Independent Electricity Market Operator

18-Month Outlook:

An Assessment of the Reliability of the Ontario Electricity System from October 2002 to March 2004

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Executive Summary

This report presents the IMO's assessment of the reliability of the Ontario electricity system for the 18-month period from October 2002 through March 2004. This assessment is based on the IMO's forecast of electricity demand, the participants' submission of available supply and the latest information on the configuration and capability of the transmission system.

Reference Resource Scenario

The Reference Resource Scenario is the base case for this assessment and assumes:

- forecast Ontario Demand based on normal weather;
- the availability of existing generation in Ontario based on information provided by market participants;
- 3,000 MW of additional generation, consisting of new generation resources currently under construction and nuclear units returning to service, commencing production on the dates identified by market participants; and
- outage plans of generators and transmitters and generator return to service plans based on information provided by market participants as of the beginning of August 2002.

To assess reliability, the IMO uses this information to determine whether reserve margins, over and above Ontario's anticipated demands, are adequate to accommodate circumstances that cannot be accurately predicted - such as weather variations and unforeseen generator outages.

Under the reference scenario Ontario's reserves are forecast to be in the range of 1,800 to 3,100 MW during late October through December 2002. The reserves in most weeks during this period are below the IMO's required planning reserve levels. Resources outside Ontario may be required to supplement Ontario supply. Current indications are that such resources will be available. The importance of external resources is heightened in the event of higher than forecast forced outages to Ontario generators or higher than forecast demands due to extreme weather conditions.

The impact of extreme weather was demonstrated in August when Ontario established an all-time peak demand of 25,414 MW. Roughly 1,650 MW of this demand was due to the higher than average heat and humidity. The occurrence and timing of extreme weather that gives rise to peak demands is impossible to accurately forecast far in advance. For this reason, IMO 18-Month assessments are based on the assumption of normal (average) weather, with extreme weather and random forced outages each being modeled probabilistically and combined together to determine the required reserve level. For example, this 18-Month Outlook has a maximum resource requirement of about 27,000 MW over the summer of 2003, based on a forecast normal weather demand of 23,354 MW plus a reserve requirement of around 3,700 MW. Because the uncertainty associated with weather and random outages diminishes in the operating timeframe, this 3,700 MW reserve requirement reduces to about 1,600 MW for same day operations.

Tighter demand/supply balances during periods of reduced reserve levels will have several potential market impacts. These include upward pressure on market prices during peak demand

periods and limited opportunities for the IMO to approve the release of generators for planned maintenance. Various responses can be anticipated in these circumstances, including: for Ontario generators, maximizing their availability to offer into the Ontario market; for marketers, arranging imports to help meet anticipated Ontario requirements; and for consumers, taking measures to reduce their electricity consumption.

Over the summer of 2002, the IMO-controlled grid was stressed to the limit on occasion in order to supply Ontario demands. Extensive reliance was placed on the good performance of internal generation and on high levels of imports. Market participants have advised the IMO that substantial amounts of additional generation will come into service in the latter half of 2002 and the first half of 2003. As a result, forecast reserves in 2003 exceed requirements in all but the last three weeks in April. Under these conditions, generators would have considerable flexibility in the scheduling of planned outages

Over the 18-month period under study, accounting for the availability of regional supply, the Northeast Power Coordinating Council resource adequacy criterion is expected to be met.

Reference Scenario Risks

The additional resources forecast for 2003 come from laid-up nuclear units returning to service. The improved demand/supply situation in 2003 is critically dependent on these units returning to service on schedule. To date, no laid-up nuclear unit has been returned to service in Ontario and there have been past delays in projected return dates. This history suggests a significant risk that some return to service dates will not be met. For purposes of this assessment, the IMO has adopted the nuclear return-to-service dates provided to it in August. The 18-month resource outlook would deteriorate significantly should these schedules not be met.

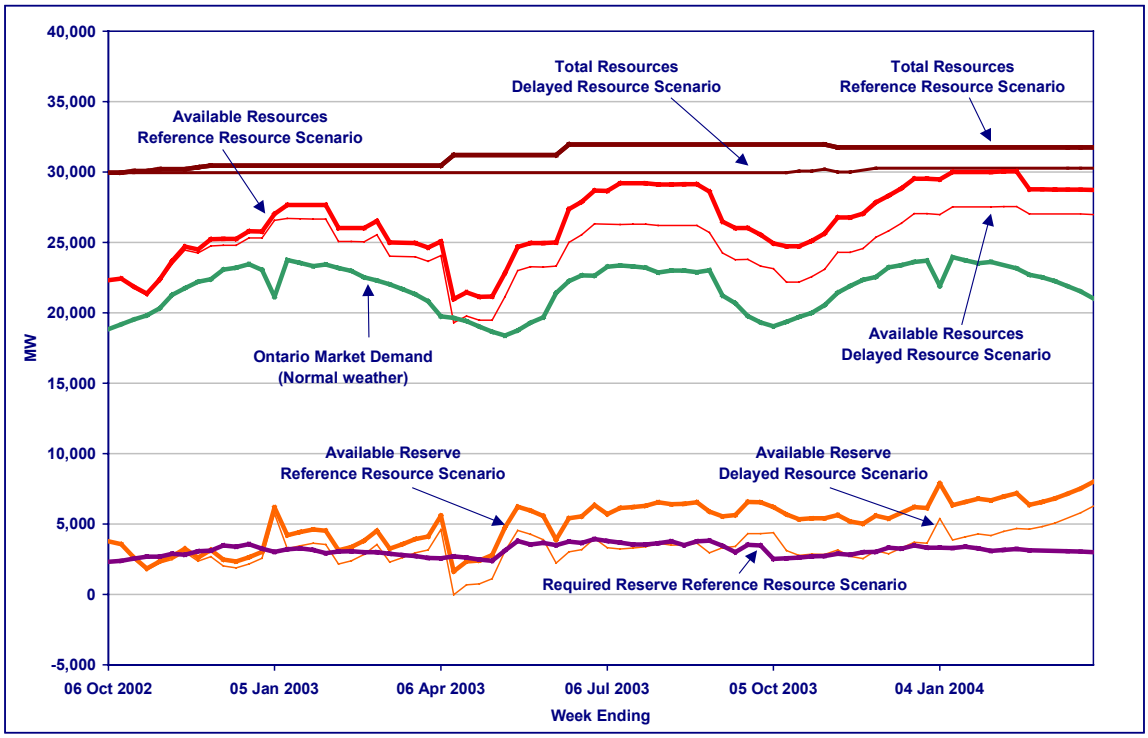
In addition, a number of large generating units are scheduled to return to service from long duration maintenance outages at the beginning of winter 2002/03, with others scheduled to return from similar outages just prior to summer 2003. Similar to the return of laid-up nuclear units, meeting these schedules is critical to maintaining reserve margins.

Delays in commissioning new units or returning generators to service, whether from lay-up or maintenance outages, could once again lead to extensive reliance on imports as has been the case during 2002. Under these circumstances, opportunities for planned outages, especially during the summer period, would be very limited.

Delayed Resource Scenario

The Delayed Resource scenario differs from the Reference Resource scenario only by delaying the in-service dates of additional resources by one year. Under this scenario, reserve margins will remain tight for the remainder of 2002 and throughout most of 2003. The same concerns discussed above regarding the return to service of generators from planned outages leading in to the summer, and the need for extensive reliance on imports, apply equally to the Delayed scenario. Opportunities for the IMO to approve planned generator outages would be limited.

The following figure illustrates the weekly resource adequacy situation of the Ontario electricity system for the two resource availability scenarios.



Under both scenarios, it is anticipated that market participants will focus on periods of high and low reserve margins as opportunities to optimize their operational and commercial plans.

Ontario Demand Forecast

The IMO's resource adequacy assessments utilize the Ontario Demand forecast under normal weather. As well, the impact of deviations from normal weather on peak demands is factored into the determination of the required reserve.

Starting with this Outlook the IMO has changed from using forecast 20-minute peak demands for adequacy assessments to using forecast 60-minute peak demands for adequacy assessments. This makes the peak demand measure consistent with surrounding jurisdictions and reduces the demand forecast in the order of 100 MW. Generally, the electricity demand forecast is similar to the demand forecast that was prepared for the previous 18-Month Outlook published in June 2002. The information used in preparing the forecast includes updated economic, demand and weather data up to the end of June 2002. For 2003, the normal weather peak demands are expected to be 23,750 MW for the winter and 23,350 MW for the summer, whereas the extreme weather peaks are forecasted to be 25,470 MW for the winter and 26,000 MW for the summer. Energy demand is expected to be 149.5 TWh for 2003, an increase over the previous forecast due to a better economic outlook.

Transmission Outlook

As in the previous Outlook, the transmission system is expected to be adequate to supply demand under the forecast conditions studied in this Outlook, with some limits on the flexibility for planned outages in the Toronto and Windsor areas. Lakeview, Pickering and Darlington units are required to provide reactive capability to maintain adequate voltage levels during summer peak demand periods.

Energy

The overall monthly energy production capability is forecast to be adequate, however shorter-term energy deficiencies could arise as a result of higher than forecast forced outage situations, extreme demands and other influencing factors. Experience over the past summer identified that even when sufficient capacity is available, its use can be limited because of a lack of energy. Shorter-term energy studies are undertaken closer to real-time to support more detailed assessments and provide additional information to market participants as appropriate.

Caution and Disclaimer

The contents of these materials are for discussion and information purposes and are provided "as is" without representation or warranty of any kind, including without limitation, accuracy, completeness or fitness for any particular purpose. The Independent Electricity Market Operator (IMO) assumes no responsibility to you or any third party for the consequences of any errors or omissions. The IMO may revise these materials at any time in its sole discretion without notice to you. Although every effort will be made by the IMO to update these materials to incorporate any such revisions it is up to you to ensure you are using the most recent version.

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1.0 Introduction

The Ontario Electricity Market Rules (Chapter 5) require that the Independent Electricity Market Operator (IMO) provide forecasts and assessments of the reliability of the existing and committed resources and transmission facilities of the Ontario market.

This Outlook covers the 18-Month period from October 1, 2002 to March 31, 2004. It supercedes the report titled "An Assessment of the Reliability of the Ontario Electricity System from July 2002 to December 2003", dated June 24, 2002. 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.

Section 2 of this Outlook identifies the resources expected to be available during the study period and Section 3 presents an assessment of the adequacy of these resources under the current generation outage program. An assessment of the reliability of the transmission system is described in Section 4. The overall observations, findings and conclusions related to the resource and transmission reliability assessments are contained in Section 5.

