	16.2	3,845	248
10-Sep-06	30,647	3,781	372	27,238	26,685	18.7	4,286	16.3	3,733	553
17-Sep-06	30,647	4,611	372	26,408	25,961	18.6	4,141	16.6	3,694	447
24-Sep-06	30,647	5,212	372	25,807	24,958	20.0	4,304	16.1	3,455	849

Note: 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 supersede information presented in this report.

(Table A1 continued)

Week Ending Day	Total Resources MW	Total Reductions in Resources MW	Price-responsive Demand MW	Available Resources MW	Required Resources MW	Available Reserve %	Available Reserve MW	Required Reserve %	Required Reserve MW	Reserve Above Requirement MW
01-Oct-06	30,647	5,113	372	25,906	23,544	28.0	5,668	16.3	3,306	2,362
08-Oct-06	30,647	5,833	372	25,186	23,280	24.6	4,968	15.1	3,062	1,906
15-Oct-06	30,647	6,818	372	24,201	23,113	18.8	3,823	13.4	2,735	1,088
22-Oct-06	30,647	6,095	372	24,924	23,681	19.5	4,064	13.5	2,821	1,243
29-Oct-06	30,647	6,176	372	24,843	24,223	17.2	3,649	14.3	3,029	620
05-Nov-06	30,647	6,486	372	24,533	24,858	12.5	2,723	14.0	3,048	-325
12-Nov-06	30,663	6,375	372	24,660	25,098	11.8	2,596	13.8	3,034	-438
19-Nov-06	30,663	5,110	372	25,925	25,856	14.1	3,211	13.8	3,142	69
26-Nov-06	30,663	4,135	372	26,900	26,283	16.5	3,806	13.8	3,189	617
03-Dec-06	30,663	3,039	372	27,996	26,418	20.6	4,774	13.8	3,196	1,578
10-Dec-06	30,663	3,463	372	27,572	27,226	15.6	3,714	14.1	3,368	346
17-Dec-06	30,663	1,844	372	29,191	27,355	22.1	5,279	14.4	3,443	1,836
24-Dec-06	30,663	1,399	372	29,636	27,679	23.9	5,712	15.7	3,755	1,957
31-Dec-06	30,663	1,448	372	29,587	26,063	31.9	7,153	16.2	3,629	3,524
07-Jan-07	30,663	1,427	372	29,608	27,300	24.2	5,764	14.5	3,456	2,308
14-Jan-07	30,663	1,427	372	29,608	27,676	22.5	5,433	14.5	3,501	1,932
21-Jan-07	30,663	1,383	372	29,652	28,146	20.8	5,105	14.7	3,599	1,506
28-Jan-07	30,663	2,207	372	28,828	27,752	18.5	4,493	14.0	3,417	1,076
04-Feb-07	30,663	2,168	372	28,867	27,378	19.8	4,778	13.7	3,289	1,489
11-Feb-07	30,663	2,182	372	28,853	27,193	20.7	4,953	13.8	3,293	1,660
18-Feb-07	30,663	2,124	372	28,911	27,037	22.3	5,272	14.4	3,398	1,874
25-Feb-07	30,663	2,124	372	28,911	26,637	24.0	5,586	14.2	3,312	2,274
04-Mar-07	30,663	3,744	372	27,291	26,256	18.0	4,159	13.5	3,124	1,035
11-Mar-07	30,663	3,756	372	27,279	25,841	19.6	4,466	13.3	3,028	1,438
18-Mar-07	30,663	3,776	372	27,259	25,393	22.3	4,964	13.9	3,098	1,866
25-Mar-07	30,663	4,637	372	26,398	25,009	20.2	4,440	13.9	3,051	1,389
01-Apr-07	30,663	4,637	372	26,398	24,612	23.3	4,996	15.0	3,210	1,786
08-Apr-07	30,663	4,440	347	26,570	24,389	25.5	5,404	15.2	3,223	2,181
15-Apr-07	30,663	4,401	347	26,609	24,001	28.6	5,916	16.0	3,308	2,608
22-Apr-07	30,663	4,960	347	26,050	23,609	27.0	5,531	15.1	3,090	2,441
29-Apr-07	30,663	4,605	347	26,405	23,144	30.6	6,185	14.5	2,924	3,261
06-May-07	30,663	5,130	347	25,880	23,048	29.0	5,814	14.9	2,982	2,832
13-May-07	30,663	5,061	347	25,949	22,861	30.3	6,031	14.8	2,943	3,088
20-May-07	30,663	5,640	347	25,370	24,383	18.0	3,870	13.4	2,883	987
27-May-07	30,663	3,737	347	27,273	24,977	26.4	5,702	15.8	3,406	2,296
03-Jun-07	30,663	4,025	347	26,985	25,484	22.5	4,948	15.6	3,447	1,501
10-Jun-07	30,663	3,555	347	27,455	26,009	24.2	5,345	17.6	3,899	1,446
17-Jun-07	30,663	3,176	347	27,834	27,229	20.2	4,675	17.6	4,070	605
24-Jun-07	30,663	3,280	347	27,730	28,276	14.2	3,444	16.4	3,990	-546
01-Jul-07	30,663	2,061	347	28,949	28,625	19.7	4,761	18.3	4,437	324

