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Ontario Energy Board

Phase II Northern York Region Report

Ontario Power Authority

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PHASE II NORTHERN YORK REGION REPORT

BACKGROUND

In September 2005, the Ontario Power Authority (the "OPA") submitted a report to the Ontario Energy Board (the "OEB") recommending a staged electricity plan to meet the needs of Northern York Region ("NYR"). This report was the culmination of several months of extensive study and stakeholder engagement. The OPA adopted a two-phase integrated solution to meet the growing area electricity needs. The first phase was intended to take immediate actions that could address the supply shortfalls in place since 2002. It recommended increasing the amount of static capacitors at Armitage Transformer Station ("TS") and implementing as much of the planned 20 MW of demand response ("DR") as possible. It also recommended that construction of a new transformer station at Holland Junction, along with static capacitors at this station, proceed as soon as possible. It was assumed that Holland Junction TS ("HJTS") could be in-service for summer 2007. The capacitors were installed and a DR program was implemented for summer 2006. The Environmental Assessment ("EA") process for Holland Junction was also initiated by Hydro One Networks Inc. ("Hydro One"), following an order from the OEB. The second phase of the plan was expected to provide a solution that could continue meeting the growing needs of NYR. This longer-term phase consisted of roughly 350 MW of simple cycle gas generation and a new transformer station, likely in Aurora. Both were recommended to be in-service by 2011.

On March 26, 2007, the OEB issued letters to parties involved in the NYR supply project – the York Region Distributors (PowerStream, Newmarket Hydro and Hydro One Distribution), Hydro One, and the OPA – requesting information on potential electricity management measures that had been implemented or would be in place for the summer of 2007, as well as any initiatives that could be expected for 2008 and 2009. The OEB had become aware of potential risks to the in-service date of HJTS, due to delays related to the environmental assessment process. It was identified that the delayed in-service of HJTS may result in inadequate capacity being available from the existing Armitage TS, even with the capacitors and DR in place. The OPA was asked to report on electricity efficiency, demand reduction/conservation behaviour, self-generation and fuel switching (collectively referred to as "Conservation") projects over which it had authority, and the York Region Distributors were collectively asked to comment on the status of all distribution infrastructure projects and Conservation initiatives. As well, Hydro One was asked to identify the expected delays in securing environmental permitting, covering best- and worst-case scenarios. The transmitter was also asked to provide information on any solutions being contemplated to address the identified problem. Each of these parties subsequently filed a report with the OEB as requested.

On April 20, 2007, the OEB then issued a further letter asking the OPA to (i) develop a plan by the end of May for remedial action to address the potential overloading of Armitage TS for summer 2007; and (ii) develop a further plan to address the time period from October 2007 to the end of 2009 with emphasis on remedial action for the summers of 2008 and 2009. The OEB requested that the OPA coordinate a response from all parties so that operational approaches and any current mitigating measures were identified.

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A remedial action plan for June to September 2007 was filed with the Board on May 31, 2007 (the "Phase I NYR Report"). In response to the second part of the OEB's request, the OPA provides here the "Phase II NYR Report", a remedial action plan focusing on mitigation for June to September in both 2008 and 2009.

UPDATE ON STATUS OF HOLLAND JUNCTION TS

Since the filing of the Phase I NYR Report at the end of May, the Minister of Environment issued a decision stating that an individual EA is not required for HJTS. There were, however, thirteen conditions that came with the decision. These conditions fall into six categories: storm water management plan, air and noise documentation, landscape plan, agency commitments and mitigation measures, environmental study report documentation, archaeological resources, and reporting requirements. Hydro One is therefore able to proceed with construction of HJTS, subject to the imposed conditions and any other permits or approvals required. HJTS is now proceeding and the expected in-service date, based on Hydro One's latest schedule, is May 2009.

REVIEW OF SUMMER 2007 – NYR SUPPLY ADEQUACY

NYR Supply Capability

As shown in the Phase I NYR report to the OEB, the critical load levels for the [N-1] line and transformer outages are summarized in Table 1 below. The supply capability of Armitage TS is determined by these critical single-element or [N-1] contingencies from the most to the least restrictive.

