2008 Long-Term Reliability Assessment
Narrative

Ontario

Demand - Ontario's forecast of demand is based on Monthly Normal weather. The economic forecast is based on the most recent information and predicts a fairly neutral growth for Ontario in 2008 and 2009, followed by modest economic growth. The impacts of the high Canadian dollar, the current economic climate and particularly the considerable impacts from planned conservation and growing load-displacing generation is stabilizing Ontario's load growth and moving it in the direction of gradual, intentional decline.

Due to the economic, conservation and load-displacing generation impacts, demand is expected to shrink over the course of the forecast. Peak demand is expected to average declines of 0.5% per year and annual energy demand is expected to average declines of 0.9% per annum. This is in contrast to last year's forecast where peak demand had average annual decreases of 0.2% and energy demand was expected to grow by 0.4%.

Ontario has a number of demand response programs that can reduce demand. A number of consumers within the province bid their load into the market and are responsive to price through IESO to dispatch instructions. Other consumers have been contracted by the Ontario Power Authority (OPA) to provide demand response under tight supply conditions. The combined amount of these demand measures has been steadily increasing and currently amounts to slightly more than 800 MW in total, of which two thirds is included for seasonal capacity planning purposes, with half of the included amount categorized as interruptible. This amount is expected to grow over time as more load is contracted to respond to tight supply conditions. By the end of the forecast, the interruptible component is expected to grow to more than 500 MW.

The IESO quantifies the uncertainty in peak demand due to weather variation through the use of Load Forecast Uncertainty (LFU), which represents the impact on demand of one standard deviation in the underlying weather parameters. This is used with Monthly Normal weather demand to conduct probabilistic analysis. As well, the IESO uses an Extreme Weather scenario to study the impacts of adverse weather conditions on reliability of the IESO controlled grid.

The IESO also studies the reliability of the system prior to the impact of planned conservation savings. The IESO did not look at alternate economic scenarios.

Generation - The total capacity of existing installed resources connected to the IESO controlled grid is 31,297 MW, of which the amount of 'certain' capacity is 28,194 MW for summer 2008. The remainder, 3,103 MW, is 'uncertain' capacity for 2008 which includes on-peak resource deratings, planned outages and transmission-limited resources.

About 300 MW of dependable new supply (394 MW installed) is scheduled to come into service before the 2008 summer peak period. All of this new supply, with one exception, is gas-fired generation, including 340 MW of generation (250 MW under contract and considered dependable) in downtown Toronto from the first, simple cycle phase of a 550 MW combined cycle energy centre to be completed by summer 2009 and 31 MW of Combined Heat and Power

projects in several locations around the province. A hydroelectric project with an installed capacity of 23 MW will, also, come into service before summer 2008. Eighty percent of this new installed hydroelectric capacity is assumed to be available at the time of weekly peak.

The existing installed capacity of wind generation connected to the IESO controlled grid is 471 MW. Ten percent of the installed wind capacity is assumed to be available at the time of weekday peak, thus, 47 MW of wind is considered certain for capacity planning purposes. Of the 75 MW of installed biomass generation in the province, 45 MW is assumed certain. The generation output of some biomass units has been reduced as a consequence of reductions in steam demand primarily from pulp and paper operations.

The table below lists the certain and uncertain capacities for Existing, Planned and Proposed resources for summer 2008 to 2017.