Table A2 Assessment of Resource Adequacy: Planned Resource Scenario

Week Ending Day	Total Resources MW	Total Reductions in Resources MW	Price-responsive Demand MW	Available Resources MW	Required Resources MW	Available Reserve %	Available Reserve MW	Required Reserve %	Required Reserve MW	Reserve Above Requirement MW
01-Jan-06	30,631	2,776	376	28,231	25,345	27.4	6,067	14.4	3,181	2,886
08-Jan-06	30,634	2,658	376	28,352	26,914	20.4	4,794	14.3	3,356	1,438
15-Jan-06	30,634	2,183	376	28,827	27,402	20.5	4,913	14.6	3,488	1,425
22-Jan-06	30,751	2,855	376	28,272	27,924	16.4	3,987	15.0	3,639	348
29-Jan-06	30,751	2,215	376	28,912	27,579	20.1	4,839	14.6	3,506	1,333
05-Feb-06	30,751	1,775	391	29,367	27,256	23.4	5,566	14.5	3,455	2,111
12-Feb-06	30,819	2,238	391	28,972	26,965	22.6	5,342	14.1	3,335	2,007
19-Feb-06	30,819	2,164	391	29,046	26,813	24.3	5,673	14.7	3,440	2,233
26-Feb-06	30,819	3,488	391	27,722	26,275	20.2	4,667	14.0	3,220	1,447
05-Mar-06	30,858	4,481	391	26,768	26,083	17.3	3,947	14.3	3,262	685
12-Mar-06	30,858	4,870	391	26,379	25,679	17.1	3,843	14.0	3,143	700
19-Mar-06	30,858	4,870	391	26,379	25,148	19.8	4,360	14.2	3,129	1,231
26-Mar-06	30,858	4,910	391	26,339	24,813	21.5	4,657	14.4	3,131	1,526
02-Apr-06	30,858	4,536	427	26,749	24,563	26.6	5,623	16.3	3,437	2,186
09-Apr-06	30,858	5,320	427	25,965	24,070	24.2	5,055	15.1	3,160	1,895
16-Apr-06	30,858	5,221	427	26,064	23,604	27.5	5,628	15.5	3,168	2,460
23-Apr-06	30,858	4,471	427	26,814	23,549	32.4	6,559	16.3	3,294	3,265
30-Apr-06	30,858	7,129	427	24,156	22,587	21.3	4,242	13.4	2,673	1,569
07-May-06	30,957	6,336	427	25,048	22,853	26.5	5,246	15.4	3,051	2,195
14-May-06	30,957	6,400	427	24,984	22,596	27.4	5,379	15.3	2,991	2,388
21-May-06	30,957	5,078	427	26,306	24,529	24.4	5,163	16.0	3,386	1,777
28-May-06	30,957	4,798	427	26,586	24,789	25.3	5,374	16.9	3,577	1,797
04-Jun-06	30,957	4,393	427	26,991	25,372	24.5	5,313	17.0	3,694	1,619
11-Jun-06	30,957	3,179	427	28,205	26,027	29.6	6,448	19.6	4,270	2,178
18-Jun-06	30,957	2,410	427	28,974	27,188	27.1	6,168	19.2	4,382	1,786
25-Jun-06	30,957	2,067	427	29,317	28,148	22.2	5,318	17.3	4,149	1,169
02-Jul-06	30,957	1,904	427	29,480	28,104	24.6	5,826	18.8	4,450	1,376
09-Jul-06	30,957	1,826	427	29,558	28,041	22.4	5,409	16.1	3,892	1,517
16-Jul-06	30,957	1,826	427	29,558	28,435	22.0	5,326	17.3	4,203	1,123
23-Jul-06	30,957	1,788	427	29,596	28,103	22.3	5,399	16.1	3,906	1,493
30-Jul-06	30,957	1,914	427	29,470	28,104	21.8	5,276	16.2	3,910	1,366
06-Aug-06	30,973	2,092	427	29,308	27,656	23.7	5,623	16.8	3,971	1,652
13-Aug-06	30,973	1,935	427	29,465	27,964	22.6	5,438	16.4	3,937	1,501
20-Aug-06	30,973	2,041	427	29,359	27,509	24.1	5,708	16.3	3,858	1,850
27-Aug-06	30,973	2,112	427	29,288	27,505	25.5	5,944	17.8	4,161	1,783
03-Sep-06	30,973	3,436	427	27,964	27,566	18.0	4,255	16.3	3,857	398
10-Sep-06	30,973	4,000	427	27,400	26,697	19.4	4,448	16.3	3,745	703
17-Sep-06	30,973	4,830	427	26,570	25,973	19.3	4,303	16.6	3,706	597
24-Sep-06	30,973	5,431	427	25,969	24,969	20.8	4,466	16.1	3,466	1,000

Note: 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 supersede information presented in this report.

(Table A2 continued)

Week Ending Day	Total Resources MW	Total Reductions in Resources MW	Price-responsive Demand MW	Available Resources MW	Required Resources MW	Available Reserve %	Available Reserve MW	Required Reserve %	Required Reserve MW	Reserve Above Requirement MW
01-Oct-06	30,973	5,332	427	26,068	23,555	28.8	5,830	16.4	3,317	2,513
08-Oct-06	31,072	6,151	427	25,348	23,292	25.4	5,130	15.2	3,074	2,056
15-Oct-06	31,072	7,136	427	24,363	23,126	19.6	3,985	13.5	2,748	1,237
22-Oct-06	31,072	6,413	427	25,086	23,693	20.3	4,226	13.6	2,833	1,393
29-Oct-06	31,072	6,494	427	25,005	24,222	18.0	3,811	14.3	3,028	783
05-Nov-06	31,072	6,804	427	24,695	24,855	13.2	2,885	14.0	3,045	-160
12-Nov-06	31,088	6,693	427	24,822	25,094	12.5	2,758	13.7	3,030	-272
19-Nov-06	31,088	5,418	427	26,097	25,842	14.9	3,383	13.8	3,128	255
26-Nov-06	31,088	4,452	427	27,063	26,276	17.2	3,969	13.8	3,182	787
03-Dec-06	31,088	3,347	427	28,168	26,431	21.3	4,946	13.8	3,209	1,737
10-Dec-06	31,088	3,771	427	27,744	27,217	16.3	3,886	14.1	3,359	527
17-Dec-06	31,088	2,152	427	29,363	27,366	22.8	5,451	14.4	3,454	1,997
24-Dec-06	31,088	1,717	427	29,798	27,691	24.6	5,874	15.8	3,767	2,107
31-Dec-06	31,088	1,766	427	29,749	26,075	32.6	7,315	16.2	3,641	3,674
07-Jan-07	31,088	1,745	427	29,770	27,313	24.9	5,926	14.6	3,469	2,457
14-Jan-07	31,088	1,745	427	29,770	27,688	23.1	5,595	14.5	3,513	2,082
21-Jan-07	31,088	1,701	427	29,814	28,158	21.5	5,267	14.7	3,611	1,656
28-Jan-07	31,088	2,525	427	28,990	27,764	19.1	4,655	14.1	3,429	1,226
04-Feb-07	31,088	2,486	427	29,029	27,390	20.5	4,940	13.7	3,301	1,639
11-Feb-07	31,088	2,500	427	29,015	27,205	21.4	5,115	13.8	3,305	1,810
18-Feb-07	31,088	2,432	427	29,083	27,050	23.0	5,444	14.4	3,411	2,033
25-Feb-07	31,088	2,432	427	29,083	26,649	24.7	5,758	14.3	3,324	2,434
04-Mar-07	31,138	4,101	427	27,464	26,256	18.7	4,332	13.5	3,124	1,208
11-Mar-07	31,138	4,113	427	27,452	25,853	20.3	4,639	13.3	3,040	1,599
18-Mar-07	31,138	4,133	427	27,432	25,405	23.0	5,137	14.0	3,110	2,027
25-Mar-07	31,138	4,994	427	26,571	25,021	21.0	4,613	14.0	3,063	1,550
01-Apr-07	31,138	4,994	427	26,571	24,624	24.2	5,169	15.1	3,222	1,947
08-Apr-07	31,138	4,798	398	26,737	24,402	26.3	5,571	15.3	3,236	2,335
15-Apr-07	31,138	4,759	398	26,776	24,013	29.4	6,083	16.0	3,320	2,763
22-Apr-07	31,138	5,318	398	26,217	23,621	27.8	5,698	15.1	3,102	2,596
29-Apr-07	31,138	4,963	398	26,572	23,157	31.4	6,352	14.5	2,937	3,415
06-May-07	31,138	5,487	398	26,048	23,060	29.8	5,982	14.9	2,994	2,988
13-May-07	31,138	5,418	398	26,117	22,874	31.1	6,199	14.8	2,956	3,243
20-May-07	31,138	5,998	398	25,537	24,387	18.8	4,037	13.4	2,887	1,150
27-May-07	31,138	4,104	398	27,431	24,990	27.2	5,860	15.9	3,419	2,441
03-Jun-07	31,138	4,382	398	27,153	25,497	23.2	5,116	15.7	3,460	1,656
10-Jun-07	31,138	3,912	398	27,623	26,021	24.9	5,513	17.7	3,911	1,602
17-Jun-07	31,138	3,533	398	28,002	27,242	20.9	4,843	17.6	4,083	760
24-Jun-07	31,138	3,638	398	27,897	28,272	14.9	3,611	16.4	3,986	-375
01-Jul-07	31,138	2,418	398	29,117	28,637	20.4	4,929	18.4	4,449	480