This Outlook presents an assessment of 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 changes in assumptions can be considered. The tables contained in the document can be downloaded from the IMO web site in MS Excel format.

The contents of this Outlook document 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 separate document titled "Ontario Demand Forecast from October 2002 to March 2004" (IMO_REP_0088) (found on the IMO web site at www.theimo.com/imoweb/pubs/marketReports/18Month_ODF_2002oct.pdf) describes in detail the 18-month forecast of electricity demand for the Ontario Market used in this Outlook. The demand forecast document also 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 IMO web site.
- The separate document titled "Methodology to Perform Long Term Assessments" (IMO_REP_0044) (found on the IMO web site at www.theimo.com/imoweb/pubs/marketReports/Methodology_RTAA_2002oct.pdf) contains information regarding the methodology used to perform the demand forecasts, resource adequacy assessments and transmission reliability assessments in this Outlook.

1.1 Changes from Previous Outlook

Changes to Forecast Demands

Starting with this Outlook the IMO has changed from using forecast 20-minute peak demands for adequacy assessments to using forecast 60-minute peak demands for adequacy assessments. This makes the peak demand measure consistent with surrounding jurisdictions and reduces the demand forecast in the order of 100 MW. Generally, the electricity demand forecast is similar to the demand forecast that was prepared for the previous 18-Month Outlook published in June 2002. The information used in preparing the forecast includes updated economic, demand and weather data up to the end of June 2002. For 2003, the normal weather peak demands are expected to be 23,750 MW for the winter and 23,350 MW for the summer, whereas the extreme weather peaks are forecasted to be 25,470 MW for the winter and 26,000 MW for the summer. Energy demand is expected to be 149.5 TWh for 2003, an increase over the previous forecast due to a better economic outlook.

Changes to Resources

The existing installed generation resources have been updated from the previous 18-Month Outlook, to include all generators that are registered to participate in the IMO-administered markets, and now includes generators owned by Great Lakes Power. The list does not include generators that are not registered to participate in the IMO-administered markets.

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 the IMO help centre:

- Toll Free: 1-888-448-7777
- Tel: 905-403-6900
- Fax: 905-403-6921
- E-mail: helpcentre@theIMO.com.

2.0 Resources

This Section describes the generation resources that are considered in this Outlook based on information available to the IMO as of August 2002.

2.1 Existing Generation Resources Included in the Study

The existing installed generation within Ontario is summarized in Table 2.1. This includes nuclear, coal, oil, gas, hydroelectric, wood and waste-fuelled generation and results in a total capacity of 29,749 MW.

The capacity of installed generation resources in Table 2.1 does not include Bruce A nuclear units, which are currently in laid-up state. Bruce A units, together with other additions to generating capacity identified to the IMO, are added to the installed resources as they come into service, as described in Section 2.4.

Table 2.1 Existing Installed Generation Resources

Fuel Type	Total Capacity (MW)	Number of Stations
Nuclear	10,808	4
Coal	7,553	5
Oil / Gas	3,663	23
Hydroelectric	7,676	59
Miscellaneous (wind, waste, wood, etc.)	49	2
Total	29,749	93

2.2 External Transactions

A firm purchase of 200 MW is assumed to be delivered to Ontario for the period until October 31, 2003 and is explicitly included in the resource availability scenarios described in Section 2.4. No other firm purchase contracts have been identified for the study period. There are no firm sales identified at any point in the study period.

2.3 Potential New Generation Resources

Table 2.2 summarizes the new generation projects that have been identified to the IMO and that are expected to be placed in-service within the 18-month study period, under the Reference Resource Scenario described in the next Section. The in-service dates represent the expected date for full commercial operation of the listed facilities. Commissioning energy and individual unit operation may occur earlier than these dates.

Table 2.2 Potential Generation Projects in Ontario

Project Name	Zone	Fuel Type	Capacity MW	Connection Applicant's Estimated I/S Date
Transalta - SRCP	West	Gas	510	2003 - Q1
Bruce Power Inc.	Bruce	Nuclear	1,500	2003 - Q3
Total			2,010	

Details regarding the IMO's Connection Assessment and Approval (CAA) process , the status of all current applicants, including copies of available Preliminary Assessment (PA) and System Impact Assessment (SIA) Reports can be found on the IMO's web site www.theIMO.com under the "Services - Connection Assessments" link.

In addition to the generation projects listed in Table 2.2, three units at Pickering A are scheduled to be returned to service during this Outlook period.

2.4 Summary of Generation Resource Scenarios

In assessing future resource adequacy, it is necessary to make a number of assumptions regarding the magnitude of supply resources that are expected to be available. Two resource scenarios are considered in this Outlook: a Reference Resource Scenario and a Delayed Resource Scenario. Both resource scenarios are based on the existing installed resources shown in Table 2.1.

Under the **Reference Resource Scenario** existing Ontario Resources are assumed to be in-service for the duration of the study period and 200 MW of purchases are assumed to be available up to the end of October 2003. This resource scenario assumes that Pickering-A units come into service on the dates that the facility owner has indicated to the IMO. It also includes those generation projects listed in the CAA queue where the connection applicant has indicated that construction is in progress or has been completed, and where the proposed in-service date falls within the 18-month period of this Outlook. For this Outlook, this includes the 510 MW TransAlta gas-fired generation project in Sarnia and an additional 1,500 MW of capacity from the Bruce Power project.

Under the **Delayed Resource Scenario** the same assumptions are used as for the Reference Resource Scenario except that the in-service dates of additional resources are delayed by one year. No other new generation facilities are assumed to come into service in this resource scenario.

Table 2.3 shows a snapshot of the available resources assumed in the study, under the two scenarios, at the time of the seasonal peak demands. The installed resources in the table include the additional resources, which are considered to be in-service for each of the scenarios. Imports include the purchases that are assumed to be delivered to Ontario as described in Section 2.2. The total reduction to resources includes generator deratings, generator outages under each resource scenario, generation limitations due to transmission interface constraints and allowances for non-utility and hydroelectric generation production below rated capacity. These reductions are subtracted from Total Resources to obtain Available Resources.

Table 2.3 Summary of Available Resources

Notes	Description \ Year	Winter Peak 2003		Summer Peak 2003		Winter Peak 2004	
		Reference Resource Scenario	Delayed Resource Scenario	Reference Resource Scenario	Delayed Resource Scenario	Reference Resource Scenario	Delayed Resource Scenario
1	Installed Resources (MW)	30,259	29,749	31,759	29,749	31,759	30,259
2	Imports (MW)	200	200	200	200	0	0
3	Total Resources (MW)	30,459	29,949	31,959	29,949	31,759	30,259
4	Total Reductions in Resources (MW)	2,787	3,257	2,762	3,662	1,755	2,744
5	Available Resources (MW)	27,672	26,692	29,197	26,287	30,004	27,515

Notes to Table 2.3:

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 the generators in Ontario, except Bruce A and retired generators. New generation capacity is progressively included, according to estimated in-service dates assumed for the applicable Resource Scenario.

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

3. Total Resources (MW): This is the sum of lines 1 and 2 above.

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

5. Available Resources (MW): This is the difference between lines 3 and 4 above.

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3.0 Resource Adequacy Assessment

This Section provides an assessment of the adequacy of the resources described in Section 2 to meet the forecast demand. The purpose of the two resource scenarios described in Section 2.4 is to present a range of possible outcomes, in recognition of the uncertainty which exists regarding the future availability of new generation. The Reference Resource Scenario reflects information provided by generator operators and forms the foundation for assessment purposes. The Delayed Resource Scenario represents a more pessimistic outcome, from the perspective of assessing adequacy. The methodology used to carry out this assessment is described in detail in the document titled "Methodology to Perform Long Term Assessments" (IMO_REP_0044). Results of the adequacy assessment are described in Section 3.1, observations, findings and conclusions are provided in Section 5, and detailed tables of results can be found in Appendix A of this document.

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

3.1 Assessment of Resource Adequacy

3.1.1 Weekly Reserve Margins

An overall picture of the 18-month assessment of resource adequacy is provided in Figure 3.1, showing the Total Resources, Available Resources and Available Reserve for the Reference Resource Scenario and the Delayed Resource Scenario. The Required Reserve for the Reference Resource Scenario and the Ontario Demand based on normal weather are also shown in Figure 3.1. The total reduction to resources for each week is shown in Figure 3.2. The reserve margin, which is the difference between the available reserve and the required reserve, is shown in Figure 3.3 for both resource scenarios studied. Available reserve is the amount of resources expected to be available in excess of the normal weather non-dispatchable demand. The Ontario Demand forecast includes 300 MW of price-sensitive demand. Further details showing weekly values are provided in Appendix A.

Under the **Reference Resource Scenario**, negative reserve margins are forecast during most weeks from late October through December 2002. During negative reserve margin periods, opportunities for the IMO to approve planned outages are expected to be limited. For 2003 negative reserve margins exist in April, during weeks when significant capacity has been submitted for planned outage. Rescheduling of a large portion of these generator outages, as well as external generating capacity from neighbouring systems, would be needed to maintain reserves.

Outside of these periods, reserve margins are positive indicating potential opportunities for scheduling additional generator outages and/or sales outside of Ontario.

Under the **Delayed Resource Scenario**, with units returning to service one year later than the Reference Resource Scenario, reserve margins are lower than under the Reference Resource Scenario, starting in October 2002. During the period from October 2002 through to the first half

of 2003, more than half the weeks show negative reserve margins, indicating fewer opportunities for additional generator planned outages in this period without additional alternate supply. Up to about 2,800 MW of additional capacity could potentially be needed to maintain required reserve levels. This would have to be achieved through market participants offering external capacity into the Ontario market and/or through rescheduling planned generator outages. The reserve shortfalls are the most significant during the spring of 2003. The situation improves in the second half of 2003, during which period about one quarter of the weeks show negative reserve margins. In the first quarter of 2004, the reserve margins are positive under this scenario.

The IMO will closely monitor the resource situation and implement the necessary control actions, if required, in accordance with the Market Rules. Tighter demand/supply balances during periods of reduced reserve levels will have several potential market impacts. These include upward pressure on market prices and limited opportunities for the IMO to approve the release of generators for planned maintenance. Various responses can be anticipated in these circumstances, including: for Ontario generators, maximizing their availability to offer into the Ontario market; for marketers, arranging imports to help meet anticipated Ontario requirements; and for consumers, taking measures to reduce their electricity consumption.