Table 1: NYR Supply Capability

Limit	MW
Station LTR (10 day)	340
Maximum Voltage Change Limit	340
Station LTR (2 hr)	355
Voltage Stability	380
Station LTR (15 min)	415
Thermal (B82V/B83V)	420
Thermal (tap)	440

Source: OPA

In addition to the [N-1] limits shown in Table 1, the lack of additional 44 kV breaker positions at Armitage TS to accommodate new distribution feeders also affects the reliability of supply. Many of the existing feeders have exceeded their planned normal maximum loading of 23 MW (25 MVA). Increased unreliability could occur as a result of longer exposures and less backup capability due to higher than normal loading.

In addition to the supply capacity concern, there is also a security concern which affects the reliability of supply in NYR. For a double-circuit or [N-2] outage on the most critical section between Armitage TS and the tap point at Holland Junction, all load in NYR would be interrupted until the line is repaired, except for load that can be transferred to adjacent supply

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points through the distribution system. Loss of other, less critical line sections could result in rotational load interruptions until the line is repaired.

Area Demand in the Summer of 2007

The peak demand on Armitage TS was reached on August 1, 2007 at 16:00 hours. As shown in Table 2, the net demand that day was 359 MW after accounting for load transfers to Brown Hill TS in Georgina Township, Conservation measures, and Keele Valley generation. This peak is roughly 26 MW lower than the forecast net demand of 385 MW for extreme weather, and 3 MW lower than expected for normal weather, due in part to more Conservation than expected and cooler weather than in previous summers. Note that demand response measures were not activated at the time of peak.

Table 2: 2007 Peak Demand at Armitage TS (MW)

Entity	2007 Actual (MW)	2007 forecast (MW)	
		Normal Weather	Extreme Weather
Newmarket	146	154	163
PowerStream	93	94	100
Hydro One Distribution	158	152	160
Total Area Demand	**397**	**400**	**423**
Adjusted Load - Transfers	-17	-17	-17
Keele Valley Generation	-19	-19	-19
Conservation	-2.2	-1.7	-1.7
Net Demand	**359**	**362**	**385**

Source: Hydro One, Newmarket Hydro, PowerStream

As summarized in Table 3, 28 hours were above the 10 day station Long Term Emergency Rating ("LTR") and maximum voltage change limit of 340 MW, or 78 hours if DR and Keele Valley Generation had not been available. There were however, no hours above the voltage stability limit of 380 MW for summer 2007 (June to September), even without Keele Valley Generation and DR.

Table 3: Risk Exposure – Summer 2007

	With DR & Keele Valley Generation	Without DR & Keele Valley Generation
Hours Exceeding 340 MW Limit	28	78
Hours Exceeding 380 MW Limit	0	0

Source: OPA

Operational Measures

On four occasions, control actions of opening the bus-tie breakers were taken by Hydro One, a remedial action identified in the Phase I NYR Report. These control actions occurred on June 27, August 1, August 2 and August 29, and amounted to a total of 15 hours. No load was lost due to these control actions, though these actions do put load at risk for a single-element outage.

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Maintenance

Hydro One followed more stringent maintenance and inspection procedures at Armitage TS, as planned. Also, a spare transformer (one of two transformers destined for HJTS) was moved to the site, which should reduce the time required for replacement if a transformer should fail.

Capital Plans and New Facilities

PowerStream made available a 28 kV feeder from Southern York Region into Aurora for emergency use. This new feeder was in place to serve as a backup supply to Aurora if the supply from Armitage was constrained, such as following equipment outages. This feeder was able to provide 10 MW of additional post-contingency relief, within about 30 minutes, but was not required this past summer.

Conservation

A number of Conservation initiatives took place during the summer of 2007 in NYR.

The demand response capacity under contract with Rodan in NYR was increased to 15.5 MW this past summer, with additional increments expected for summer 2008. The maximum capacity allowed to be achieved under the contract was also increased to 30 MW.

The IESO has the sole authority to dispatch Rodan under the terms of the NYR demand response contract. Rodan has provided a 7/24 contact and is activated based on instructions from the IESO.

The IESO dispatches Rodan based on:

- Hydro One's initiation of rotational load shedding associated with Armitage TS for equipment concerns. The estimated duration of the load shedding and an IESO assessment for the most efficient utilization of the activation determines the IESO's dispatch requirements for Rodan.

- IESO reliability concerns due to system configuration during planned or forced outages or to maintain acceptable post-contingency voltages during Armitage TS loading concerns. If these situations are expected to persist for an extended period of time, the IESO will assess the best time to dispatch Rodan in order to make the most efficient utilization of the activation.