Table A3 Demand Forecast Range For Required Resources Calculation

Week Ending Day	Ontario Demand Normal Weather MW	Ontario Demand Extreme Weather MW
01-Jan-06	22164	23401
08-Jan-06	23558	25403
15-Jan-06	23914	25802
22-Jan-06	24285	25438
29-Jan-06	24073	25486
05-Feb-06	23801	25376
12-Feb-06	23630	24949
19-Feb-06	23373	24924
26-Feb-06	23055	24191
05-Mar-06	22821	24288
12-Mar-06	22536	24099
19-Mar-06	22019	23417
26-Mar-06	21682	22943
02-Apr-06	21126	22320
09-Apr-06	20910	22394
16-Apr-06	20436	21603
23-Apr-06	20255	23267
30-Apr-06	19914	23249
07-May-06	19802	22973
14-May-06	19605	23574
21-May-06	21143	23196
28-May-06	21212	23863
04-Jun-06	21678	24653
11-Jun-06	21757	25643
18-Jun-06	22806	26596
25-Jun-06	23999	26470
02-Jul-06	23654	26504
09-Jul-06	24149	27083
16-Jul-06	24232	27407
23-Jul-06	24197	26615
30-Jul-06	24194	26187
06-Aug-06	23685	26581
13-Aug-06	24027	26713
20-Aug-06	23651	26236
27-Aug-06	23344	25865
03-Sep-06	23709	26779
10-Sep-06	22952	25972
17-Sep-06	22267	25762
24-Sep-06	21503	25054

(Table A3 continued)

Week Ending Day	Ontario Demand Normal Weather MW	Ontario Demand Extreme Weather MW
01-Oct-06	20238	23729
08-Oct-06	20218	24046
15-Oct-06	20378	21058
22-Oct-06	20860	21707
29-Oct-06	21194	23771
05-Nov-06	21810	22506
12-Nov-06	22064	22835
19-Nov-06	22714	23630
26-Nov-06	23094	24184
03-Dec-06	23222	24672
10-Dec-06	23858	25522
17-Dec-06	23912	25131
24-Dec-06	23924	25977
31-Dec-06	22434	23806
07-Jan-07	23844	25689
14-Jan-07	24175	26088
21-Jan-07	24547	25700
28-Jan-07	24335	25756
04-Feb-07	24089	25642
11-Feb-07	23900	25218
18-Feb-07	23639	25190
25-Feb-07	23325	24464
04-Mar-07	23132	24565
11-Mar-07	22813	24375
18-Mar-07	22295	23712
25-Mar-07	21958	23220
01-Apr-07	21402	22597
08-Apr-07	21166	22651
15-Apr-07	20693	21861
22-Apr-07	20519	23627
29-Apr-07	20220	23608
06-May-07	20066	23275
13-May-07	19918	23940
20-May-07	21500	23553
27-May-07	21571	24220
03-Jun-07	22037	25010
10-Jun-07	22110	26000
17-Jun-07	23159	26950
24-Jun-07	24286	26824
01-Jul-07	24188	27037

Table A4 Assessment of Resource Adequacy: Extreme Weather, Existing Resource Scenario

Week Ending Day	Total Resources MW	Total Reductions in Resources MW	Price-responsive Demand MW	Available Resources MW	Required Resources MW	Available Reserve %	Available Reserve MW	Required Reserve %	Required Reserve MW	Reserve Above Requirement MW
01-Jan-06	30,631	2,776	372	28,227	26,342	20.6	4,826	12.6	2,941	1,885
08-Jan-06	30,631	2,655	372	28,348	28,640	11.6	2,945	12.7	3,237	-292
15-Jan-06	30,631	2,180	372	28,823	29,170	11.7	3,021	13.1	3,368	-347
22-Jan-06	30,631	2,852	372	28,151	28,808	10.7	2,713	13.3	3,370	-657
29-Jan-06	30,631	2,212	372	28,791	28,833	13.0	3,305	13.1	3,347	-42
05-Feb-06	30,631	1,772	372	29,231	28,689	15.2	3,855	13.1	3,313	542
12-Feb-06	30,631	2,167	372	28,836	28,114	15.6	3,887	12.7	3,165	722
19-Feb-06	30,631	2,093	372	28,910	28,069	16.0	3,986	12.6	3,145	841
26-Feb-06	30,631	3,417	372	27,586	27,282	14.0	3,395	12.8	3,091	304
05-Mar-06	30,631	4,371	372	26,632	27,436	9.7	2,344	13.0	3,148	-804
12-Mar-06	30,631	4,760	372	26,243	27,255	8.9	2,144	13.1	3,156	-1,012
19-Mar-06	30,631	4,760	372	26,243	26,456	12.1	2,826	13.0	3,039	-213
26-Mar-06	30,631	4,800	372	26,203	25,892	14.2	3,260	12.9	2,949	311
02-Apr-06	30,631	4,426	372	26,577	25,471	19.1	4,257	14.1	3,151	1,106
09-Apr-06	30,631	5,209	372	25,794	25,377	15.2	3,400	13.3	2,983	417
16-Apr-06	30,631	5,111	372	25,892	24,480	19.9	4,289	13.3	2,877	1,412
23-Apr-06	30,631	4,361	372	26,642	26,458	14.5	3,375	13.7	3,191	184
30-Apr-06	30,631	7,029	372	23,974	26,353	3.1	725	13.4	3,104	-2,379
07-May-06	30,631	6,098	372	24,905	26,042	8.4	1,932	13.4	3,069	-1,137
14-May-06	30,631	6,201	372	24,802	26,779	5.2	1,228	13.6	3,205	-1,977
21-May-06	30,631	4,863	372	26,140	26,297	12.7	2,944	13.4	3,101	-157
28-May-06	30,631	4,589	372	26,414	27,166	10.7	2,551	13.8	3,303	-752
04-Jun-06	30,631	4,327	372	26,676	28,066	8.2	2,023	13.8	3,413	-1,390
11-Jun-06	30,631	3,156	372	27,847	29,256	8.6	2,204	14.1	3,613	-1,409
18-Jun-06	30,631	2,279	372	28,724	30,345	8.0	2,128	14.1	3,749	-1,621
25-Jun-06	30,631	1,909	372	29,094	30,197	9.9	2,624	14.1	3,727	-1,103
02-Jul-06	30,631	1,891	372	29,112	29,971	9.8	2,608	13.1	3,467	-859
09-Jul-06	30,631	1,813	372	29,190	30,638	7.8	2,107	13.1	3,555	-1,448
16-Jul-06	30,631	1,813	372	29,190	31,012	6.5	1,783	13.2	3,605	-1,822
23-Jul-06	30,631	1,853	372	29,150	30,074	9.5	2,535	13.0	3,459	-924
30-Jul-06	30,631	1,869	372	29,134	29,560	11.3	2,947	12.9	3,373	-426
06-Aug-06	30,647	1,995	372	29,024	30,049	9.2	2,443	13.1	3,468	-1,025
13-Aug-06	30,647	1,946	372	29,073	30,190	8.8	2,360	13.0	3,477	-1,117
20-Aug-06	30,647	2,047	372	28,972	29,661	10.4	2,736	13.1	3,425	-689
27-Aug-06	30,647	2,097	372	28,922	29,237	11.8	3,057	13.0	3,372	-315
03-Sep-06	30,647	3,235	372	27,784	30,315	3.8	1,005	13.2	3,536	-2,531
10-Sep-06	30,647	3,759	372	27,260	29,347	5.0	1,288	13.0	3,375	-2,087
17-Sep-06	30,647	4,540	372	26,479	29,227	2.8	717	13.5	3,465	-2,748
24-Sep-06	30,647	5,220	372	25,799	28,418	3.0	745	13.4	3,364	-2,619