3.1.2 Loss of Load Expectation

A number of simulations were performed using General Electric's Multi-Area Reliability Simulation (MARS) software, to calculate the Loss of Load Expectation (LOLE) during the study period. The simulations start from the two resource scenarios described in Section 2.4 and use the methodology described in Section 2.3 of the document "Methodology to Perform Long Term Assessments" (IMO_REP_0044). The MARS calculations were performed in two steps. In the first step, the resource availability modeled in MARS was established based on the same levels that were used in the calculations described in the previous section. In the second step, additional resources were assumed to be available to Ontario, with the purpose of reducing the LOLE value such that the target LOLE value is attained. The target LOLE value is equivalent to an annual LOLE of less than or equal to 0.1 days/year. The modeling of additional resources expected to be available is in accordance with the NPCC resource adequacy criterion, which allows for supplemental capacity in the form of interconnection assistance, outage rescheduling and/or operating procedures.

MARS simulation results indicate that the LOLE value for the 18-month period under study is less than the target of 0.1 days/year. Hence, the Ontario electricity system is forecast to meet the NPCC resource adequacy criterion during the study period. The months with the highest LOLE include the months of November and December, for 2002, and April, for 2003. In order to achieve the target annual LOLE value, additional capacity to offset the largest margin deficiencies shown in Appendix A, could be required in these months, under each of the two resource scenarios.

3.1.3 Overall Adequacy of Energy Production Capability

An overall monthly energy adequacy assessment has been performed, based on forecast energy production capabilities of the generating units provided by their operators. Figure 3.5 depicts the energy adequacy situation under the two resource scenarios. The detailed result table can be found in Appendix A. The energy production capability is generally expected to be well above

energy demand levels in each month of the Outlook period, under both the Reference Resource Scenario and the Delayed Resource Scenario. No additional energy is expected to be needed to meet the Ontario forecast energy demand. The energy that is assumed to be available is provided by internal resources and from the purchase quantities assumed to be delivered to Ontario during the Outlook period.

Although the overall monthly energy production capability is forecast to be adequate, shorter-term energy deficiencies could arise as a result of higher than forecast forced outage situations, extreme demands and other influencing factors. Experience over the past summer identified that, although capacity is available, its use can be limited because of a lack of energy. Shorter-term energy studies are undertaken closer to real-time, which provide a more detailed assessment.

In addition to the monthly, weekly or other shorter-term energy limits, there are annual limits of energy production capability for certain generating stations, and for certain groups of generating stations. The energy assessment indicates that the annual limitations are not expected to be exceeded.

3.1.4 Uncertainties in Forecast Margins and Loss of Load Expectation

Uncertainties in demands due to weather effects and uncertainties in generator forced outages are taken into account in the calculation of the weekly amount of Required Reserve, as described in Section 2.2 of the document titled "Methodology to Perform Long Term Assessments" (IMO_REP_0044).

Although current economic conditions are reflected in the base demand forecast, uncertainties in the forecast of demand due to unforeseen economic growth or decline are not. Since the demand forecast embodies the economic outlook at the time it is done, changes to the economic landscape will be captured in subsequent Outlooks. Readers may wish to make their own assessments by considering that higher demand growth reduces reserve margins, while lower demand growth increases reserve margins.

The impact of extreme weather was demonstrated in August when Ontario established an all-time peak demand of 25,414 MW. Roughly 1,650 MW of this demand was due to the higher than average heat and humidity. The occurrence and timing of extreme weather that gives rise to peak demands is impossible to accurately forecast far in advance. For this reason, IMO 18-Month assessments are based on the assumption of normal (average) weather with extreme weather and random forced outages each being modeled probabilistically and combined together to determine the required reserve level. For example, this 18-Month Outlook has a maximum resource requirement of about 27,000 MW over the summer of 2003, based on a forecast normal weather demand of 23,354 MW plus a reserve requirement of around 3,700 MW. Because the uncertainty associated with weather and random outages diminishes in the operating timeframe, this 3,700 MW reserve requirement reduces to about 1,600 MW for same day operations.

Generating unit forced outage rate uncertainties in excess of the allowance already included in the assessment can have negative impacts on reserve margins and LOLE values. These events can be caused by random unit failures or by unplanned extensions to planned maintenance.

The additional resources forecast for 2003 come from laid-up nuclear units returning to service. The improved demand/supply situation in 2003 is critically dependent on these units returning to

service on schedule. To date, no laid-up nuclear unit has been returned to service in Ontario and there have been past delays in projected return dates. This history suggests a significant risk that some return to service dates will not be met. For purposes of this assessment, the IMO has adopted the nuclear return-to-service dates provided to it in August. The 18-month resource outlook would deteriorate significantly should these schedules not be met. This risk has been considered in the Delayed Resource Scenario.

In addition, a number of large generating units are scheduled to return to service from long duration maintenance outages at the beginning of winter 2002/03, with others scheduled to return from similar outages just prior to summer 2003. This represents additional risk that is not shown in the reserve margin values shown for the Reference Resource Scenario and the Delayed Resource Scenario. Similar to the return of laid-up nuclear units, meeting these schedules is critical to maintaining reserve margins.

Delays in commissioning new units or returning generators to service, whether from lay-up or maintenance outages, could once again lead to extensive reliance on imports as has been the case during 2002. Under these circumstances, opportunities for planned outages, especially during the summer period, would be very limited.

3.1.5 Outage Coordination and External Resources

Management of the Ontario demand and resource situation is a continual process, which responds to numerous factors that can affect the adequacy of the Ontario supply situation. The availability of generating units (i.e. the requirement for unit outages) and imports from other control areas are major factors that significantly impact supply adequacy. Generating unit outage plans are developed by generators to provide the necessary outage time to ensure continued equipment and staff safety, to meet regulatory requirements and to maintain long term equipment reliability. Most outages are scheduled during the fall and spring periods when demands are lower. If, during the course of time, new outages are identified or the duration of scheduled outages change, the outage coordination process established by the Market Rules is intended to maintain acceptable levels of adequacy. These actions are considered normal planning activities and exclude any emergency control actions that are available to the IMO in day to day operations.

Generators, transmitters and other market participants are expected to address the coordination of planned outages of their equipment, with each other. However, the IMO assesses the individual plans of each market participant from an integrated perspective. The results of the IMO's integrated assessment are intended to provide information to participants to assist in identifying opportunities for further coordination or by suggesting changes in timing to mitigate reliability concerns. Positive reserve margins indicate periods where generators could plan for additional outages or exports. Negative reserve margins indicate a potential role for additional external resources and suggest that generation impactive outages should be rescheduled to another time-period to restore the prescribed reserve levels.

An analysis of historical flows for the five years prior to May 1, 2002 on Ontario's interconnections shows that outside of summer peak demand periods up to 1,800 MW of external generation resources are expected to be available to offer into the Ontario market. During Ontario's summer peak demand periods of July and August opportunities for imports still exist

despite the fact that many neighbouring systems are often experiencing their peak demands. This is mainly due to the non-coincidence of the daily peak hours between Ontario and its neighbours and the availability of spare capacity from systems which are not summer peaking. From the same analysis, up to 1,400 MW is 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 in May 2002 up to September 3, 2002 indicates an average import level of 773 MW for all hours. During the 584 hours when Ontario demand exceeded 20,000 MW the average import level was 1,725 MW. During the 172 hours when Ontario demand exceeded 23,000 MW the average import level was 2,394 MW

Future levels of imports into Ontario will vary depending on several factors, including the relative prices in Ontario and adjacent markets, the availability and willingness of resources in external jurisdictions to supply the Ontario market, and the total transmission interface transfer capability.

Figure 3.1 18-Month Assessment of Resource Adequacy

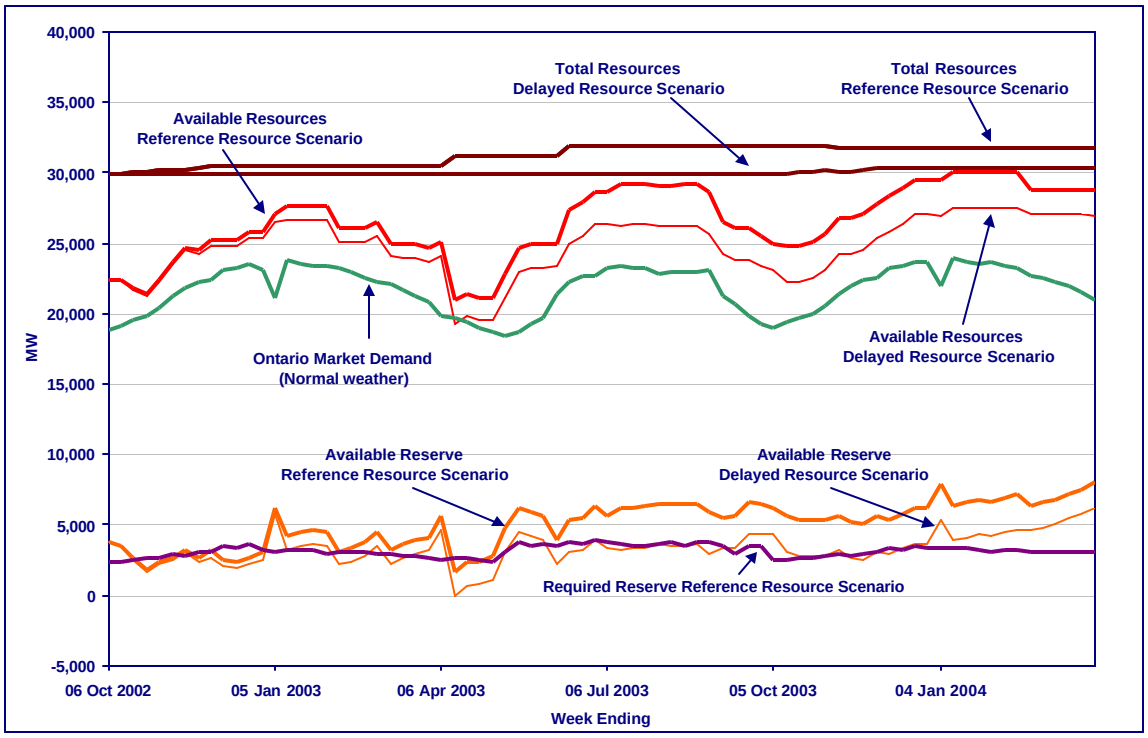


Figure 3.2 Total Reductions in Resources

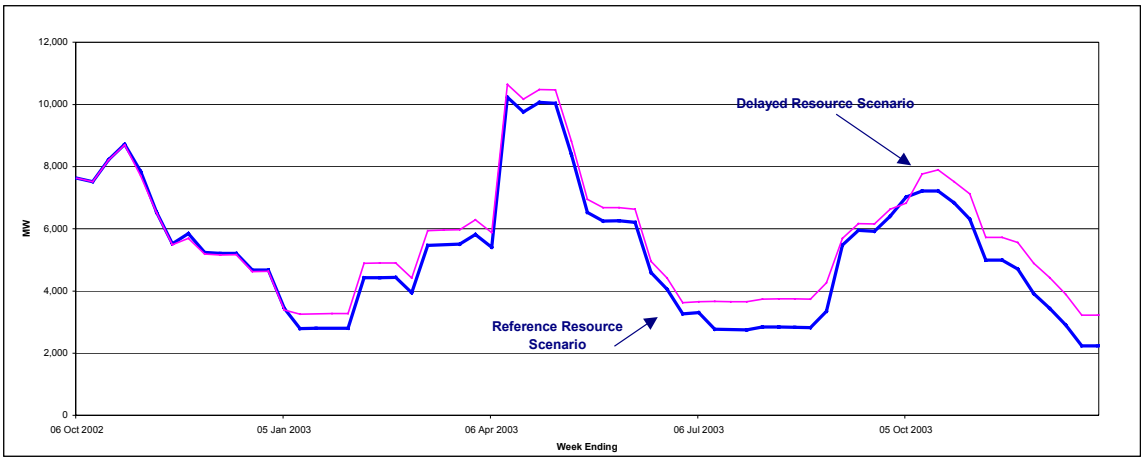


Figure 3.3 Reserve Margin: Reference Resource Scenario and Delayed Resource Scenario

