Approved by the RCC
November 27, 2007

IESO 2007 Interim Review of Resource Adequacy

Covering the Ontario Control Area

for the period 2008 to 2011

November 7, 2007

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1 EXECUTIVE SUMMARY

The Independent Electricity System Operator (IESO) submits this assessment of resource adequacy for the Ontario control area to comply with the Reliability Assessment Program established by Northeast Power Coordinating Council (NPCC). This 2007 Interim Review of Resource Adequacy covers the study period from 2008 through 2011, and highlights changes since the last Comprehensive Review was conducted in 2006. The guidelines for the review are specified in the NPCC Document B-8 entitled, "*Guidelines for Area Review of Resource Adequacy"* (Revised: November 29, 2005).

This Interim Review identifies changes in assumptions from the 2006 Comprehensive Review, including changes to facilities and system conditions, generation resources availability, load forecast, electricity sector regulations, and the impact of these changes on the overall reliability of the Ontario electricity system.

The assessment makes comparisons with the most recent Comprehensive Review, which was completed in 2006.

This 2007 Interim Review indicates that Ontario will be able to meet the NPCC resource adequacy criterion that requires an LOLE value of less than 0.1 days/year for all years from 2008 to 2011. For the calendar year of 2008, some reasonable level of imports may be needed to meet the criterion.

Changes to the Ontario electricity sector have resulted in more certainty in the amount of new resources expected to come into service in Ontario and the Integrated Power System Plan for Ontario is expected to have beneficial effects on the long-term supply-demand situation of the province.

2 INTRODUCTION

The information presented in this 2007 Interim Review of resource adequacy covers the forecast period from 2008 through 2011.

The previous Comprehensive Review was submitted at the November 2006 meeting of the Reliability Coordinating Committee. Comparisons between this review and the November 2006, "IESO 2006 Comprehensive Review of Ontario Resource Adequacy" review are included in this report.

3 ASSUMPTION CHANGES

3.1 Demand Forecast

Table 3.1 shows the summer peak demand forecast for the 2006 Comprehensive Review and for the 2007 Interim Review, if no reduction due to conservation is reflected. For the median demand growth scenario, the peak demand forecast at the time of the summer peak is now about 220 to 440 MW lower, when compared to the 2006 Comprehensive Review forecast. The general decrease in forecast demand is due, in part, to lower

demand from the energy-intensive industrial sector. As well, conservation programs from the Ontario Power Authority and Local Distribution Companies have started to gain traction further reducing demand. At this time the quantification of conservation program impacts is at an early stage. Ontario is gaining experience with conservation, with a focus on the evaluation, measurement and verification of conservation efforts.

Table 3.1 Comparison of Demand Forecasts without Conservation Reductions – Summer Peak

	Normal Weather Summer Peak [MW]		
Year	**2006 Comprehensive Review**	**2007 Interim Review**	**Difference**
2008	26,263	26,041	-222
2009	26,675	26,299	-376
2010	26,973	26,592	-381
2011	27,337	26,867	-470

Table 3.2 shows the summer peak demand forecast for the 2006 Comprehensive Review and for the 2007 Interim Review, with targeted reductions due to conservation reflected. For the median demand growth scenario, the peak demand forecast at the time of the summer peak is now about 435 to 1576 MW lower, when compared to the 2006 Comprehensive Review forecast.

Table 3.2 Comparison of Demand Forecasts with Conservation Reductions – Summer Peak

	Normal Weather Summer Peak [MW]		
Year	**2006 Comprehensive Review**	**2007 Interim Review**	**Difference**
2008	26,263	25,827	-436
2009	26,675	25,717	-958
2010	26,973	25,741	-1,232
2011	27,337	25,761	-1,576

3.2 Resources Forecast

Tables 3.3 shows the resources forecast to be available to the Ontario system at the time of the summer peak assumed for this 2007 Interim Review and for the 2006 Comprehensive Review.

The near-term action plan of the OPA identifies that the OPA will procure approximately 1,400 MW of conservation and demand management resources, up to 2,700 MW of renewable resources and various gas-fired generation projects that are required for local area supply and transmission relief. The capacity targets for the gas-fired generation includes 850 MW of capacity in the southwest part of the Greater Toronto Area, 550 MW of capacity in the downtown Toronto, 300 MW of capacity in Northern York region, and 450 MW of capacity in Kitchener-Waterloo-Cambridge-Guelph.