(Table A4 continued)

Week Ending Day	Total Resources MW	Total Reductions in Resources MW	Price-responsive Demand MW	Available Resources MW	Required Resources MW	Available Reserve %	Available Reserve MW	Required Reserve %	Required Reserve MW	Reserve Above Requirement MW
01-Oct-06	30,647	5,087	372	25,932	26,941	9.3	2,203	13.5	3,212	-1,009
08-Oct-06	30,647	5,708	372	25,311	27,418	5.3	1,265	14.0	3,372	-2,107
15-Oct-06	30,647	6,759	372	24,260	23,776	15.2	3,202	12.9	2,718	484
22-Oct-06	30,647	6,038	372	24,981	24,543	15.1	3,274	13.1	2,836	438
29-Oct-06	30,647	6,090	372	24,929	27,112	4.9	1,158	14.1	3,341	-2,183
05-Nov-06	30,647	6,325	372	24,694	25,499	9.7	2,188	13.3	2,993	-805
12-Nov-06	30,663	6,295	372	24,740	25,876	8.3	1,905	13.3	3,041	-1,136
19-Nov-06	30,663	5,110	372	25,925	26,813	9.7	2,295	13.5	3,183	-888
26-Nov-06	30,663	4,135	372	26,900	27,393	11.2	2,716	13.3	3,209	-493
03-Dec-06	30,663	3,039	372	27,996	27,901	13.5	3,324	13.1	3,229	95
10-Dec-06	30,663	3,463	372	27,572	28,933	8.0	2,050	13.4	3,411	-1,361
17-Dec-06	30,663	1,844	372	29,191	28,399	16.2	4,060	13.0	3,268	792
24-Dec-06	30,663	1,369	372	29,666	29,468	14.2	3,689	13.4	3,491	198
31-Dec-06	30,663	1,334	372	29,701	27,115	24.8	5,895	13.9	3,309	2,586
07-Jan-07	30,663	1,467	372	29,568	28,853	15.1	3,879	12.3	3,164	715
14-Jan-07	30,663	1,319	372	29,716	29,338	13.9	3,628	12.5	3,250	378
21-Jan-07	30,663	1,266	372	29,769	28,867	15.8	4,069	12.3	3,167	902
28-Jan-07	30,663	2,166	372	28,869	29,030	12.1	3,113	12.7	3,274	-161
04-Feb-07	30,663	2,150	372	28,885	28,901	12.7	3,243	12.7	3,259	-16
11-Feb-07	30,663	2,118	372	28,917	28,395	14.7	3,699	12.6	3,177	522
18-Feb-07	30,663	2,124	372	28,911	28,362	14.8	3,721	12.6	3,172	549
25-Feb-07	30,663	2,124	372	28,911	27,506	18.2	4,447	12.4	3,042	1,405
04-Mar-07	30,663	3,744	372	27,291	27,596	11.1	2,726	12.3	3,031	-305
11-Mar-07	30,663	3,756	372	27,279	27,375	11.9	2,904	12.3	3,000	-96
18-Mar-07	30,663	3,776	372	27,259	26,616	15.0	3,547	12.3	2,904	643
25-Mar-07	30,663	4,637	372	26,398	26,113	13.7	3,178	12.5	2,893	285
01-Apr-07	30,663	4,637	372	26,398	25,594	16.8	3,801	13.3	2,997	804
08-Apr-07	30,663	4,440	347	26,570	25,633	17.3	3,919	13.2	2,982	937
15-Apr-07	30,663	4,401	347	26,609	24,883	21.7	4,748	13.8	3,022	1,726
22-Apr-07	30,663	4,960	347	26,050	26,786	10.3	2,423	13.4	3,159	-736
29-Apr-07	30,663	4,610	347	26,400	26,676	11.8	2,792	13.0	3,068	-276
06-May-07	30,663	5,135	347	25,875	26,259	11.2	2,600	12.8	2,984	-384
13-May-07	30,663	5,066	347	25,944	27,016	8.4	2,004	12.9	3,076	-1,072
20-May-07	30,663	5,635	347	25,375	26,360	7.7	1,822	11.9	2,807	-985
27-May-07	30,663	3,807	347	27,203	27,268	12.3	2,983	12.6	3,048	-65
03-Jun-07	30,663	4,187	347	26,823	28,252	7.3	1,813	13.0	3,242	-1,429
10-Jun-07	30,663	3,727	347	27,283	29,429	4.9	1,283	13.2	3,429	-2,146
17-Jun-07	30,663	3,276	347	27,734	30,577	2.9	784	13.5	3,627	-2,843
24-Jun-07	30,663	3,320	347	27,690	30,434	3.2	866	13.5	3,610	-2,744
01-Jul-07	30,663	2,245	347	28,765	30,636	6.4	1,728	13.3	3,599	-1,871

Table A5 Assessment of Resource Adequacy: Extreme Weather, Planned Resource Scenario