Rodan was dispatched twice this summer. They provided 16.6 MW of DR capacity on August 2, 2007 from 1:00 PM to 7:00 PM and a yet undetermined amount on September 6, 2007 from 3:00 PM to 9:00 PM. The September 6th DR capacity has not yet been established as the settlement month just finished and results are not available.

A variety of Conservation programs were organized by the OPA with support from the NYR LDCs. The OPA operated the Every Kilowatt Counts (EKC), Summer Savings, peaksaver^{TM}, Great Refrigerator Roundup, Electricity Retrofit Incentive, and Cool Savings programs for summer 2007. The EKC program provided financial incentives to install products such as

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energy efficient lighting and ceiling fans. The Summer Savings program provided a 10% credit on customers' electricity bills if they reduced their electricity use by 10% between July 1, 2007 and August 31, 2007 as compared to the same period last summer. The peaksaver™ program is a voluntary program that allowed LDCs to reduce the electricity being drawn by participating customers' central air conditioning units for brief periods during times of peak demand. The Great Refrigerator Roundup program hauled away old, inefficient secondary refrigerators and disposed of them in an environmentally responsible manner. The Electricity Retrofit Incentive Program encouraged commercial, industrial and institutional energy users to undertake energy efficiency retrofit projects. The Cool Savings program provided rebates to consumers having their air conditioners tuned by a certified technician or replaced with an Energy Star system. Regional Conservation information is not yet available to determine the success of these programs in NYR.

The LDCs in NYR are also engaged in several Conservation initiatives which were funded through their distribution rates.

PowerStream provided savings of roughly 0.5 MW from its enerShift™ demand response program. This program reduced demand at peak periods to improve system reliability. Participating customers received a monthly capacity payment in return for agreeing to reduce their consumption at designated peak demand periods. An additional 0.1 MW also resulted from other Conservation in the area.

Newmarket Hydro proceeded with two industrial retrofit Conservation initiatives this past summer. The retrofit program was funded through distribution rates and provided savings of roughly 0.1 MW. Newmarket Hydro also ran a smart thermostat residential load control and critical peak price rebate program, which yielded a peak demand savings of approximately 0.1 MW. This program was funded from distribution rates.

Hydro One estimated that approximately one-third of the Conservation initiatives undertaken in all of York Region contributed to a reduction in load at Armitage TS. Savings of roughly 1 MW were provided at Armitage due to Hydro One's smartstat° residential load control program. Also peak savings of roughly 0.3 MW were yielded from Hydro One's commercial and industrial demand response initiative, the Double Return program. As well, approximately 0.1 MW of savings were achieved from the transmitter's PowerSaver Business Incentive program.

Observations

The following observations can be drawn for Armitage TS for the summer of 2007:

- All load was supplied this summer as there were no outages on the transmission system; and
- If there had been a single-element outage, on some occasions load would have been lost. However, the mitigation measures in place for the summer would have reduced the restoration time. The area was still susceptible to a double-circuit [N-2] outage though, which would have necessitated a longer time to restore load.

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SUPPLY ADEQUACY ANALYSIS – SUMMERS 2008 AND 2009

Approach

If Holland Junction TS is in-service in 2009 as planned, the deficit in transformer capacity and feeder positions would be resolved. However, there is still a need to reinforce supply to the area with the second phase of the plan for generation and another new transformer station. To be prudent, an assessment has been carried out for the summer of 2009 to deal with the possibility that HJTS is further delayed. The following analysis therefore assumes that HJTS is not available in 2009 as anticipated.

In order to assess supply adequacy at Armitage TS, the demand at peak was examined under two weather scenarios. The amount of available local resources was then deducted, and the remaining load was compared to the supply capability of the area to determine capacity shortfalls or supply gaps.

Weather Scenarios

In examining the supply adequacy of NYR, two weather scenarios were examined: normal and extreme. Normal weather implies an average day for the season. Thus, for the summer season in NYR, a temperature of approximately 32 degrees Celsius ("˚C") would be assumed. Extreme weather, on the other hand, looks at a day where the maximum temperature would be observed. In this case, the temperature would be approximately 35˚C. Although an area may not regularly reach this extreme weather, many times an area reaches weather conditions very near this scenario. The system must be able to meet peak demand on the hottest day of the summer, so transmission planning is done for extreme weather. The difference in terms of load between the normal and extreme weather scenarios is roughly 6% for Armitage TS.