Table 3.3 Comparison of Available Resource Forecasts

Year	Available Resources [MW] at Time of Summer Peak (July)		
	2006 Comprehensive Review	2007 Interim Review	Difference
2008	29,894	28,359	-1,535
2009	32,309	31,184	-1,125
2010	33,585	32,146	-1,439
2011	37,099	31,219	-5,880

This 2007 Interim Review assumes resource availability based on the latest available information regarding existing and future resources. Since the 2006 Comprehensive Review, there have been delays to the projected in-service dates for some new generation projects in Ontario, including the Goreway G.S. Phases 1 and 2 (860 MW) and St. Clair Energy Centre (570 MW) and several smaller hydro projects. This results in significantly less available resources at the time of the 2008 summer peak. These delayed projects are expected to be in-service by the summer of 2009. Several other projects that were previously identified to be in-service for the summer of 2011 are no longer identified to come into service by that time.

All coal units are identified to be removed from service on December 31, 2014 in accordance with Ontario Regulation 496/07 under the Environmental Protection Act. Some units may be removed from service earlier as considered in the Ontario Power Authority's Integrated Power System Plan submitted to the OEB in late August 2007. Units will only be removed from service earlier if there are adequate replacement resources available to ensure reliability. The 2007 Interim Review assumes that about 1450 MW of coal fired generation is removed from service by the time of summer peak of 2011.

In order to ensure system reliability and to support the coal replacement strategy, the government directed the Ontario Power Authority (OPA) (a) to work with the IESO to

develop an off coal plan and (b) to procure additional power in Ontario to address various reliability needs. The expected results of these procurements, with the latest forecast of the expected in-service dates related to procurements are reflected in the planned additions.

3.3 Ontario Electricity Sector Changes

Ontario government legislation requires the Ontario Power Authority (OPA) to submit an Integrated Power System Plan (IPSP) that covers a period of 20 years from the date of submission to the provincial regulator, the Ontario Energy Board (OEB). The first IPSP filing was submitted to the OEB on August 29, 2007. Under its legislated mandate, the OPA has the obligation to ensure long-term supply adequacy by forecasting resource needs and preparing an integrated system plan that includes conservation, generation and transmission development. In conjunction with the IPSP, the OPA has the responsibility to procure new generation or initiate conservation programs. The expectations for new generation projects and the retirement schedule of coal-fired generation assumed for the 2007 Interim review is based on the OPA's plan.

The OPA outlines a near-term action plan that the OPA will carry out over the 2008 to 2010 period to implement the IPSP. The near-term action plan has components of conservation, renewable supply, refurbished nuclear and gas-fired generation that are reflected in this 2007 Interim Review.

3.4 Transfer Capabilities

The most significant change in transmission facilities affecting transfer capabilities during the study period is the new 1250 MW interconnection between Ontario and Hydro Québec which is scheduled to come into service on March 31, 2009. This will increase the maximum coincident import capability into Ontario by about 1250 MW.

3.5 Fuel Supply Diversity

A diverse generation mix is critical for resource adequacy and market efficiency, through the provision of dispatch flexibility, reduced vulnerability to fuel supply contingencies and fuel price fluctuations.

A significant amount of the proposed new generation in Ontario (over 4,000 MW from 2008 to 2011) is gas-fired. When all of these facilities are built, the volume of gas consumed for electricity generation will significantly increase. Ontario is well situated with respect to natural gas transmission and storage although some infrastructure development will be required in conjunction with new gas-fired resources. Based on the input received from stakeholders, the IESO does not have any concern with the expected ability of the gas infrastructure to be modified to meet the future additional gas supply requirements.

In anticipation of growing amounts of gas-fired generation in Ontario over the coming years, the Ontario Gas Electric Interface Working Group (OGEIWG) was formed with various stakeholders. The group is establishing communication protocols and a framework for contingency analysis in order to manage operational and reliability issues in both energy sectors. Earlier work by this group provided cross-functional training and pipeline company input on gas-electric day coordination relative to design of an electricity day-ahead market in Ontario.