Week Ending Day	Total Resources MW	Total Reductions in Resources MW	Price-responsive Demand MW	Available Resources MW	Required Resources MW	Available Reserve %	Available Reserve MW	Required Reserve %	Required Reserve MW	Reserve Above Requirement MW
01-Jan-06	30,631	2,776	376	28,231	26,342	20.6	4,830	12.6	2,941	1,889
08-Jan-06	30,634	2,658	376	28,352	28,640	11.6	2,949	12.7	3,237	-288
15-Jan-06	30,634	2,183	376	28,827	29,170	11.7	3,025	13.1	3,368	-343
22-Jan-06	30,751	2,855	376	28,272	28,801	11.1	2,834	13.2	3,363	-529
29-Jan-06	30,751	2,215	376	28,912	28,827	13.4	3,426	13.1	3,341	85
05-Feb-06	30,751	1,775	391	29,367	28,674	15.7	3,991	13.0	3,298	693
12-Feb-06	30,819	2,238	391	28,972	28,104	16.1	4,023	12.7	3,155	868
19-Feb-06	30,819	2,164	391	29,046	28,058	16.5	4,122	12.6	3,134	988
26-Feb-06	30,819	3,488	391	27,722	27,282	14.6	3,531	12.8	3,091	440
05-Mar-06	30,858	4,481	391	26,768	27,432	10.2	2,480	12.9	3,144	-664
12-Mar-06	30,858	4,870	391	26,379	27,252	9.5	2,280	13.1	3,153	-873
19-Mar-06	30,858	4,870	391	26,379	26,448	12.7	2,962	12.9	3,031	-69
26-Mar-06	30,858	4,910	391	26,339	25,873	14.8	3,396	12.8	2,930	466
02-Apr-06	30,858	4,536	427	26,749	25,484	19.8	4,429	14.2	3,164	1,265
09-Apr-06	30,858	5,320	427	25,965	25,371	16.0	3,571	13.3	2,977	594
16-Apr-06	30,858	5,221	427	26,064	24,493	20.7	4,461	13.4	2,890	1,571
23-Apr-06	30,858	4,471	427	26,814	26,444	15.2	3,547	13.7	3,177	370
30-Apr-06	30,858	7,139	427	24,146	26,343	3.9	897	13.3	3,094	-2,197
07-May-06	30,957	6,307	427	25,077	26,045	9.2	2,104	13.4	3,072	-968
14-May-06	30,957	6,410	427	24,974	26,773	5.9	1,400	13.6	3,199	-1,799
21-May-06	30,957	5,072	427	26,312	26,297	13.4	3,116	13.4	3,101	15
28-May-06	30,957	4,798	427	26,586	27,147	11.4	2,723	13.8	3,284	-561
04-Jun-06	30,957	4,537	427	26,847	28,060	8.9	2,194	13.8	3,407	-1,213
11-Jun-06	30,957	3,365	427	28,019	29,247	9.3	2,376	14.1	3,604	-1,228
18-Jun-06	30,957	2,488	427	28,896	30,327	8.7	2,300	14.0	3,731	-1,431
25-Jun-06	30,957	2,118	427	29,266	30,187	10.6	2,796	14.0	3,717	-921
02-Jul-06	30,957	2,100	427	29,284	29,971	10.5	2,780	13.1	3,467	-687
09-Jul-06	30,957	2,022	427	29,362	30,630	8.4	2,279	13.1	3,547	-1,268
16-Jul-06	30,957	2,022	427	29,362	31,011	7.1	1,955	13.2	3,604	-1,649
23-Jul-06	30,957	2,062	427	29,322	30,075	10.2	2,707	13.0	3,460	-753
30-Jul-06	30,957	2,078	427	29,306	29,555	11.9	3,119	12.9	3,368	-249
06-Aug-06	30,973	2,204	427	29,196	30,050	9.8	2,615	13.1	3,469	-854
13-Aug-06	30,973	2,155	427	29,245	30,190	9.5	2,532	13.0	3,477	-945
20-Aug-06	30,973	2,256	427	29,144	29,643	11.1	2,908	13.0	3,407	-499
27-Aug-06	30,973	2,306	427	29,094	29,232	12.5	3,229	13.0	3,367	-138
03-Sep-06	30,973	3,454	427	27,946	30,311	4.4	1,167	13.2	3,532	-2,365
10-Sep-06	30,973	3,978	427	27,422	29,339	5.6	1,450	13.0	3,367	-1,917
17-Sep-06	30,973	4,749	427	26,651	29,226	3.5	889	13.5	3,464	-2,575
24-Sep-06	30,973	5,439	427	25,961	28,403	3.6	907	13.4	3,349	-2,442

(Table A5 continued)

Week Ending Day	Total Resources MW	Total Reductions in Resources MW	Price-responsive Demand MW	Available Resources MW	Required Resources MW	Available Reserve %	Available Reserve MW	Required Reserve %	Required Reserve MW	Reserve Above Requirement MW
01-Oct-06	30,973	5,306	427	26,094	26,939	10.0	2,365	13.5	3,210	-845
08-Oct-06	31,072	6,026	427	25,473	27,417	5.9	1,427	14.0	3,371	-1,944
15-Oct-06	31,072	7,077	427	24,422	23,765	16.0	3,364	12.9	2,707	657
22-Oct-06	31,072	6,356	427	25,143	24,531	15.8	3,436	13.0	2,824	612
29-Oct-06	31,072	6,408	427	25,091	27,108	5.6	1,320	14.0	3,337	-2,017
05-Nov-06	31,072	6,643	427	24,856	25,479	10.4	2,350	13.2	2,973	-623
12-Nov-06	31,088	6,613	427	24,902	25,878	9.1	2,067	13.3	3,043	-976
19-Nov-06	31,088	5,418	427	26,097	26,810	10.4	2,467	13.5	3,180	-713
26-Nov-06	31,088	4,443	427	27,072	27,377	11.9	2,888	13.2	3,193	-305
03-Dec-06	31,088	3,347	427	28,168	27,894	14.2	3,496	13.1	3,222	274
10-Dec-06	31,088	3,771	427	27,744	28,929	8.7	2,222	13.4	3,407	-1,185
17-Dec-06	31,088	2,152	427	29,363	28,390	16.8	4,232	13.0	3,259	973
24-Dec-06	31,088	1,677	427	29,838	29,468	14.9	3,861	13.4	3,491	370
31-Dec-06	31,088	1,652	427	29,863	27,127	25.4	6,057	14.0	3,321	2,736
07-Jan-07	31,088	1,785	427	29,730	28,841	15.7	4,041	12.3	3,152	889
14-Jan-07	31,088	1,637	427	29,878	29,332	14.5	3,790	12.4	3,244	546
21-Jan-07	31,088	1,574	427	29,941	28,855	16.5	4,241	12.3	3,155	1,086
28-Jan-07	31,088	2,484	427	29,031	29,022	12.7	3,275	12.7	3,266	9
04-Feb-07	31,088	2,458	427	29,057	28,895	13.3	3,415	12.7	3,253	162
11-Feb-07	31,088	2,426	427	29,089	28,384	15.4	3,871	12.6	3,166	705
18-Feb-07	31,088	2,432	427	29,083	28,351	15.5	3,893	12.6	3,161	732
25-Feb-07	31,088	2,432	427	29,083	27,506	18.9	4,619	12.4	3,042	1,577
04-Mar-07	31,138	4,101	427	27,464	27,591	11.8	2,899	12.3	3,026	-127
11-Mar-07	31,138	4,113	427	27,452	27,369	12.6	3,077	12.3	2,994	83
18-Mar-07	31,138	4,133	427	27,432	26,598	15.7	3,720	12.2	2,886	834
25-Mar-07	31,138	4,994	427	26,571	26,114	14.4	3,351	12.5	2,894	457
01-Apr-07	31,138	4,994	427	26,571	25,594	17.6	3,974	13.3	2,997	977
08-Apr-07	31,138	4,798	398	26,737	25,634	18.0	4,086	13.2	2,983	1,103
15-Apr-07	31,138	4,759	398	26,776	24,895	22.5	4,915	13.9	3,034	1,881
22-Apr-07	31,138	5,318	398	26,217	26,778	11.0	2,590	13.3	3,151	-561
29-Apr-07	31,138	4,968	398	26,567	26,667	12.5	2,959	13.0	3,059	-100
06-May-07	31,138	5,492	398	26,043	26,252	11.9	2,768	12.8	2,977	-209
13-May-07	31,138	5,423	398	26,112	27,018	9.1	2,172	12.9	3,078	-906
20-May-07	31,138	5,993	398	25,542	26,353	8.4	1,989	11.9	2,800	-811
27-May-07	31,138	4,175	398	27,360	27,269	13.0	3,140	12.6	3,049	91
03-Jun-07	31,138	4,544	398	26,991	28,230	7.9	1,981	12.9	3,220	-1,239
10-Jun-07	31,138	4,084	398	27,451	29,423	5.6	1,451	13.2	3,423	-1,972
17-Jun-07	31,138	3,633	398	27,902	30,571	3.5	952	13.4	3,621	-2,669
24-Jun-07	31,138	3,678	398	27,857	30,430	3.9	1,033	13.4	3,606	-2,573
01-Jul-07	31,138	2,602	398	28,933	30,634	7.0	1,896	13.3	3,597	-1,701