Load Forecasts

Gross Peak Demand

Growth information received from the NYR LDCs was used to derive the expected total load for summers 2008 and 2009, as shown in Table 4. Historical load growth information was included in Table 4 as a point of reference. Note that the peak demand in summer 2005 and summer 2006 occurred under near extreme-weather conditions.

Table 4: Historical and Forecast Summer Peak Demand

Entity	2005 Actual (MW)	2006 Actual (MW)	2007 Actual (MW)	2008 Forecast		2009 Forecast	
				Normal Weather	Extreme Weather	Normal Weather	Extreme Weather
Newmarket	150	155	146	159	169	165	175
PowerStream	93	96	93	99	105	104	110
Hydro One Distribution	146	152	158	155	164	159	169
Armitage TS Loading	**389**	**404**	**397**	**413**	**438**	**428**	**454**

Source: OPA, Newmarket Hydro, PowerStream, Hydro One

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Load Transfers

In the spring of 2004, Hydro One Distribution initiated a $2.5 million project to extend an existing 44 kV distribution line by 8 km in the East Gwillimbury area. This extension allowed 17 MW of load to be transferred from Armitage TS to Brown Hill TS in Georgina Township. In the spring of 2007, Hydro One began construction of a 10 km, 44 kV distribution line extension to enable the transfer of an additional 13 MW of load from Armitage TS to Brown Hill TS. This $1.7 million project is scheduled for completion in late 2007, and will help alleviate excess loading at Armitage TS. Hydro One intends to transfer this 30 MW of load back to the NYR supply area once HJTS is in-service. Both of these load transfers have been deducted from the forecast loading at Armitage TS in Table 5.

Existing Local Generation

Keele Valley is connected to the distribution system at Armitage TS, which means that it nets out the load on the transformers. So, if Keele Valley is running, the demand on the transformers at Armitage will be roughly 19 MW lower. Generally, when assessing the adequacy of an area, it is assumed that the largest generating unit is out of service. This ensures that supply can still be reliably met while allowing for the situation when a unit suffers a forced outage, is undergoing maintenance, or is not dispatched. This methodology is consistent with Reliability Criteria. However, in performing this near-term risk assessment for NYR, it should be noted that Keele Valley has been generating at the time of system peak for the last few summers and is expected to be operating normally in 2008 and 2009. Although it was indicated that the amount of generation was declining due to lower land fill gas volume, when speaking with the asset owner, 19 MW is expected to be up and running. Therefore, in this risk assessment, Keele Valley generation of 19 MW has been included.

Conservation

There is currently 15.5 MW of demand response capacity under contract with Rodan. This amount will be available for summers 2008 and 2009, and so it has been deducted from the load at Armitage TS in Table 5 below.

The existing Conservation from 2007, totalling 2.2 MW, is assumed to carry through 2008 and 2009, and so has been deducted from the load at Armitage TS.

Net Area Load

The load transfers, existing local generation, and available Conservation were deducted from the forecast loading at Armitage TS to develop the net area demand, as shown in Table 5.

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Table 5: Net Load at Armitage TS

Entity	2005 Actual (MW)	2006 Actual (MW)	2007 Actual (MW)	2008 Forecast		2009 Forecast	
				Normal Weather	Extreme Weather	Normal Weather	Extreme Weather
Armitage TS Loading	**389**	**404**	**397**	**413**	**438**	**428**	**454**
Load Transfers	-17	-17	-17	-30	-30	-30	-30
Keele Valley Generation	-23	-22	-19	-19	-19	-19	-19
Conservation	-	-	-2.2	-17.7	-17.7	-17.7	-17.7
Net Demand	**349**	**365**	**359**	**346**	**371**	**361**	**387**

Source: OPA, Newmarket Hydro, PowerStream, Hydro One

The Supply Gap

Based on the load forecasts for 2008 and 2009, an assessment of the amount of load at risk was performed. This is an application of the element outages listed above in Table 1.

As shown in Table 6 and Table 7, depending on the contingency, varying amounts of load are at risk. As well, differing amounts of load can be restored following operational measures. It should be noted that when the load is beyond the voltage stability limit of 380 MW, the bus-tie breakers are opened. When the bus-tie breakers are open, any subsequent contingency would result in immediate curtailment of half the station load. It should also be noted that roughly 40 MW of additional relief can be provided through feeder transfers both inside and outside the station for a transformer outage. These feeder transfers are a post-contingency measure though, and therefore do not reduce load loss if the bus-tie breakers are open.