	Projected									
DESCRIPTION	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Existing Total Certain Capacity	28194	28123	26041	25072	24504	24593	24593	20230	18759	18553
Wind Expected On-Peak	47	47	94	94	94	94	94	94	94	94
Hydro Expected On-Peak	5869	5869	5869	5869	5869	5869	5869	5869	5869	5869
Biomass Expected On-Peak	45	45	45	45	45	45	45	45	45	45
Existing Total Installed Capacity	31297	31297	31297	29832	28156	27991	27991	24394	24287	24081
Existing Installed Wind Capacity	471	424	377	377	377	377	377	377	377	377
Existing Installed Hydro Capacity	7788	7788	7788	7788	7788	7788	7788	7788	7788	7788
Existing Installed Biomass Capacity	75	75	75	75	75	75	75	75	75	75
Planned Total Certain Capacity	299	4013	5954	5969	5969	5969	5969	5969	5969	5969
Wind Expected On-Peak	0	63	158	173	173	173	173	173	173	173
Hydro Expected On-Peak	18	22	29	29	29	29	29	29	29	29
Biomass Expected On-Peak	0	0	0	0	0	0	0	0	0	0
Planned Total Maximum Capacity	304	4595	6599	6675	6675	6675	6675	6675	6675	6675
Planned Maximum Wind Capacity	0	631	789	865	865	865	865	865	865	865
Planned Maximum Hydro Capacity	23	36	43	43	43	43	43	43	43	43
Planned Maximum Biomass Capacity	0	0	0	0	0	0	0	0	0	0
Proposed Total Certain Capacity	0	0	58	650	1380	3137	3925	4388	4735	4773
Wind Expected On-Peak	0	0	0	115	115	190	272	317	364	379
Hydro Expected On-Peak	0	0	58	185	404	446	558	604	743	753
Biomass Expected On-Peak	0	0	0	0	61	101	144	212	373	386
Proposed Total Maximum Capacity	0	0	81	1205	2060	4130	5286	5947	6533	6635
Proposed Maximum Wind Capacity	0	0	0	575	575	948	1359	1585	1820	1895
Proposed Maximum Hydro Capacity	0	0	81	280	624	680	832	895	1085	1099
Proposed Maximum Biomass Capacity	0	0	0	0	61	101	144	212	373	386

The process used to select Planned and Proposed capacity resources is the Ontario Power Authority's Integrated Power System Plan. Established in 2005, the Ontario Power Authority (OPA) is the electricity system planner for the province of Ontario.

The OPA's statutory objects require it to, among other things; ensure adequate, reliable and secure electricity supply and resources in Ontario and to conduct independent planning for electricity generation, demand management, conservation and transmission.

One of the responsibilities of the OPA is to develop a 20-year Integrated Power System Plan (IPSP) and to submit the IPSP to the Ontario Energy Board for its review and approval. The IPSP is to be updated every three years. The IPSP must follow any directives issued by Ontario's Minister of Energy relating to the government's electricity goals. In addition, the IPSP must develop appropriate procurement processes for managing electricity supply, capacity and demand in accordance with the IPSP and apply to the Ontario Energy Board for approval of the

IPSP's proposed procurement processes.

Ontario's first IPSP was submitted to the Ontario Energy Board for review in August 2007, and is currently under regulatory review. The IPSP covers a period of twenty years, complies with the goals and requirements set out by the government of Ontario and proposes a procurement process for managing electricity supply, capacity and demand in accordance with the IPSP.

Purchases and Sales - At present, there is no Firm, Non-Firm or Expected purchases from other regions. Transactions under study (i.e. provisional) are imports from Labrador and Manitoba. The IESO has agreements in place with neighbouring jurisdictions in NPCC, RFC and MRO for emergency imports and reserve sharing, should they be required in day to day operations.

Fuel - The Ontario fuel supply infrastructure is judged to be adequate, and there are no fuel delivery problems anticipated. Nine per cent of the existing generation capacity in Ontario is gas-fired. The percentage of gas generation will increase to 26% by 2017 as coal generation is retired. Gas pipeline capacity, historically, has not limited the summer energy or capacity capability of Ontario generation fuelled solely by natural gas and is not expected to be a problem for future summers. Similarly, no fuel delivery concerns have been identified for coal-fired generating stations. In its market manuals, the IESO requires generator market participants in Ontario to provide specific information regarding energy or capacity impacts if fuel-supply limitations are anticipated. No limitations have been reported for the summer months.

The province is not experiencing a drought at present. Hydroelectric outputs are based on the median historical values of hydroelectric production and contribution to operating reserve during the weekday peak hours. The median hydroelectric value assumed available for annual peak is about 75% of the total installed capacity.

Transmission - Hydro One and TransÉnergie are building a 1,250 MW interconnection between Hawthorne TS in Ontario and Outaouais station in Quebec consisting of a double circuit 230 kV line and back-to-back high-voltage direct-current (HVdc) converters at Outaouais. Work to accommodate the tie, scheduled to be in service before summer 2009, will also include improvements to load serving capabilities in the Ottawa area.