Table A6 Energy Production Capability Forecast

Month	Existing Resource Scenario Forecast Energy Production Capability (GWh)	Planned Resource Scenario Forecast Energy Production Capability (GWh)
Jan 2006	17,181	17,345
Feb 2006	15,054	15,406
Mar 2006	15,284	15,648
Apr 2006	14,299	14,652
May 2006	14,872	15,190
Jun 2006	16,002	16,355
Jul 2006	17,123	17,465
Aug 2006	16,927	17,279
Sep 2006	14,510	14,851
Oct 2006	14,030	14,382
Nov 2006	14,526	14,879
Dec 2006	17,279	17,620
Jan 2007	17,251	17,603
Feb 2007	14,892	15,233
Mar 2007	15,495	15,848
Apr 2007	14,661	15,028
May 2007	16,099	16,431
Jun 2007	16,258	16,626

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Appendix B Transmission Projects

Zone	CAA-ID#	Description	Proposed I/S Date
East	2005-194	Belle River TS	2006-Q2
East	2004-161	Cornwall 115KV Transmission	2006-Q2
Essa	2004-135	Essa Shunt Capacitor	2006-Q2
Niagara	2002-085	Queenston Flow West	2006-Q3
Northeast	2004-EX211	Patrick St. TS - 8 oil circuit breakers replaced with SF6 breakers	2006-Q3
Northeast	2003-Ex173	New Gartshore TS - 5x115 kV breaker ring-bus to replace existing Gartshore TS	2006-Q4
Northeast	2002-070	P21G 230 kV cct Upgraded to 374 MVA continuous rating	2006-Q4
Northeast	N/A	Additional 132 kv Breaker and new customer connection to Attawapsikat TS	2006-Q3
Northeast	N/A	Energize 2nd 6/8/10 MVA transformer at Attawapiskat TS	2007-Q1
Northeast	N/A	Energize 2nd 6/8/10 MVA transformer at Albany TS	2007-Q2
Northwest	2005-195	Fort France TS reactive compensation	2006-Q4
Toronto	2004-113	Cooksville TS reconfigure connections from Applewood Junction	2005-Q4
Toronto	2003-099	Parkway TS - Completion of second auto-transformer and the remaining work for project 2003-099	2005-Q4
Toronto	2005-198	Whitby TS new transformer station	2007-Q2
West	N/A	L25/27N inline breakers	2006-Q4

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Appendix C Planned Transmission Outages

The following tables list the planned transmission outages by transmission zone, for transmission outages with an expected duration greater than five days, and/or for those transmission outages associated with a major project.

Table C1 Bruce Zone

No Outages to assess.

Table C2 East Zone

Start Date/Time	End Date/Time	Equipment	Outage Type	Recall	Impact	Reduction in Limit
Jul 06 2006 10:00 PM	Jul 31 2006 9:59 PM	Cardinal Power CGS: T1, T2H, T1H, G2B, T2	CWW	10 Hour	None	
Dec 20 2006 3:00 PM	Dec 25 2006 3:15 PM	Bowmanville SS: L27L43, X527B::LENNOX_TS::BOWMANVILLE_SS, PL527, EL527,::LENNOX_TS::BOWMANVILLE_SS, L22L27	CWW	5 Minute	None	
Apr 21 2006 10:45 PM	May 13 2006 10:59 PM	Cardinal Power CGS: T1H, T1H-H, T1	CWW	Non-Recallable	None	
Apr 21 2006 10:30 PM	May 14 2006 1:59 AM	Cardinal Power CGS: 52-S	DWW	Non-Recallable	None	
May 01 2006 6:00 AM	May 11 2006 4:00 PM	Barrett Chute JCT: W3B::BARRETT_CHUTE_JCT::MOUNTAIN_CHUTE_DS, W3B::BARRETT_CHUTE_JCT::STEWARTVILLE_TS, W3B::BARRETT_CHUTE_SS::BARRETT_CHUTE_JCT, T1-L, 10-W3B, 14-W3B, W3B::BARRETT_CHUTE_SS::BARRETT_CHUTE_JCT	CNW	4 Hour	None	
Jul 03 2006 6:00 AM	Aug 04 2006 4:00 PM	Haley Industries JCT: 3501-X2Y-4, X2Y-LL01	CNW	4 Hour	None	
Jul 10 2006 6:00 AM	Aug 10 2006 4:00 PM	Cobden TS: X2Y::HALEY_JCT::COBDEN_TS, 69X2Y-23, 23X2Y-MSS1, X2Y	CNW	4 Hour	None	
Jan 23 2006 6:00 AM	Mar 02 2006 4:00 PM	Chats Falls TS: 2W6CS, 61W6CS-LC1, 58W6CS-MSO	CNW	4 Hour	None	

Table C3 Essa Zone

Jan 23 2006 7:00 AM	Feb 09 2006 6:00 PM	Minden TS: D3M::DES_JOACHIMS_TS::MINDEN_TS, L3L80, AL3, T3L3, AL3, D3M	CWW	4 Hour	None	

Table C4 Niagara Zone

No Outages to assess.