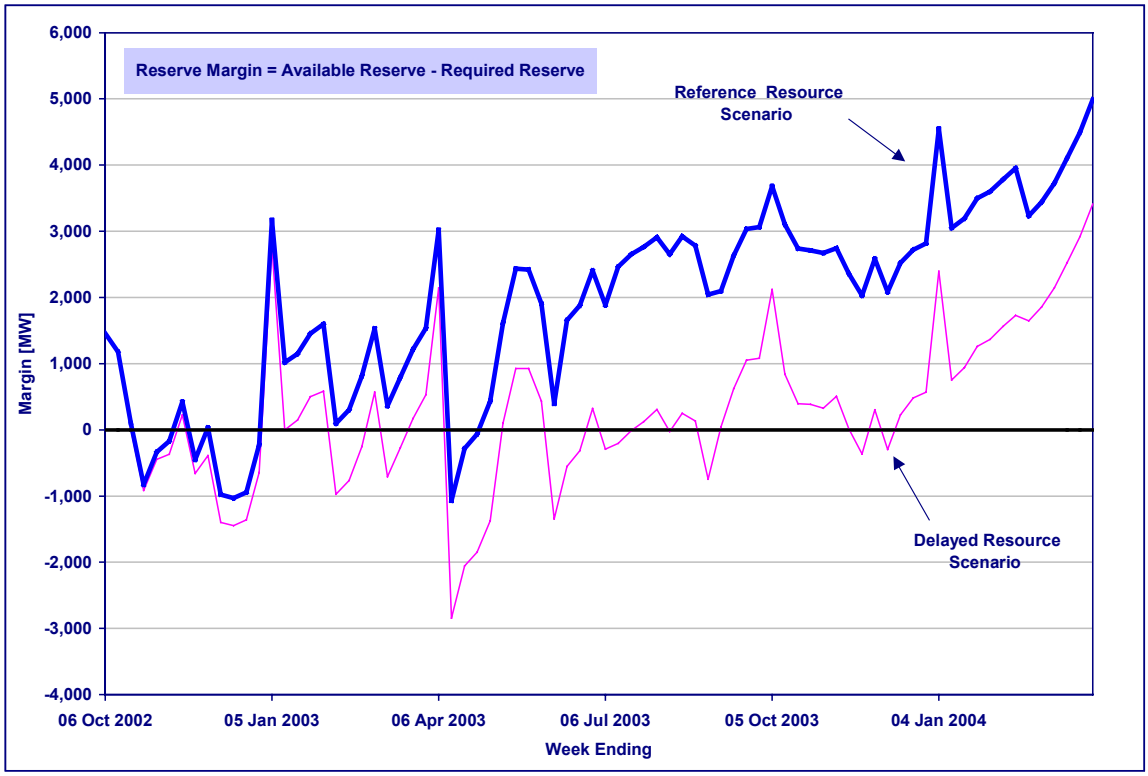


Figure 3.4 Reserve Margin Compared to Previous Outlook (Reference Resource Scenario)

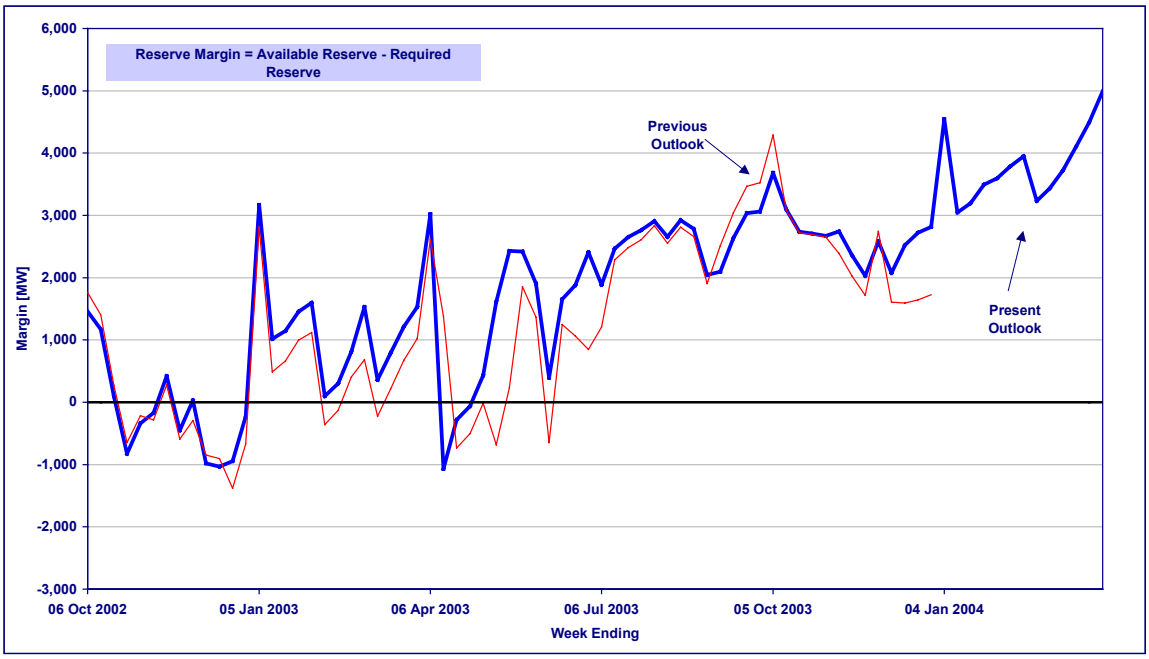
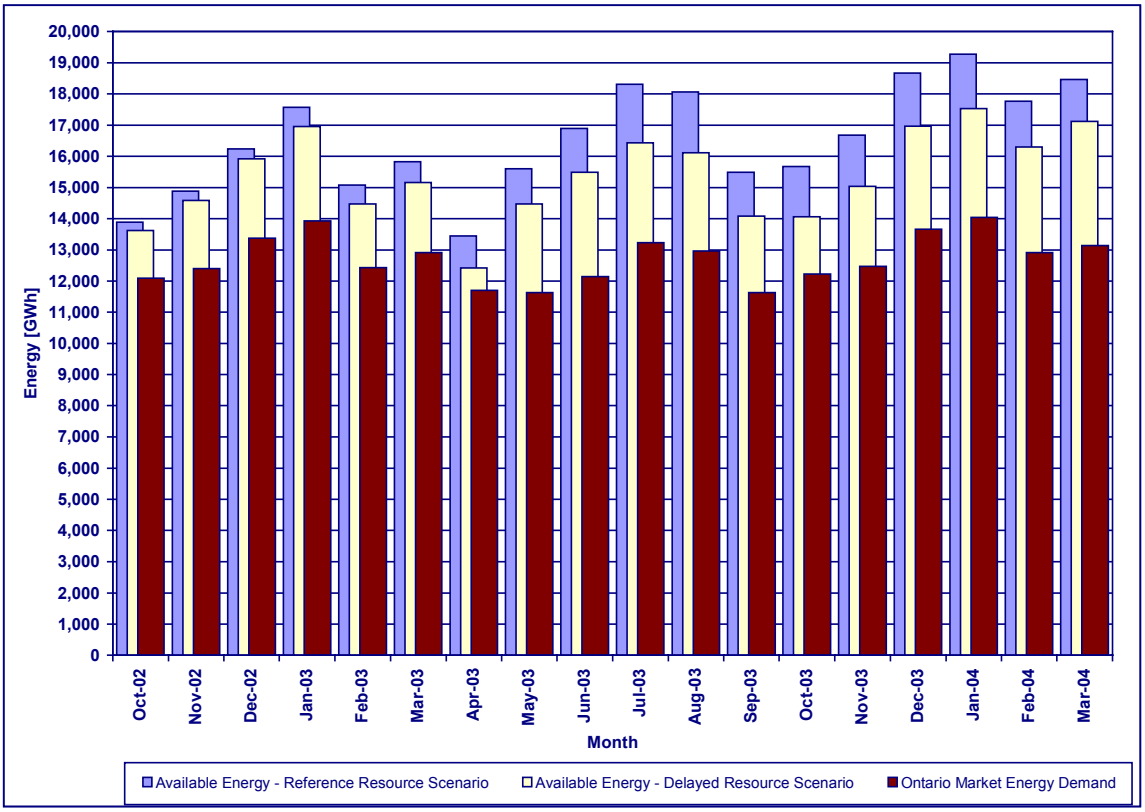


Figure 3.5 18-Month Forecast of Energy Production Capability



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4.0 Transmission Reliability Assessment

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

4.1 Changes from the Previous 18-Month Outlook

Committed transmission projects summarized in Appendix B by transmission zone represent a subset of the transmission projects in the CAA queue. Only those projects with the estimated in-service date within the 18-month period under study were listed.

4.2 Assessment of Transmission Outage Plan

The 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 is to identify the possibility of any security-related events on the IMO controlled grid that could require contingency planning by market participants or by the IMO. As a result, the transmission outages are reviewed to identify transmission system reliability concerns and to highlight those outages that could be rescheduled.