The existing special protection system (SPS) at St. Lawrence was modified, allowing increased westward transfers. This SPS, which rejects generation at Saunders GS for circuit contingencies between eastern Ontario and the Toronto area, is planned to be enhanced further, to increase its functionality and reliability under peak load conditions, and to maximize simultaneous import capability from Hydro Québec and New York. These future enhancements will be required in 2009 upon completion of the new 1,250 MW Ontario-Québec interconnection.
Over the next decade, the need for transmission enhancements is particularly evident in three areas of the Ontario:

- In south-western Ontario to deliver additional nuclear and wind supply from the Bruce area,
- In northern Ontario to enable the planned expansion of hydroelectric and wind capability and to reinforce the connection of these areas to the load centre in southern Ontario
- In the Toronto region in order to meet capacity needs of fast growing areas in the

Greater Toronto Area and to improve reliability to Canada's largest city.

The southwestern Ontario transmission system needs to be enhanced to deliver the planned and future increases in generating capability in and around the Bruce peninsula. Currently, there is inadequate transmission out of the Bruce area to accommodate both the expected wind developments in that area and the expanded capacity of the Bruce nuclear station resulting from planned refurbishments. Some near-term reinforcements include the up-rating of the Hanover to Orangeville 230 kV circuits, and the installation of additional voltage support facilities at various transmission stations in southwestern Ontario. These will increase the transfer capability out of Bruce in the short-term. The proposed 500 kV double circuit line from Bruce to Milton received the OEB approval for leave to construct on September 15, 2008. This represents a significant milestone in the approval process and the line is planned to go into service in December 2011.

The line will provide the required transmission capability over the long-term to deliver the full capability of the Bruce refurbishment and both planned and potential new renewable resources in the Bruce area. The new 500 kV line out of the Bruce area is required to accommodate the additional generation from both new wind projects and refurbished Bruce nuclear units.

As the Nanticoke coal-fired station is phased out by 2014, additional voltage support in southwestern Ontario will be required. Both static and dynamic reactive power solutions are being considered, ranging from shunt capacitors to possible replacement generation.

Over the next few years, over 1,600 MW of contracted gas-fired generation will be coming inservice in the Sarnia area. This will significantly increase the amount of power flowing between the Sarnia area and the London area and stress the existing transmission system west of London.

The planned retirement of the Lambton coal-fired generating plant (2,000 MW) early next decade, however, will reduce this transmission concern. Thus, there is currently no plan to reinforce the transmission west of London. This need will be monitored into the future as new generating resources such as renewables and combined heat and power projects are proposed in the Sarnia and Windsor-Essex areas.

Transmission enhancements in the northeastern part of the Ontario grid are required to allow the delivery of planned generation from that area to southern Ontario. The proposed enhancements, including series capacitors at Nobel TS, and a static var compensator (SVC) in northeastern Ontario, are expected to relieve existing congestion and accommodate the additional output from the proposed expansion of the four existing hydroelectric stations on the Lower Mattagami River and other committed renewable energy developments in northeastern Ontario.

The development of enabling transmission reinforcements is planned to integrate additional renewable resources procured in the northern parts of Ontario and to connect these areas to the load centre in southern Ontario.

The continuous economic growth experienced in parts of Ontario in the last decade has resulted in the loads in a number of areas reaching or exceeding the capability of the existing transformer stations and/or their supply lines. Some large load centers also have concerns with supply

security. To address these needs and provide additional local area supply capacity for future load growth, work has commenced on a number of area supply projects.

Phase angle regulators (PARs) are installed on the Ontario-Michigan interconnection at Lambton TS, representing two of the four interconnections with Michigan, but are not currently available to regulate flows on the interconnection except in emergencies. These PARs are expected to become operational by the end of 2008. The operation of the these PARs along with the PAR on the Ontario-Michigan interconnection near Windsor will control flows to a limited extent, and assist in the management of system congestion.

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

The table below lists the transmission projects that are planned for completion within the next ten years. They are considered to provide significant improvement to system reliability.