4 RESOURCE ADEQUACY ASSESSMENT

This assessment is based on engineering judgment, IESO assessments and NPCC joint interconnected studies.

This 2007 Interim Review indicates that, for the future years in the study period horizon (2008 to 2011), there is a lower forecast of demands and there are fewer resources available at the time of summer peak compared to the 2006 Comprehensive Review. The OPA is presently reporting 9,849 megawatts (MW) of generation and demand management contracts. These contracts include 3,000 MW of nuclear refurbishment, over 5,400 MW of natural gas generation, and over 1,400 MW of renewable and demand reduction capacity. From 2008 to 2011, there is almost 9,000 MW of additional generation expected to come into service. In addition, under the OPA's Standard Offer Program, 595 MW of small distributed generation projects have signed contracts. Most of them are expected to come into service within the next three years. Given the nature of the contracts, there is increased certainty with respect to the completion of these resources compared to last year.

MARS runs were completed based on the latest demand forecast, and latest forecast of available resources. Table 4.1 provides a summary of the LOLE results from these MARS runs for four different scenarios.

Table 4.1 LOLE Results from MARS Runs

Scenario	EOPs	Additional Resources (MW)	LOLE [days/year]			
			2008	2009	2010	2011
1	no	0	3.085	0.087	0.030	0.094
2	yes	0	0.476	0.008	0.002	0.006
3	yes	970	0.100	-	-	-
4	yes	756	0.100	-	-	-

Scenario 1 represents a scenario where no emergency operating procedures (EOPs) and no additional resources are included. Scenario 2 represents the scenario where EOPs are utilized. Scenario 3 indicates a scenario where EOPs are utilized and additional resources are used. The additional resources could be some combination of additional imports into Ontario and/or additional resources within Ontario, such as additional conservation. The

first three scenarios consider a demand forecast that does not include the impacts of planned conservation targets. The final scenario indicates the additional resources that would be required if the conservation targets are achieved.

The IESO reliability assessment for the 2008 calendar year includes MARS runs that indicate 970 MW of imports are required to meet NPCC criterion, without considering the possible decrease in demand that would be achieved if Ontario was to meet the target level of conservation. If Ontario achieves the target conservation amounts, the need for imports would be 756 MW. In either scenario, the estimated interconnection support is well below the available interconnection support considered available based on the latest NPCC Tie Benefit Report.

For the 2009 to 2011 calendar years, both the demand and the available resources are now forecast to be lower than the forecast for the 2006 Comprehensive Review. MARS results indicate that Ontario is expected to be compliant with the NPCC criterion, and the target LOLE of 0.1 days per year can be achieved without the need for imports into Ontario.

4.1 Alleviating Factors and Contingency Mechanisms

There are several study assumptions which may change in such a way that reserve levels in Ontario could be higher than presented in this 2007 Interim Review, including the amount of new generating resources available, the amount of conservation or the amount of demand response, the amount of imports and the amount of generation that may be on planned outage.

The present plan identifies that some coal-fired generation will begin to be removed from service in 2011. However, if future assessments identify reliability concerns, it is possible to defer the shutdown of these units.

Every quarter, looking out 18 months into the future, the IESO assesses the integrated generator and transmission outage plans of market participants. Periods where outages result in inadequate resource levels are identified to generators and transmitters. If market participants fail to proactively reschedule outages to mitigate concerns, the IESO may veto outages in the near-term to ensure sufficient capacity is available to meet non-dispatchable demand.

The relief that can be expected from this measure can range from 0 MW to over 2,000 MW or more as outage programs resume in September. Deviation from initial generator outage plans through outage rescheduling and rejection are not always desirable. This could stretch the ability of generator owners/operators to accommodate larger amounts of outages over shorter time periods and may increase forced outage occurrences. Operational experience so far indicates generator owners are usually able to adapt their outage plans.

5 CONCLUSIONS

This 2007 Interim Review indicates that Ontario will be able to meet the NPCC resource adequacy criterion that requires an LOLE value of less than 0.1 days/year for all years from 2008 to 2011. For the calendar year of 2008, some reasonable level of imports may be needed to meet the criterion.

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