Table C5 Northeast Zone

Start Date/Time	End Date/Time	Equipment	Outage Type	Recall	Impact	Reduction in Limit
Aug 22 2006 7:00 AM	Sep 29 2006 6:00 PM	Porcupine TS: H1L502	CWW	8 Hour	None	
Jul 04 2006 7:00 AM	Aug 11 2006 6:00 PM	Porcupine TS: L01L02	CWW	8 Hour	None	
Jul 11 2006 9:00 AM	Jul 22 2006 3:00 PM	Porcupine TS: K2K3	CWW	8 Hour	None	
Oct 10 2006 7:00 AM	Nov 10 2006 6:00 PM	Porcupine TS: H2L501	CWW	8 Hour	None	
Apr 10 2006 8:00 AM	Apr 17 2006 6:00 PM	Mississagi TS: 34-P22G, P22G::ECHO_RIVER_CTS::MISSISSAGI_TS, P22G::ECHO_RIVER_CTS	CWW	Non-Recallable	None	
Apr 24 2006 7:00 AM	May 01 2006 1:00 PM	Mississagi TS: AL23, 34-P21G, 34-T27P, AL25	CWW	4 Hour	None	
Apr 10 2006 7:00 AM	Apr 17 2006 5:00 PM	Mississagi TS: 34-T28P, KL24, KL74, 34-P22G	CWW	4 Hour	None	
Apr 24 2006 8:00 AM	May 01 2006 6:00 PM	P21G P8 JCT: P21G::P21G_P8_JCT::THIRD_LINE_CTS, P21G::MISSISSAGI_TS::P21G_P8_JCT, P21G::MISSISSAGI_TS::P21G_P8_JCT, 34-P21G, P21G::P21G_P8_JCT::THIRD_LINE_CTS	CWW	4 Day	None	
Jan 16 2006 9:00 AM	Mar 03 2006 4:00 PM	Porcupine TS: 30T8-T, 30T8-H, T8	CNW	1 Hour	None	
May 03 2005 8:00 AM	Feb 07 2006 3:01 PM	Inco #4 CTS: T1	CWW	Non-Recallable	None	
Apr 10 2006 5:30 PM	Apr 17 2006 4:00 PM	Mississagi TS: 34-P22G, P22G::ECHO_RIVER_CTS::MISSISSAGI_TS, P22G::ECHO_RIVER_CTS::MISSISSAGI_TS	CWW	Non-Recallable	None	
Apr 24 2006 5:30 PM	May 01 2006 5:00 PM	Third Line CTS: P21G::P21G_P8_JCT::THIRD_LINE_CTS, 34-P21G, P21G::MISSISSAGI_TS::P21G_P8_JCT, P21G::MISSISSAGI_TS::P21G_P8_JCT, P21G::P21G_P8_JCT::THIRD_LINE_CTS	CWW	Non-Recallable	None	
Nov 22 2005 12:00 AM	Jun 14 2030 11:59 PM	Mackay TS: ANJIGAMI LINE #1, ANJIGAMI LINE #1	CWW	Non-Recallable	None	
Nov 13 2005 8:01 AM	Nov 13 2006 7:01 PM	Scott GS: 902	CWW	1 Hour	None	

Table C6 Northwest Zone

Start Date/Time	End Date/Time	Equipment	Outage Type	Recall	Impact	Reduction in Limit
Oct 29 2006 9:00 AM	Nov 19 2006 9:00 AM	Ignace JCT: M2D-D, M2D::DRYDEN_TS::IGNACE_JCT, M2D::DRYDEN_TS::IGNACE_JCT, M2D-1	CWW	4 Hour	None	
Jan 23 2006 8:00 AM	Feb 24 2006 6:00 PM	Fort Frances TS: K24F::KENORA_TS::FORT_FRANCES_TS, K24F::KENORA_TS::FORT_FRANCES_TS, 22-K24F, 34-K24F	CNW	4 Hour	OMTE, OMTW, EWTE, MPFN, MPFS	OMTE - 50 MW OMTW - 250 MW EWTE - 75 MW MPFN - 50 MW MPFS - 140 MW
Mar 13 2006 8:30 AM	May 12 2006 4:00 PM	Dryden TS: K23D::DRYDEN_TS::VERMILION_JCT, 25-K23D, 3411-25, K23D::DRYDEN_TS::VERMILION_JCT	CWW	4 Hour	OMTE, OMTW, EWTE, MPFN	OMTE - 50 MW OMTW - 250 MW EWTE - 75 MW MPFN - 25 MW
Sep 11 2006 8:30 AM	Oct 20 2006 4:00 PM	Vermilion JCT: K23D::DRYDEN_TS::VERMILION_JCT, K23D::DRYDEN_TS::VERMILION_JCT, 25-K23D, 3411-25	CWW	4 Hour	OMTE, OMTW, EWTE, MPFN	OMTE - 50 MW OMTW - 250 MW EWTE - 75 MW MPFN - 25 MW

Table C7 Ottawa Zone

Jan 30 2006 6:00 AM	Feb 09 2006 4:00 PM	Orleans JCT: 42H9A-77, T2-A, H9A::BILBERRY_CREEK_TS::BILBERRY_CREEK_JCT, A1-A2	CNW	4 Hour	None	

Table C8 Southwest Zone

Start Date/Time	End Date/Time	Equipment	Outage Type	Recall	Impact	Reduction in Limit
Nov 26 2004 8:00 AM	Dec 25 2006 3:00 PM	Campbell TS: SC4Q, SC4	CWW	30 Minute	None	
Jun 03 2005 7:01 AM	Jun 03 2006 3:00 PM	Kitchener MTS#8: K8T16-M20D, T16B, T16	DWW	4 Hour	None	
Jan 03 2006 7:01 AM	Jan 27 2006 4:01 PM	Kitchener MTS#1: 52-1B2, T1, K1T1-D12K, 52-T1B	CWW	4 Hour	None	
Mar 01 2006 5:00 AM	Mar 31 2006 6:00 PM	Bronte TS: T2-B8, M24, M23, T2-B7, M26, T2, M25, SS2-X	CWW	1 Minute	None	