Transmission Project Name			Voltage (kV)	Length (Miles)	In-service Date(s)	Description/Status
Cardiff TS	to	Hurontario SS	230	3	05-2010	Under Construction
Hurontario TS	to	Jim Yarrow TS	230	3	05-2011	Under Construction
Hurontario SS					05-2010	Under Construction
Ingersoll Jct.	to	Woodstock-Karn TS	230	7	04-2011	Construction Imminent
Essa TS	to	Stayner TS	230	17	04-2009	Under Construction
Nobel SS Series Compensation			500		12-2010	Construction Imminent
Porcupine TS SVC			230		11-2010	Construction Imminent
Bruce GS	to	Milton TS	500	115	12-2011	EA Approval Phase
Allanburg TS	to	Middleport TS	230	50	To be determined	On-hold
Outaouais SS	to	Hawthorne TS	230	14	06-2009	Under Construction
Nanticoke TS SVC			500		2011	Planning Phase
Detweiler TS SVC			230		2011	Planning Phase
Lakehead	to	Birch	230	13	2013	Planning Phase
Sudbury	to	Greater Toronto Area	500	180-250	2017	Planning Phase
Mississagi TS to Hanmer TS			500	130	2017	Planning Phase
Pinard TS to Hanmer TS			500	230	2017	Planning Phase
Mackay TS to Third Line TS			230	60	2017	Planning Phase
Nipigon TS to Little Jackfish			230 or 115	120	2014	Planning Phase
Seaforth TS	to	Goderich TS	230	25	2015	Planning Phase
Owen Sound	to	Bruce Peninsula	230 or 115	30-50	2015	Planning Phase
Manitowadge	to	Espanola TS	230 or 115	50	2015	Planning Phase

Alternatives for some other are supply projects are being assessed. These include Supply to Essex County and Guelph Area Transmission Reinforcement. Since the terminal points for these have not yet been identified, they are not included in the table above.

There are no major transformer additions planned for in service in the next ten years.

Operational Issues - One of the most important developments in the Ontario system is the planned retirement of all coal fired generation by 2014, an initiative taken in response to a directive issued by the Ontario government. The Integrated Power System Plan developed by the

OPA provides a plan to address this resource gap with generation from a number of committed and planned resources. Although this presents a major change in the Ontario system, with careful planning it is anticipated that all operational challenges can be addressed.

At this time, there are no unusual operating condition, environmental, or regulatory restrictions that are expected to affect capacity availability for the next ten years, beyond those identified in the OPA's IPSP.

Reliability Assessment Analysis - The IESO reliability assessments include multi-area resource adequacy assessments as well as transmission adequacy assessments, to determine the deliverability of resources to load. Two major assessments are performed periodically by the IESO.

Every quarter, the IESO prepares an18-Month Outlook which advises market participants of the resource and transmission reliability of the Ontario electricity system, assesses potentially adverse conditions that might be avoided through adjustment or coordination of maintenance plans for generation and transmission equipment, and reports on initiatives that are being put in place to improve reliability within the 18-month timeframe.

At least once a year, the IESO investigates the adequacy of the Ontario system for the next five years and the key messages are published in the Ontario Reliability Outlook. The assessment processes and the criteria which are followed are described in the documents, "Method to Perform Long-Term Assessments",[167] and "Ontario Resource and Transmission Assessment Criteria."[168]

The IESO determines required reserve levels based on probabilistic methods deemed by NPCC to be acceptable for meeting regional LOLE criteria. In considering what resources contribute to adequacy the IESO assumes that the planned and proposed resource additions can meet their stated in service dates and the forecast amount of conservation can be achieved. At this time, the reserve requirements are met solely with the planned and proposed resources that are internal to Ontario. Should capacity commitments be contracted in future from external entities, these will be included to the extent they are not considered to be capacity in the balancing area from which they may be supplied.

Each year, in compliance with NPCC requirements, the IESO performs a five-year LOLE analysis to determine the resource adequacy of Ontario. Every third year, a comprehensive study is conducted, with annual interim reviews between major studies. In addition, IESO participates with the other members of NPCC in regional studies which look at regional long range adequacy and interconnection benefits between Balancing Authorities in NPCC.