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 Ontario electricity system should be coordinated with the generator operators involved, especially at times when reserve margins are below required levels. Under the Market Rules, where the scheduling of planned outages by different market participants conflicts such that both or all outages cannot be approved by the IMO, the IMO will inform the affected market participants and request that they resolve the conflict. If the conflict remains unresolved, the IMO shall determine which of the planned outages can be approved according to the precedence 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 as of the beginning of August 2002 were used.

The IMO'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 IMO document titled "Methodology to Perform Long Term Assessments" (IMO_REP_0044).

In summary, only a few of the planned outages will potentially impact transmission system reliability. The outages with the highest potential impact are listed below:

East Zone

The 230 kV St. Lawrence TS AL31 outage from February 24, 2003 to March 2, 2003 will reduce the Ontario – Quebec South Interconnection transfer capability by approximately 400 MW in

both directions. The impact on the Ontario – Quebec South Interconnection will require reconsideration in the operating timeframe, based on the prevailing demand-supply situation.

Northeast Zone

The 230 kV W71D circuit outage from September 30, 2002 to October 18, 2002 affects the Ontario - Quebec North Interconnection. The outage is not expected to be limiting.

Northwest Zone

The 230 kV K21W and K22W circuit outages from September 23, 2002 to October 11, 2002 and from October 15, 2002 to October 25, 2002, respectively, will reduce the transfer capability between Ontario and Manitoba. However, these outages are not expected to affect the contracted purchase from Manitoba. These outages will reduce the East-West Transfer East capability, in the order of 50 MW, further reducing dispatching flexibility in the Northwest zone and requiring more coordination in the planning of transmission and generation outages.

Ottawa Zone

The 500 kV X523A circuit outage from September 16, 2002 to October 18, 2002, will reduce the Flow Into Ottawa (FIO) interface limit by 400 MW. This outage is not expected to be limiting.

West Zone

The 230 kV Modeland TS – Lucasville Jct. – Scott TS circuit outage from October 16, 2002 to November 15, 2002, will reduce the FABC interface limit by approximately 100 MW, BLIP interface limit by approximately 500 MW, and NBLIP interface limit by approximately 500 MW. The outages are not considered to be of concern. However, the impact on the BLIP and NBLIP interfaces will be reassessed in the operating timeframe, pending the demand-supply situation.

This Outlook has limited the assessment of transmission outages, to those transmission outages with a scheduled duration of six days or more. The IMO 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 IMO will, as required, reassess the outage for potential system impacts, taking into account all current and forecasted conditions.

4.3 System Voltage and Thermal Limits

As in previous Outlooks, low system voltage concerns in certain sub-areas of the province will limit the generation and transmission outages that can be planned during summer peak demand periods. The various system voltage concerns are described below.

In the Windsor area, load growth will continue to stress the capability of the existing system under extreme-weather, summer peak conditions, such that voltages are expected to be near the low end of the acceptable range even with most static reactive sources in-service. In addition, maintaining acceptable voltage levels may require restrictions on the use of the J5D interconnection with Michigan, particularly during summer peak periods. This requirement was experienced during August 2001 and July and August 2002, when peak demands exceeded 25,000 MW. Avoiding planned outages to generating units or transmission circuits in the Windsor and Sarnia area during the summer may be required to alleviate this concern.

When peak demands exceeded 25,000 MW in August 2001 and July and August 2002, pre-contingency voltage levels in the Toronto zone were acceptable but with little margin for contingencies. The reactive requirement to maintain voltage levels at or above the minimum required levels was very high. Most static reactive resources and transmission elements were required in-service and the Lakeview, Pickering and Darlington units had to supply higher than normal amounts of reactive power. The high demand for reactive power left significantly lower than normal reactive margin for contingencies. The performance of these units in providing reactive power to maintain acceptable voltage levels in the Toronto zone during summer peak periods is extremely important. Planned outages and restrictions on the use of the reactive capability of the Lakeview, Pickering and Darlington units should be avoided during summer peak periods. High transmission facility thermal loadings were also observed during the August 2001 and July and August 2002 hot weather conditions. With some local generating facilities operating at less than full output, the 500/230 kV autotransformers located at the Cherrywood Transmission Station in the Toronto zone were operated at power levels near, but below their continuous ratings.

In the Northwest zone at least one of the two generators at Thunder Bay is required to be in-service, most of the time, to maintain minimum voltages in the area, at times of normal industrial demand.

4.4 Forced Outages

There are currently no long-term forced outages with significant impact on the transmission system reliability, expected to extend into the 18-month period studied.

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5.0 Overall Observations, Findings and Conclusions

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

- Under the reference scenario Ontario's reserves are forecast to be in the range of 1,800 to 3,100 MW during late October through December 2002. The reserves in most weeks during this period are below the IMO's required planning reserve levels. Reserves in April 2003 are also below required levels. Resources outside Ontario may be required to supplement Ontario supply. Current indications are that such resources will be available. For the remainder of the study period, reserve levels exceed requirements.
- Tighter demand/supply balances during periods of reduced reserve levels will have several potential market impacts. These include upward pressure on market prices during peak demand periods and limited opportunities for the IMO to approve the release of generators for planned maintenance. Various responses can be anticipated in these circumstances, including: for Ontario generators, maximizing their availability to offer into the Ontario market; for marketers, arranging imports to help meet anticipated Ontario requirements; and for consumers, taking measures to reduce their electricity consumption.
- The importance of external resources is heightened in the event of higher than forecast forced outages to Ontario generators or higher than forecast demands due to extreme weather conditions. If sufficient external resources are not available, control actions in the operating timeframe are expected to be effective in managing a wide range of uncertainties in demand or resource levels.
- The additional resources forecast for 2003 come from laid-up nuclear units returning to service. The improved demand/supply situation in 2003 is critically dependent on these units returning to service on schedule. To date, no laid-up nuclear unit has been returned to service in Ontario and there have been past delays in projected return dates. This history suggests a significant risk that some return to service dates will not be met. For purposes of this assessment, the IMO has adopted the nuclear return-to-service dates provided to it in August. The 18-month resource outlook would deteriorate significantly should these schedules not be met.
- A number of large generating units are scheduled to return to service from long duration maintenance outages at the beginning of winter 2002/03, with others scheduled to return from similar outages just prior to summer 2003. Similar to the return of laid-up nuclear units, meeting these schedules is critical to maintaining reserve margins.
- Delays in commissioning new units or returning generators to service, whether from lay-up or maintenance outages, could once again lead to extensive reliance on imports as has been the case during 2002. Under these circumstances, opportunities for planned outages, especially during the summer period, would be very limited.
- Under the Delayed Resource Scenario, reserve margins will remain tight for the remainder of 2002 and throughout most of the first half of 2003. The same concerns discussed above regarding the return to service of generators from planned outages leading in to the summer,

and the need for extensive reliance on imports, apply equally to the Delayed Scenario. Opportunities for the IMO to approve planned generator outages would be limited.

- Over the 18-month period under study, accounting for the availability of regional supply, the Northeast Power Coordinating Council resource adequacy criterion is expected to be met.
- The overall monthly energy production capability is forecast to be adequate, however shorter-term energy deficiencies could arise as a result of higher than forecast forced outage situations, extreme demands and other influencing factors. Experience over the past summer identified that even when sufficient capacity is available, its use can be limited because of a lack of energy. Shorter-term energy studies are undertaken closer to real-time to support more detailed assessments and provide additional information to market participants as appropriate.
- The planned transmission outages are not expected to significantly reduce transmission capacity during the study period.
- Avoiding planned outages and maximizing the reactive capability of the Lakeview, Pickering and Darlington units is required to maintain voltage levels above the minimum required levels in the Toronto zone during summer peak conditions.
- Restricting planned outages to transmission facilities in the Windsor area will assist in maintaining adequate voltage levels during summer peak periods
- Rotating reactive resources in the Thunder Bay area will continue to be required to address local voltage concerns.

Appendix A Resource Adequacy Assessment Details

Table A1 Assessment of Resource Adequacy (Reference Resource Scenario)

Week Ending Day	Ontario Market Demand MW	Total Resources MW	Total Reductions in Resources MW	Available Resources MW	Available Reserve %	Available Reserve MW	Required Reserve %	Required Reserve MW	Reserve Margin MW
06-Oct-02	18,853	29,949	7,631	22,318	20.3	3,765	12.4	2,305	1,460
13-Oct-02	19,174	29,949	7,515	22,434	18.9	3,560	12.6	2,385	1,175
20-Oct-02	19,512	30,079	8,223	21,856	13.8	2,644	13.3	2,545	99
27-Oct-02	19,825	30,079	8,715	21,364	9.4	1,839	13.7	2,667	-828
03-Nov-02	20,331	30,209	7,841	22,368	11.7	2,337	13.4	2,674	-337
10-Nov-02	21,266	30,209	6,530	23,679	12.9	2,713	13.8	2,882	-169
17-Nov-02	21,755	30,209	5,517	24,692	15.1	3,237	13.1	2,814	423
24-Nov-02	22,197	30,339	5,844	24,495	11.9	2,598	13.9	3,051	-453
01-Dec-02	22,375	30,459	5,237	25,222	14.3	3,147	14.1	3,117	30
08-Dec-02	23,071	30,459	5,204	25,255	10.9	2,484	15.2	3,465	-981
15-Dec-02	23,207	30,459	5,207	25,252	10.2	2,345	14.7	3,376	-1,031
22-Dec-02	23,458	30,459	4,669	25,790	11.4	2,632	15.4	3,574	-942
29-Dec-02	23,045	30,459	4,678	25,781	13.4	3,036	14.3	3,262	-226
05-Jan-03	21,132	30,459	3,434	27,025	29.7	6,193	14.5	3,023	3,170
12-Jan-03	23,755	30,459	2,787	27,672	18.0	4,217	13.7	3,202	1,015
19-Jan-03	23,533	30,459	2,797	27,662	19.1	4,429	14.1	3,282	1,147
26-Jan-03	23,333	30,459	2,805	27,654	20.1	4,621	13.8	3,167	1,454
02-Feb-03	23,433	30,459	2,806	27,653	19.5	4,520	12.6	2,923	1,597
09-Feb-03	23,194	30,459	4,423	26,036	13.7	3,142	13.3	3,046	96
16-Feb-03	22,972	30,459	4,425	26,034	14.8	3,362	13.5	3,059	303
23-Feb-03	22,508	30,459	4,434	26,025	17.2	3,817	13.5	3,002	815
02-Mar-03	22,297	30,459	3,942	26,517	20.6	4,520	13.6	2,992	1,528
09-Mar-03	22,032	30,459	5,466	24,993	15.0	3,261	13.4	2,902	359
16-Mar-03	21,695	30,459	5,485	24,974	16.7	3,579	13.0	2,787	792
23-Mar-03	21,319	30,459	5,505	24,954	18.7	3,935	12.9	2,720	1,215
30-Mar-03	20,818	30,459	5,814	24,645	20.1	4,127	12.6	2,592	1,535
06-Apr-03	19,758	30,459	5,407	25,052	28.8	5,594	13.2	2,572	3,022
13-Apr-03	19,643	31,209	10,230	20,979	8.5	1,636	14.0	2,705	-1,069
20-Apr-03	19,410	31,209	9,758	21,451	12.3	2,341	13.7	2,624	-283
27-Apr-03	19,026	31,209	10,061	21,148	12.9	2,422	13.3	2,484	-62
04-May-03	18,663	31,209	10,037	21,172	15.3	2,809	12.9	2,375	434
11-May-03	18,379	31,209	8,387	22,822	26.2	4,743	17.3	3,129	1,614
18-May-03	18,759	31,209	6,521	24,688	33.8	6,229	20.6	3,797	2,432
25-May-03	19,295	31,209	6,249	24,960	31.4	5,965	18.7	3,546	2,419
01-Jun-03	19,678	31,209	6,255	24,954	28.8	5,576	18.9	3,668	1,908
08-Jun-03	21,408	31,209	6,206	25,003	18.5	3,895	16.6	3,500	395
15-Jun-03	22,265	31,959	4,590	27,369	24.6	5,404	17.1	3,750	1,654
22-Jun-03	22,657	31,959	4,059	27,900	24.8	5,543	16.4	3,665	1,878
29-Jun-03	22,652	31,959	3,265	28,694	28.4	6,342	17.6	3,935	2,407