Table C9 Toronto Zone

Start Date/Time	End Date/Time	Equipment	Outage Type	Recall	Impact	Reduction in Limit
Mar 06 2006 5:00 AM	Apr 14 2006 6:00 PM	Manby East TS: TR5-S, T5, T5-H2, TR5-T	CWW	4 Week	None	
Dec 25 2005 7:00 AM	Jan 20 2006 2:30 PM	Bermondsey TS: T4Y, T4, T4B, T4-C14L	CWW	36 Hour	None	
Dec 25 2006 7:00 AM	Jan 20 2007 6:00 PM	Pickering B SS: T5L27, P27C::CHERRYWOOD_TS::PICKERING_B_SS,L27R, L26L27, KL27	CWW	2 Day	None	
Jan 02 2007 7:00 AM	Jan 23 2007 6:00 PM	Cherrywood TS: KL8, L8D, P8C::PICKERING_A_SS::CHERRYWOOD_TS, L8L24, T2L8	CWW	2 Day	None	
Oct 30 2006 6:00 AM	Dec 01 2006 5:00 PM	Bridgman TS: T14, T14Y-B, T14X-H, T14-L14W	CWW	10 Day	None	
Dec 25 2006 7:00 AM	Dec 30 2006 6:00 PM	Pickering A SS: T1L6, L3L6, L6K, P6C::CHERRYWOOD_TS::PICKERING_A_SS, DL6	CWW	2 Day	None	
Jan 02 2007 7:00 AM	Jan 17 2007 6:00 PM	Pickering A SS: T3L7, P7C::PICKERING_A_SS::CHERRYWOOD_TS, L7H, DL7, L7L11	CWW	2 Day	None	
Oct 31 2005 5:00 PM	Nov 17 2006 5:00 PM	Markham MTS #1 JCT: C12R::MARKHAM_MTS_#1_JCT::PARKWAY_JCT	CWW	4 Hour	FETT	200 MW
Nov 01 2005 5:00 AM	Nov 01 2006 5:00 PM	Bathurst JCT: C12R::BATHURST_JCT::FINCH_JCT, C12R::FINCH_JCT::RICHVIEW_TS, C12R::BATHURST_JCT::LEASIDE_JCT, 12R::IBM_MARKHAM_JCT::MARKHAM_MTS_#1_JCT, C12R::IBM_MARKHAM_JCT::LEASIDE_JCT	CWW	30 Minute	FETT	200 MW
Oct 12 2005 1:29 PM	Apr 17 2006 6:00 PM	Claireville TS: T13-HT13, T13, T13-A		Non-Recallable	FETT	150 MW

Table C10 West Zone

Start Date/Time	End Date/Time	Equipment	Outage Type	Recall	Impact	Reduction in Limit
Jun 28 2005 7:00 AM	Jun 29 2006 3:00 PM	Sarnia Scott TS: KL1	CWW	2 Hour	None	
May 15 2006 5:00 AM	May 23 2006 6:00 PM	Aylmer TS: SC1, M1, SC1B	CWW	1 Hour	None	
Apr 18 2006 6:00 AM	May 19 2006 4:00 PM	Strathroy TS: 29-W2S, 19-W2S, W2S::BUCHANAN_TS::SYDENHAM_JCT, W2S::BUCHANAN_TS::SYDENHAM_JCT, W2S::SYDENHAM_JCT::STRATHROY_TS, W2S::SYDENHAM_JCT::STRATHROY_TS	CWW	4 Hour	None	

Appendix D Transformer Distribution Factors

The following table lists the distribution factors used to determine the planned 2006 LTE capability of the 500/230 kV autotransformers shown in Table 7.1.

Table D1 Transformer Distribution Factors

		1	2	3	4	5	6	7	8
	Contingency	TRAF-T14	TRAF-T15	CLAIRT13	CLAIRT14	CLAIRT15	CLAIRT16	PARKWT12	PARKWT13
	Monitored								
1	TRAF-T14	-1	0.267	0.063	0.063	0.063	0.062	0.034	0.034
2	TRAF-T15	0.269	-1	0.064	0.064	0.064	0.063	0.034	0.034
3	CLAIRT13	0.072	0.073	-1	0.176	0.176	0.174	0.053	0.053
4	CLAIRT14	0.073	0.074	0.178	-1	0.178	0.176	0.054	0.054
5	CLAIRT15	0.073	0.073	0.177	0.178	-1	0.175	0.054	0.054
6	CLAIRT16	0.068	0.068	0.165	0.165	0.165	-1	0.05	0.05
7	PARKWT12	0.035	0.035	0.048	0.048	0.048	0.047	-1	0.279
8	PARKWT13	0.035	0.035	0.048	0.048	0.048	0.047	0.279	-1
9	CHERY-14	0.027	0.027	0.037	0.037	0.037	0.037	0.092	0.092
10	CHERY-15	0.028	0.028	0.038	0.038	0.038	0.038	0.092	0.092
11	CHERY-16	0.028	0.028	0.038	0.038	0.038	0.038	0.093	0.093
12	CHERY-17	0.027	0.027	0.037	0.037	0.037	0.037	0.092	0.092
13	MIDD-T3	0.062	0.062	0.021	0.021	0.021	0.021	0.011	0.011
14	MIDD-T6	0.072	0.072	0.017	0.017	0.017	0.017	0.009	0.009
15	NANT-11	0.029	0.029	0.008	0.008	0.008	0.008	0.004	0.004
16	NANT-12	0.03	0.03	0.008	0.008	0.008	0.008	0.004	0.004

		9	10	11	12	13	14	15	16
	Contingency	CHERY-14	CHERY-15	CHERY-16	CHERY-17	MIDD-T3	MIDD-T6	NANT-11	NANT-12
	Monitored								
1	TRAF-T14	0.026	0.026	0.026	0.026	0.076	0.089	0.033	0.033
2	TRAF-T15	0.026	0.027	0.027	0.026	0.077	0.089	0.033	0.033
3	CLAIRT13	0.041	0.042	0.042	0.041	0.03	0.024	0.011	0.011
4	CLAIRT14	0.042	0.042	0.042	0.042	0.03	0.024	0.011	0.011
5	CLAIRT15	0.042	0.042	0.042	0.042	0.03	0.024	0.011	0.011
6	CLAIRT16	0.039	0.039	0.039	0.039	0.028	0.022	0.01	0.01
7	PARKWT12	0.091	0.09	0.09	0.091	0.014	0.011	0.005	0.005
8	PARKWT13	0.091	0.09	0.09	0.091	0.014	0.011	0.005	0.005
9	CHERY-14	-1	0.105	0.105	0.297	0.011	0.009	0.004	0.004
10	CHERY-15	0.106	-1	0.297	0.106	0.011	0.009	0.004	0.004
11	CHERY-16	0.107	0.298	-1	0.106	0.011	0.009	0.004	0.004
12	CHERY-17	0.296	0.104	0.104	-1	0.011	0.009	0.004	0.004
13	MIDD-T3	0.009	0.009	0.009	0.009	-1	0.147	0.146	0.147
14	MIDD-T6	0.007	0.007	0.007	0.007	0.147	-1	0.142	0.143
15	NANT-11	0.003	0.003	0.003	0.003	0.16	0.155	-1	0.478
16	NANT-12	0.003	0.004	0.004	0.003	0.164	0.159	0.484	-1

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