Projected capacity reserve requirements, determined on the basis of the IESO's requirements for Ontario self-sufficiency, are.14.5% until 2014 and 15.3% thereafter. IESO routinely assesses resource requirements for the first five years of the ten-year period. In association with the OPA, the periods beyond five years are assessed and resource plans developed as part of the IPSP process. Transmission assessments are conducted, as needed, as far into the future as necessary recognizing the long lead time for significant transmission facility development.

IESO considered only the committed and contracted resources in the 2007 assessment. Projects that are in the planning stage from the IPSP are included in this year's assessment. These projects amount to about 6,600 MW in the next ten years.

IESO and the Ontario Power Authority recognize the potential for certain adverse conditions to result in higher than expected resource unavailability and establish planning reserves sufficient to handle many of these. To the extent resource procurement exceeds the planning reserve requirements, resource adequacy can be maintained for higher than normal contingencies.

However, there are always conditions which can exceed those planning assumptions. In such adverse situations the IESO's operations would rely on interconnection support and available control actions to maintain system reliability. Through development of a diverse resource mix, the potential consequence of these events is reduced.

Although energy supplies available within Ontario are expected to be adequate overall, energy deficiencies could arise as a result of higher than forecast forced outage situations, prolonged extreme weather conditions and other influencing factors. Interconnection capability and available market and operational measures have been evaluated as sufficient to ensure summer energy demands can be met for a wide variety of conditions. The IESO uses a measure of forecast uncertainty in a probabilistic analysis to account for variations in demand due to weather volatility. This uncertainty is used in conjunction with the normal weather demand forecast to determine resource adequacy. As well, the IESO creates a demand forecast based on extreme weather and uses it in further assessing system adequacy.

IESO assessments of resource adequacy recognize the supply limitations associated with uncertain and transmission constrained resources. Transmission limits are modeled on a zonal basis and recognize transmission improvements which will result from implementation of the OPA's IPSP. Uncertain resources, such as wind, are considered using a statistical approach which conservatively combines simulated and historical data to arrive at expected levels of "certain" capability.

A number of major unit refurbishment or retirement decisions are expected to occur in Ontario by the year 2017. Expected unit retirements are approximately 6,400 MW of coal-fired resources across four facilities and 15 units (by the end of the year 2014). Measures taken to mitigate reliability concerns include the development of an IPSP for Ontario. The IPSP considers expected and potential unit refurbishments or retirements and proposes ways to meet resulting resource requirements. Specific measures include the procurement of new gas-fired, renewable and conservation resources as well as the procurement of refurbished nuclear resources. In addition, the IPSP considers the potential role for nuclear refurbishments and new-build nuclear resources as well as transmission that would be required to integrate all of the above-mentioned resources. Additional options include the potential for firm purchases from outside of Ontario, expanding capability at existing gas-fired stations, continuation of capability at existing gas-fired stations that would otherwise be retired, developing greater coordination and flexibility related to nuclear refurbishment outages and converting existing coal stations to natural gas. Mitigation of reliability concerns is to be supported through ongoing monitoring, assessment, measurement and verification and regular updates (i.e. every three years) to the IPSP.

The IESO has a local area deliverability criterion for load security and restoration, and a resource adequacy assessment criterion which are described in sections 7 and 8 of the "Ontario Resource and Transmission Adequacy Criteria" document. In our quarterly and annual assessments mentioned at the beginning of the section, the IESO identifies any deliverability concerns which are subsequently addressed by the transmitters as part of their planning activities and the OPA as part of the generation procurement programs.

The IESO reviews its system operating limits on an ongoing basis, as warranted by system configuration changes on the grid. In advance of each summer peak season, the IESO analyzes the forecast demand for Ontario, and forecast transmission and generation availability, and assesses the ability of the planned generation to supply the forecast load (in essence its deliverability). Where transfer limits are expected to restrict available generation, these restrictions, in addition to zone-to-zone system operating limits, are factored into the reliability analysis for the season, to determine IESO's resource adequacy. IESO, as the Reliability Coordinator, and via its authority to direct the operation of the IESO-administered market and the IESO-controlled grid, can ensure that generation dispatch does not violate system operating limits. Where resources are expected to be insufficient to satisfy established criteria[169], the IESO can deny final approval for planned outages, and can rely on emergency procedures in the operational time frame to address shortfall conditions.