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

(Table A1 continued)

Week Ending Day	Ontario Market Demand MW	Total Resources MW	Total Reductions in Resources MW	Available Resources MW	Available Reserve %	Available Reserve MW	Required Reserve %	Required Reserve MW	Reserve Margin MW
06-Jul-03	23,272	31,959	3,299	28,660	24.8	5,688	16.6	3,804	1,884
13-Jul-03	23,354	31,959	2,762	29,197	26.7	6,143	16.0	3,677	2,466
20-Jul-03	23,294	31,959	2,757	29,202	27.0	6,208	15.5	3,555	2,653
27-Jul-03	23,212	31,959	2,754	29,205	27.5	6,293	15.4	3,530	2,763
03-Aug-03	22,873	31,959	2,840	29,119	29.0	6,546	16.1	3,638	2,908
10-Aug-03	23,005	31,959	2,839	29,120	28.3	6,415	16.6	3,760	2,655
17-Aug-03	22,990	31,959	2,831	29,128	28.4	6,438	15.5	3,515	2,923
24-Aug-03	22,882	31,959	2,826	29,133	29.0	6,551	16.7	3,766	2,785
31-Aug-03	23,035	31,959	3,345	28,614	25.9	5,879	16.9	3,834	2,045
07-Sep-03	21,235	31,959	5,470	26,489	26.5	5,554	16.5	3,459	2,095
14-Sep-03	20,680	31,959	5,947	26,012	27.6	5,632	14.7	2,997	2,635
21-Sep-03	19,774	31,959	5,924	26,035	33.7	6,561	18.1	3,525	3,036
28-Sep-03	19,314	31,959	6,402	25,557	34.4	6,543	18.3	3,478	3,065
05-Oct-03	19,034	31,959	7,020	24,939	33.1	6,205	13.5	2,522	3,683
12-Oct-03	19,362	31,959	7,215	24,744	29.8	5,682	13.6	2,582	3,100
19-Oct-03	19,705	31,959	7,215	24,744	27.5	5,339	13.4	2,600	2,739
26-Oct-03	20,004	31,959	6,835	25,124	27.5	5,420	13.8	2,712	2,708
02-Nov-03	20,538	31,959	6,313	25,646	26.7	5,408	13.5	2,736	2,672
09-Nov-03	21,434	31,759	4,989	26,770	26.7	5,636	13.7	2,893	2,743
16-Nov-03	21,900	31,759	4,989	26,770	23.9	5,170	13.0	2,813	2,357
23-Nov-03	22,342	31,759	4,704	27,055	22.7	5,013	13.5	2,984	2,029
30-Nov-03	22,543	31,759	3,912	27,847	25.2	5,604	13.6	3,017	2,587
07-Dec-03	23,239	31,759	3,436	28,323	23.5	5,384	14.4	3,305	2,079
14-Dec-03	23,375	31,759	2,901	28,858	25.1	5,783	14.1	3,260	2,523
21-Dec-03	23,626	31,759	2,230	29,529	26.6	6,203	14.9	3,481	2,722
28-Dec-03	23,693	31,759	2,230	29,529	26.2	6,136	14.2	3,321	2,815
04-Jan-04	21,898	31,759	2,283	29,476	36.5	7,878	15.4	3,330	4,548
11-Jan-04	23,960	31,759	1,755	30,004	26.8	6,344	13.9	3,296	3,048
18-Jan-04	23,727	31,759	1,755	30,004	28.1	6,577	14.4	3,380	3,197
25-Jan-04	23,524	31,759	1,755	30,004	29.2	6,780	14.1	3,285	3,495
01-Feb-04	23,626	31,759	1,755	30,004	28.6	6,678	13.2	3,080	3,598
08-Feb-04	23,384	31,759	1,721	30,038	30.1	6,954	13.7	3,169	3,785
15-Feb-04	23,161	31,759	1,721	30,038	31.4	7,177	14.1	3,226	3,951
22-Feb-04	22,703	31,759	2,989	28,770	28.4	6,367	14.0	3,135	3,232
29-Feb-04	22,516	31,759	2,989	28,770	29.5	6,554	14.0	3,114	3,440
07-Mar-04	22,243	31,759	3,005	28,754	31.0	6,811	14.1	3,085	3,726
14-Mar-04	21,894	31,759	3,005	28,754	33.2	7,160	14.1	3,053	4,107
21-Mar-04	21,515	31,759	3,010	28,749	35.5	7,534	14.3	3,039	4,495
28-Mar-04	21,029	31,759	3,033	28,726	38.6	7,997	14.5	3,002	4,995
04-Apr-04	20,466	31,759	3,183	28,576	41.7	8,410	14.8	2,975	5,435

Table A2 Assessment of Resource Adequacy (Delayed Resource Scenario)

Week Ending Day	Ontario Market Demand MW	Total Resources MW	Total Reductions in Resources MW	Available Resources MW	Available Reserve %	Available Reserve MW	Required Reserve %	Required Reserve MW	Reserve Margin MW
06-Oct-02	18,853	29,949	7,631	22,318	20.3	3,765	12.4	2,305	1,460
13-Oct-02	19,174	29,949	7,515	22,434	18.9	3,560	12.6	2,385	1,175
20-Oct-02	19,512	29,949	8,208	21,741	13.2	2,529	13.1	2,519	10
27-Oct-02	19,825	29,949	8,700	21,249	8.8	1,724	13.5	2,637	-913
03-Nov-02	20,331	29,949	7,696	22,253	11.1	2,222	13.3	2,670	-448
10-Nov-02	21,266	29,949	6,500	23,449	11.8	2,483	13.6	2,851	-368
17-Nov-02	21,755	29,949	5,487	24,462	14.0	3,007	13.0	2,783	224
24-Nov-02	22,197	29,949	5,684	24,265	10.8	2,368	13.8	3,024	-656
01-Dec-02	22,375	29,949	5,192	24,757	12.2	2,682	13.9	3,071	-389
08-Dec-02	23,071	29,949	5,159	24,790	8.9	2,019	15.0	3,416	-1,397
15-Dec-02	23,207	29,949	5,162	24,787	8.2	1,880	14.5	3,330	-1,450
22-Dec-02	23,458	29,949	4,624	25,325	9.4	2,167	15.2	3,526	-1,359
29-Dec-02	23,045	29,949	4,633	25,316	11.3	2,571	14.1	3,215	-644
05-Jan-03	21,132	29,949	3,389	26,560	27.5	5,728	14.2	2,958	2,770
12-Jan-03	23,755	29,949	3,257	26,692	13.8	3,237	13.8	3,240	-3
19-Jan-03	23,533	29,949	3,267	26,682	14.9	3,449	14.2	3,298	151
26-Jan-03	23,333	29,949	3,275	26,674	15.8	3,641	13.6	3,137	504
02-Feb-03	23,433	29,949	3,276	26,673	15.3	3,540	12.8	2,957	583
09-Feb-03	23,194	29,949	4,893	25,056	9.4	2,162	13.7	3,135	-973
16-Feb-03	22,972	29,949	4,895	25,054	10.5	2,382	13.9	3,150	-768
23-Feb-03	22,508	29,949	4,904	25,045	12.8	2,837	13.9	3,088	-251
02-Mar-03	22,297	29,949	4,412	25,537	16.1	3,540	13.5	2,974	566
09-Mar-03	22,032	29,949	5,936	24,013	10.5	2,281	13.8	2,991	-710
16-Mar-03	21,695	29,949	5,955	23,994	12.2	2,599	13.4	2,872	-273
23-Mar-03	21,319	29,949	5,975	23,974	14.1	2,955	13.2	2,780	175
30-Mar-03	20,818	29,949	6,284	23,665	15.3	3,147	12.7	2,615	532
06-Apr-03	19,758	29,949	5,877	24,072	23.7	4,614	12.7	2,471	2,143
13-Apr-03	19,643	29,949	10,640	19,309	-0.2	-34	14.5	2,810	-2,844
20-Apr-03	19,410	29,949	10,168	19,781	3.5	671	14.3	2,726	-2,055
27-Apr-03	19,026	29,949	10,471	19,478	4.0	752	13.9	2,602	-1,850
04-May-03	18,663	29,949	10,467	19,482	6.1	1,119	13.6	2,492	-1,373
11-May-03	18,379	29,949	8,817	21,132	16.9	3,053	16.3	2,954	99
18-May-03	18,759	29,949	6,951	22,998	24.6	4,539	19.6	3,609	930
25-May-03	19,295	29,949	6,679	23,270	22.5	4,275	17.6	3,346	929
01-Jun-03	19,678	29,949	6,685	23,264	20.1	3,886	17.8	3,453	433
08-Jun-03	21,408	29,949	6,626	23,323	10.5	2,215	16.9	3,564	-1,349
15-Jun-03	22,265	29,949	4,947	25,002	13.8	3,037	16.4	3,592	-555
22-Jun-03	22,657	29,949	4,416	25,533	14.2	3,176	15.6	3,493	-317
29-Jun-03	22,652	29,949	3,622	26,327	17.8	3,975	16.4	3,654	321