The IESO regularly conducts transmission studies that include results of stability, voltage, thermal and short-circuit analyses in conformance with NPCC criteria. Since the implementation of the NERC TPL standards in June 2007, the IESO's comprehensive 2007 transmission studies have been conducted to comply with these standards, in addition to NPCC criteria.

The IESO has market rules and connection requirements that establish minimum dynamic reactive requirements, and the requirement to operate in voltage control mode for all resources connected to the IESO-controlled grid. In addition, the IESO's transmission assessment criteria includes requirements for absolute voltage ranges, and permissible voltage changes, transient voltage-dip criteria, steady-state voltage stability and requirements for adequate margin demonstrated via pre and post-contingency P-V curve analysis. These requirements are applied in facility planning studies. Seasonal operating limit studies review and confirm the limiting phenomenon identified in planning studies.

There are currently no Under-Voltage Load Shedding systems installed in Ontario for the purpose of controlling the voltage on the bulk power system portion of the IESO-controlled grid in response to bulk power system events. There are several systems used for localized voltage control in the event of an outage to local supply facilities.

Following the 1998 ice storm and prior to the 2002 opening of Ontario s competitive markets for electricity Ontario's Emergency Planning Task Force (EPTF) was created. It is chaired by the IESO and includes the major electricity sector players including the provincial government's Ministry of Energy. The EPTF oversees an emergency management team, the Crisis Management Support Team (CMST), to manage the crisis and mitigate the impact on public health and safety due to an extended electricity system emergency. Annually Ontario runs a

program of Reliability and Emergency Management workshops including table top drills.

Additionally major integrated exercises are staged in which both the operational response and emergency management infrastructure is activated. The CMST also performs regular test activations.

During the nine day capacity and energy emergency that followed the August 2003 blackout, the CMST managed the emergency via thirty one conference call meetings and were instrumental in producing media messages, facilitating the government's appeal and direction for reduced demand and obtaining of environmental variances for additional supply.

The province is not experiencing a drought at present. Hydroelectric outputs are based on the median historical values of hydroelectric production and contribution to operating reserve during the weekday peak hours. The median hydroelectric value assumed available for annual peak is about 75% of the total installed capacity.

In 2007, the IESO conducted a Comprehensive Review of Transmission Adequacy which assessed the IESO controlled grid's conformance with the NERC TPL-001 – 004 standards and NPCC's more stringent planning criteria. The Ontario power system, including the proposed generation and transmission changes up to 2012, is in conformance with the applicable NPCC and NERC documents, with no exceptions. The proposed changes and additions to the existing power system in Ontario will not adversely affect the reliability of the Eastern Interconnection.

The IESO initiated the Ontario Smart Grid Forum, a broad-based industry working group focused on developing a vision for a provincial smart grid that will provide consumers with more efficient, responsive and cost effective electricity service. It is hoped that this forum will build on the provincial Smart Metering Initiative to install smart meters by 2010 and complements the renewal taking place in Ontario's transmission and generation sectors.

The IESO is developing an on-line limit derivation tool to maximize transmission capability in the operating time frame. This tool is planned to be implemented over the next one to four years. The Ontario Market Rules obligate anyone planning to connect or modify a connection to the IESO-controlled grid to apply to the IESO for a connection assessment. All connection assessment studies performed by the IESO for connection of new or modified generation and transmission facilities include a short circuit study which identifies the effect of the new facility on the system short circuit levels. In addition, Hydro One periodically performs a short circuit level survey and makes the results available to the IESO. Where short circuit levels are envisaged to exceed the capability of the existing equipment, new equipment with higher ratings is required to be installed if available, or short circuit levels are limited to safe levels by operating the system split during the critical periods.

The reliability impacts due to aging equipment are managed by the equipment owners through extensive maintenance programs and equipment replacement programs for equipment that is expected to reach end of life.

Other Region-Specific Issues that were not mentioned above -There are no other issues to

report.