(Table A2 continued)

Week Ending Day	Ontario Market Demand MW	Total Resources MW	Total Reductions in Resources MW	Available Resources MW	Available Reserve %	Available Reserve MW	Required Reserve %	Required Reserve MW	Reserve Margin MW
06-Jul-03	23,272	29,949	3,656	26,293	14.5	3,321	15.7	3,611	-290
13-Jul-03	23,354	29,949	3,662	26,287	14.0	3,233	14.9	3,439	-206
20-Jul-03	23,294	29,949	3,657	26,292	14.3	3,298	14.4	3,310	-12
27-Jul-03	23,212	29,949	3,654	26,295	14.8	3,383	14.2	3,260	123
03-Aug-03	22,873	29,949	3,740	26,209	16.1	3,636	14.7	3,328	308
10-Aug-03	23,005	29,949	3,750	26,199	15.4	3,494	15.5	3,520	-26
17-Aug-03	22,990	29,949	3,742	26,207	15.5	3,517	14.4	3,268	249
24-Aug-03	22,882	29,949	3,737	26,212	16.1	3,630	15.5	3,495	135
31-Aug-03	23,035	29,949	4,256	25,693	13.0	2,958	16.3	3,705	-747
07-Sep-03	21,235	29,949	5,693	24,256	15.9	3,321	15.7	3,277	44
14-Sep-03	20,680	29,949	6,170	23,779	16.7	3,399	13.6	2,779	620
21-Sep-03	19,774	29,949	6,147	23,802	22.2	4,328	16.8	3,273	1,055
28-Sep-03	19,314	29,949	6,625	23,324	22.7	4,310	17.0	3,230	1,080
05-Oct-03	19,034	29,949	6,827	23,122	23.4	4,388	12.1	2,268	2,120
12-Oct-03	19,362	29,949	7,764	22,185	16.4	3,123	12.0	2,282	841
19-Oct-03	19,705	30,079	7,894	22,185	14.3	2,780	12.3	2,384	396
26-Oct-03	20,004	30,079	7,514	22,565	14.5	2,861	12.6	2,476	385
02-Nov-03	20,538	30,209	7,122	23,087	14.1	2,849	12.5	2,524	325
09-Nov-03	21,434	30,009	5,718	24,291	14.9	3,157	12.5	2,650	507
16-Nov-03	21,900	30,009	5,718	24,291	12.5	2,691	12.4	2,677	14
23-Nov-03	22,342	30,139	5,563	24,576	11.5	2,534	13.1	2,896	-362
30-Nov-03	22,543	30,259	4,891	25,368	14.1	3,125	12.7	2,823	302
07-Dec-03	23,239	30,259	4,425	25,834	12.6	2,895	13.9	3,190	-295
14-Dec-03	23,375	30,259	3,890	26,369	14.3	3,294	13.3	3,071	223
21-Dec-03	23,626	30,259	3,219	27,040	15.9	3,714	13.9	3,234	480
28-Dec-03	23,693	30,259	3,219	27,040	15.6	3,647	13.2	3,080	567
04-Jan-04	21,898	30,259	3,272	26,987	25.0	5,389	13.9	2,995	2,394
11-Jan-04	23,960	30,259	2,744	27,515	16.3	3,855	13.1	3,104	751
18-Jan-04	23,727	30,259	2,744	27,515	17.5	4,088	13.4	3,149	939
25-Jan-04	23,524	30,259	2,744	27,515	18.5	4,291	13.1	3,031	1,260
01-Feb-04	23,626	30,259	2,744	27,515	18.0	4,189	12.1	2,823	1,366
08-Feb-04	23,384	30,259	2,710	27,549	19.3	4,465	12.6	2,897	1,568
15-Feb-04	23,161	30,259	2,710	27,549	20.5	4,688	12.9	2,958	1,730
22-Feb-04	22,703	30,259	3,226	27,033	20.7	4,630	13.3	2,984	1,646
29-Feb-04	22,516	30,259	3,226	27,033	21.7	4,817	13.4	2,965	1,852
07-Mar-04	22,243	30,259	3,242	27,017	23.1	5,074	13.4	2,931	2,143
14-Mar-04	21,894	30,259	3,242	27,017	25.1	5,423	13.4	2,894	2,529
21-Mar-04	21,515	30,259	3,247	27,012	27.3	5,797	13.6	2,881	2,916
28-Mar-04	21,029	30,259	3,270	26,989	30.2	6,260	13.7	2,847	3,413
04-Apr-04	20,466	30,259	4,172	26,087	29.4	5,921	13.4	2,696	3,225

Table A3 Energy Production Capability Adequacy

Month	Ontario Market Energy Demand (GWh)	Available Energy Reference Resource Scenario (GWh)	Available Energy Delayed Resource Scenario (GWh)	Energy Margin Reference Resource Scenario (GWh)	Energy Margin Delayed Resource Scenario (GWh)
Oct 2002	12,090	13,887	13,621	1,797	1,531
Nov 2002	12,400	14,888	14,581	2,488	2,181
Dec 2002	13,379	16,242	15,919	2,863	2,540
Jan 2003	13,923	17,564	16,952	3,641	3,029
Feb 2003	12,430	15,076	14,473	2,646	2,043
Mar 2003	12,906	15,826	15,160	2,920	2,254
Apr 2003	11,703	13,444	12,422	1,741	719
May 2003	11,632	15,600	14,475	3,968	2,843
Jun 2003	12,147	16,892	15,491	4,745	3,344
Jul 2003	13,231	18,307	16,431	5,076	3,200
Aug 2003	12,970	18,067	16,112	5,097	3,142
Sep 2003	11,635	15,493	14,084	3,858	2,449
Oct 2003	12,224	15,671	14,059	3,447	1,835
Nov 2003	12,472	16,680	15,035	4,208	2,563
Dec 2003	13,662	18,666	16,967	5,004	3,305
Jan 2004	14,039	19,270	17,534	5,231	3,495
Feb 2004	12,909	17,765	16,298	4,856	3,389
Mar 2004	13,134	18,462	17,122	5,328	3,988

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Appendix B Transmission Projects

East Zone - Transmission Projects	Projected I/S Date
Cyrville Jct.: Replace overhead lines H2AR/A4K with underground cable.	2002-Q4
National Research TS: New 13.2 kV feeder on T3 at National Research TS.	2002-Q4

Northeast Zone - Transmission Projects	Projected I/S Date
Chenaux TS: Add 2x230 kV breakers. Reconnect the transformers.	2003-Q3

Niagara Zone - Transmission Projects	Projected I/S Date
DeCew GS: Replace T4 & 23T3 transformers with a single unit.	2003-Q1
Winona TS: New DESN connected to 115 kV circuit Q2AH.	2003-Q2

Northwest Zone - Transmission Projects	Projected I/S Date
NW Ontario: New 115 kV line to suppy the First Nations community.	2003-Q3
Wawa TS: Install reactive compensation; 4x40MVar.	2003-Q4

Southwest Zone - Transmission Projects	Projected I/S Date
Centralia TS: Install low voltage capacitor – 10.8 MVar.	2002-Q4
Galt TS: Install 230 kV metering and associated facilities.	2002-Q4
Strathroy TS: Install low voltage capacitor – 10.8 MVar.	2002-Q4
Wanstead TS: Install low voltage capacitor – 10.8 MVar.	2002-Q4
Dundas TS: New DESN connected to 115 kV double circuit B3/B4.	2003-Q2
Bronte TS: Install two new feeders.	2003-Q3
Nanticoke GS: Exciter replacement on Units 1-8.	2003-Q4
Nanticoke GS: Replace station service transformers.	2003-Q4

Toronto Zone - Transmission Projects	Projected I/S Date
Cecil TS: Increase station capacity.	2002-Q4
Oakville TS: Install low voltage capacitor - 21.6 MVar.	2002-Q4
Terauley TS: 115 kV bus split.	2002-Q4
Hearn TGS: Install 125 MVar 115 kV Capacitor Bank.	2003-Q2
Murray TS: Install three new feeder breakers.	2003-Q2
Glengrove TS: Replace T2 transformer.	2003-Q4

West Zone - Transmission Projects	Projected I/S Date
Clarke TS: Install low voltage capacitor – 21.6 MVar.	2002-Q4
Imperial Oil CTS: New Transformer. Transfer of 33 MW of load from St. Andrews TS.	2002-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 of six days or greater.

Table C1 Bruce Zone

Start Date/Time	End Date/Time	Equipment	Outage Type	Recall Time	Impact	Reduction in Limit
Mon 19-Aug-02 05:00	Mon 07-Oct-02 18:00	Bruce A TS: T27.	CNW	2 Hours	FABC	50 MW
Mon 30-Sep-02 07:00	Fri 01-Nov-02 18:00	Bruce A TS: T3E.	CNW	5 Days	FABC	50 MW

Table C2 East Zone

Start Date/Time	End Date/Time	Equipment	Outage Type	Recall Time	Impact	Reduction in Limit
Mon 24-Feb-03 07:00	Sun 02-Mar-03 15:00	St.Lawrence TS: L31L33.	CNW	4 Hours		
Mon 24-Feb-03 07:00	Sun 02-Mar-03 15:00	St.Lawrence TS: AL31.	CNW	4 Hours	Ontario - Quebec South Interconnection	400 MW

Table C3 Essa Zone

No outages to analyze.

Table C4 Niagara Zone

No outages to analyze.

Table C5 Northeast Zone

Start Date/Time	End Date/Time	Equipment	Outage Type	Recall Time	Impact	Reduction in Limit
Sun 11-Nov-01 12:16	Tue 31-Dec-02 18:00	St.Andrews TS: SC4Q.	CNW	Non-Recallable		
Tue 14-May-02 16:30	Fri 15-Nov-02 16:30	Coniston TS: T2.	CNW	1 Week		
Mon 30-Sep-02 06:00	Fri 18-Oct-02 16:00	Widdifield SS: W71D: Lower_Notch_GS - Widdifield_SS.	CNW	12 Hours	Ontario - Quebec North Interconnection	Mode 2 on D4Z 55 - 120 MW Mode 3 on D4Z 25 -120 MW
Mon 30-Sep-02 08:00	Thu 10-Oct-02 15:00	Porcupine TS: H1L502.	CNW	2 Days		
Tue 01-Oct-02 08:00	Sat 26-Oct-02 18:00	Mackay TS: #3-Sault-Line: Mackay_TS - Third_Line_TS.	CNW	24 Hours		
Mon 07-Oct-02 09:00	Fri 25-Oct-02 15:00	Martindale TS: KT22.	CNW	Non-Recallable		
Fri 18-Oct-02 06:00	Fri 15-Nov-02 18:00	Mackay TS: Anjigami-Line-#1: Mackay_TS - Anjigami_TS.	CNW	24 Hours		
Mon 11-Nov-02 09:00	Wed 20-Nov-02 17:00	Algoma TS: KL24.	CNW	5 Hours		
Sun 15-Dec-02 07:00	Thu 02-Jan-03 07:00	Neelon Steel CTS: T1.	CNW	Non-Recallable		
Mon 14-Apr-03 09:00	Fri 02-May-03 17:00	Pinard TS: PL20.	CNW	Non-Recallable		

Table C6 Northwest Zone

Start Date/Time	End Date/Time	Equipment	Outage Type	Recall Time	Impact	Reduction in Limit
Mon 23-Sep-02 07:00	Sun 06-Oct-02 17:00	Aguasabon SS: A5A: Aguasabon_SS - Schreiber_Jct.	CNW	2 Hours		
Mon 23-Sep-02 07:00	Fri 11-Oct-02 17:00	Kenora TS: K21W: Whiteshell-Man_CTS - Kenora_TS.	CNW	24 Hours	OMTE, OMTW, EWTE	OMTE - 100 MW OMTW - 100 MW EWTE - 50 MW
Mon 23-Sep-02 07:00	Fri 11-Oct-02 17:00	Kenora TS: L21_BUS.	CNW	24 Hours	OMTE, OMTW, EWTE	OMTE - 100 MW OMTW - 100 MW EWTE - 50 MW
Mon 07-Oct-02 07:00	Sun 20-Oct-02 17:00	Alexander SS: A5A: Alexander_SS - Minnova_Jct.	CNW	2 Hours		
Tue 15-Oct-02 07:00	Fri 25-Oct-02 17:00	Kenora TS: K22W: Whiteshell-Man_CTS - Kenora_TS.	CNW	2 Hours	OMTE, OMTW, EWTE	OMTE - 100 MW OMTW - 100 MW EWTE - 50 MW
Tue 15-Oct-02 07:00	Fri 25-Oct-02 17:00	Kenora TS: L22_BUS.	CNW	2 Hours	OMTE, OMTW, EWTE	OMTE - 100 MW OMTW - 100 MW EWTE - 50 MW
Mon 21-Oct-02 07:00	Sun 03-Nov-02 17:00	Alexander SS: A7L: Alexander_SS - Reserve_Jct.	CNW	2 Hours		
Mon 21-Oct-02 07:00	Sun 03-Nov-02 17:00	Lakehead TS: A7L: Lakehead_TS - Reserve_Jct.	CNW	2 Hours		
Mon 21-Oct-02 07:00	Sun 03-Nov-02 17:00	Lakehead TS: L7_BUS.	CNW	2 Hours		

Table C7 Ottawa Zone

Start Date/Time	End Date/Time	Equipment	Outage Type	Recall Time	Impact	Reduction in Limit
Mon 16-Sep-02 07:00	Fri 18-Oct-02 16:00	Hawthorne TS: X523A: Lennox_TS - Hawthorne_TS.	CWW	4 Hours	FIO	400 MW
Mon 16-Sep-02 07:00	Sat 05-Oct-02 15:00	Overbrook TS: T2.	CNW	48 Hours		
Mon 30-Sep-02 06:00	Sun 20-Oct-02 15:00	Hawthorne TS: T4.	CNW	4 Hours		

Table C8 West Zone

Start Date/Time	End Date/Time	Equipment	Outage Type	Recall Time	Impact	Reduction in Limit
Tue 01-Jan-02 07:00	Mon 06-Jan-03 17:30	Lambton TS #2: PS4.	CNW	1 Hour		
Wed 30-Jan-02 08:00	Sat 30-Nov-02 15:00	Imperial Oil CTS: T2.	CNW	Non-Recallable		
Mon 30-Sep-02 07:00	Fri 11-Oct-02 15:00	Buchanan TS: L2P.	CNW	8 Hours		
Tue 15-Oct-02 05:00	Fri 01-Nov-02 18:00	Keith TS: T12.	CNW	Non-Recallable		
Tue 15-Oct-02 08:00	Fri 25-Oct-02 16:00	Keith TS: T12K.	CNW	8 Hours		
Wed 16-Oct-02 05:00	Fri 15-Nov-02 18:00	Modeland TS: N21W: Lucasville_JCT - Modeland_TS.	CNW	3 Days	FABC, BLIP, NBLIP	FABC - 100 MW BLIP - 500 MW NBLIP - 500 MW
Wed 16-Oct-02 05:00	Fri 15-Nov-02 18:00	Sarnia Scott TS: N21W: Lucasville_JCT - Sarnia_Scott_TS.	CNW	3 Days	FABC, BLIP, NBLIP	FABC - 100 MW BLIP - 500 MW NBLIP - 500 MW
Mon 04-Nov-02 08:00	Fri 15-Nov-02 16:00	Keith TS: T11P.	CNW	8 Hours		
Mon 18-Nov-02 05:00	Fri 13-Dec-02 18:00	Keith TS: L4K.	CNW	Non-Recallable		
Sat 14-Dec-02 05:00	Sun 26-Jan-03 18:00	Keith TS: T1.	CNW	Non-Recallable		

Table C9 Southwest Zone

Start Date/Time	End Date/Time	Equipment	Outage Type	Recall Time	Impact	Reduction in Limit
Mon 02-Sep-02 05:00	Fri 01-Nov-02 18:00	Milton SS: L72L85.	CNW	5 Days		
Mon 04-Nov-02 08:00	Sun 17-Nov-02 15:00	Bronte TS: S4B.	CNW	4 Days		
Mon 18-Nov-02 08:00	Sun 01-Dec-02 15:00	Bronte TS: S4Y.	CNW	4 Days		

Table C10 Toronto Zone

Start Date/Time	End Date/Time	Equipment	Outage Type	Recall Time	Impact	Reduction in Limit
Fri 13-Jul-01 15:00	Tue 31-Dec-02 15:00	Manby West TS: L21K: Lakeview_SS - Manby_West_TS.	CNW	Non-Recallable		
Tue 03-Sep-02 07:00	Fri 04-Oct-02 16:00	Manby West TS: H2JK: Manby_West_TS - Riverside_Jct.	CNW	Non-Recallable		
Tue 03-Sep-02 07:00	Fri 04-Oct-02 16:00	Riverside JCT: H2JK: Riverside_Jct - Strachan_TS.	CNW	Non-Recallable		
Mon 16-Sep-02 05:00	Tue 05-Nov-02 15:30	Cecil TS: T3.	CNW	3 Days		
Mon 30-Sep-02 05:00	Fri 25-Oct-02 18:00	Manby West TS: L21K: Lakeview_SS - Manby_West_TS.	CNW	4 Hours		
Tue 01-Oct-02 05:00	Fri 01-Nov-02 18:00	Glengrove TS: T3.	CNW	9 Hours		
Tue 01-Oct-02 05:00	Fri 01-Nov-02 18:00	Glengrove TS: T4.	CNW	9 Hours		
Tue 01-Oct-02 05:00	Fri 01-Nov-02 18:00	Leaside TS: L2Y: Leaside_TS - Glengrove_TS.	CNW	9 Hours		
Mon 07-Oct-02 06:00	Fri 22-Nov-02 15:00	Manby West TS: K6J: Manby_West_TS - Riverside_Jct.	CNW	2 Hours		
Mon 07-Oct-02 06:00	Fri 22-Nov-02 15:00	Strachan TS: K6J: Riverside_Jct - Strachan_TS.	CNW	2 Hours		
Tue 15-Oct-02 05:00	Fri 08-Nov-02 15:00	Esplanade TS: H7E: Don_Fleet_Jct - Esplanade_TS.	CNW	3 Hours		
Tue 15-Oct-02 05:00	Fri 08-Nov-02 15:00	Esplanade TS: H5E: Don_Fleet_Jct - Esplanade_TS.	CNW	3 Hours		
Tue 15-Oct-02 05:00	Fri 08-Nov-02 15:00	Hearn SS: H7E: Hearn_SS - Don_Fleet_Jct.	CNW	3 Hours		
Tue 15-Oct-02 05:00	Fri 08-Nov-02 15:00	Hearn SS: H5E: Hearn_SS - Don_Fleet_Jct.	CNW	3 Hours		
Tue 15-Oct-02 05:00	Sun 15-Dec-02 18:00	Hearn SS: H7L: Hearn_SS - Main_TS.	CNW	6 Hours		
Tue 15-Oct-02 05:00	Sun 15-Dec-02 18:00	Hearn SS: H11L: Hearn_SS - Main_TS.	CNW	6 Hours		
Tue 12-Nov-02 05:00	Mon 06-Jan-03 15:30	Cecil TS: T4.	CNW	3 Days		
Tue 12-Nov-02 08:00	Fri 13-Dec-02 14:00	Cecil TS: HL7.	CNW	72 Hours		
Sun 17-Nov-02 18:00	Sat 23-Nov-02 05:00	Manby East TS: T9.	CNW	48 Hours		
Mon 18-Nov-02 07:30	Mon 25-Nov-02 15:00	Bowmanville SS: A2_BUS.	CNW	15 Minutes		
Sun 01-Dec-02 18:00	Sat 07-Dec-02 05:00	Leaside TS: T12.	CNW	18 Hours		
Sun 08-Dec-02 18:00	Sat 14-Dec-02 05:00	Leaside TS: T11.	CNW	18 Hours		
Sun 15-Dec-02 18:00	Sat 21-Dec-02 05:00	Leaside TS: T16.	CNW	18 Hours		
Mon 20-Jan-03 07:00	Fri 31-Jan-03 16:00	Basin Jct: H3L: Basin_Jct - Mill_Street_Jct.	CNW	12 Hours		
Mon 20-Jan-03 07:00	Fri 31-Jan-03 16:00	Gerrard TS: H3L: Mill_Street_Jct - Gerrard_TS.	CNW	12 Hours		
Fri 24-Jan-03 05:00	Tue 04-Feb-03 18:00	Glengrove TS: T2.	CNW	5 Hours		
Fri 24-Jan-03 05:00	Tue 04-Feb-03 18:00	Glengrove TS: T1.	CNW	5 Hours		
Fri 07-Feb-03 05:00	Wed 19-Feb-03 18:00	Glengrove TS: T3.	CNW	5 Hours		
Mon 17-Feb-03 05:00	Fri 14-Mar-03 18:00	Lakeview SS: RSS4_BUS.	CNW	48 Hours		