Table 6: Supply Gap at Armitage TS for Normal Weather Forecast

Year	Outage	Forecast Net Demand on Armitage TS (MW)	Immediately following contingency		Sustained post-contingency operation	
			Capability (MW)	Unsupplied Load (MW)	Capability (MW)	Unsupplied Load (MW)
2008	Transformer Outage	346	380	0	340 + 40	0
	Circuit Outage (N-1)		380	0	340	6
2009	Transformer Outage	361	380	0	340 + 40	0
	Circuit Outage (N-1)		380	0	340	21

Source: OPA

Table 7: Supply Gap at Armitage TS for Extreme Weather Forecast

Year	Outage	Forecast Net Demand on Armitage TS (MW)	Immediately following contingency		Sustained post-contingency operation	
			Capability (MW)	Unsupplied Load (MW)	Capability (MW)	Unsupplied Load (MW)
2008	Transformer Outage	371	380	0	340 + 40	0
	Circuit Outage (N-1)		380	0	340	31
2009	Transformer Outage	387	380	194	340 + 40	7
	Circuit Outage (N-1)		380	194	340	47

Source: OPA

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Armitage TS 2008

The following observations can be drawn for Armitage TS at peak load for the summer of 2008:

- No load would be at risk pre-contingency if all facilities were to be available;
- If one of the transformers at Armitage TS were to become unavailable, no load would be immediately curtailed for the normal or extreme weather scenario. Following the contingency, the load would need to be curtailed down to the 10 day LTR of 340 MW. Roughly 40 MW of load could be switched over to the full dual-element spot network ("DESN"), so no load would be left unsupplied. As it usually takes about 30 days to replace a failed transformer, any load above the normal transformer rating (approximately 121 MW for each transformer) would need to be curtailed and rotational load shedding would occur after this initial 10 days; and
- If an outage is experienced on one of the circuits supplying Armitage TS, no load would have to be curtailed immediately following a contingency for normal or extreme weather. Following the contingency, load would have to be reduced to the 10 day LTR of the two remaining transformers. This would mean that 6 MW of load would be unsupplied for the normal weather scenario and 31 MW for the extreme weather scenario. Rotational load shedding would occur for any amount of load that would not be able to be supplied until the circuit would be able to be returned to service. Restoration of the outaged circuit could take less than 30 minutes or up to a few days depending upon the problem, system conditions and pre-contingency loading.

Armitage TS 2009

The following observations can be drawn for Armitage TS at peak load for the summer of 2009, assuming that the planned HJTS would not yet be in-service:

- No load would be at risk pre-contingency if all facilities were to be available;
- If one of the transformers at Armitage TS were unavailable, no load would be immediately curtailed for the normal weather scenario. For the extreme weather scenario, half of the station would be lost immediately when the bus-tie breakers are open as each DESN would normally supply about half of the load. This would mean 194 MW would be curtailed. Following controller action, the remaining healthy transformer would be brought back into service as soon as possible so that there were two transformers remaining at one DESN and one transformer at the other DESN. This process could take less than 30 minutes or up to a few hours, depending upon the system conditions and pre-contingency loading. If no load were to be lost immediately following the contingency, then the load would need to be curtailed down to the 10 day LTR of 340 MW. Roughly 40 MW of load could be switched over to the full DESN, so no load would be left unsupplied at normal weather. If the bus-tie breakers had been open and load was lost immediately following the contingency, then load could be restored up to the 10 day LTR of 340 MW. Again, 40 MW of load could be transferred over to the full DESN, so only 7 MW would be left unsupplied. As it usually takes about 30 days to replace a failed transformer, any load above the normal transformer rating (approximately 121 MW for each transformer) would need to be curtailed and rotational load shedding would occur after this initial 10 days; and

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- If an outage were to be experienced on one of the circuits supplying Armitage TS, no load would have to be curtailed immediately following a contingency for normal weather. However, for the extreme weather scenario, half of the station load would be lost immediately due to the open bus-tie breakers. Again, this would be roughly 194 MW for the extreme weather scenario. If load were not to be curtailed following the contingency, as with the normal weather scenario, then load would have to be reduced to the 10 day LTR of the two remaining transformers. This would mean that 21 MW of load would go unsupplied. For the extreme weather scenario in which load were to be lost immediately, load could be restored up to the LTR of the two remaining transformers, or 340 MW. In this case, 47 MW of load would be unsupplied. Rotational load shedding would occur for the amount of load that would not able to be supplied until the circuit would be able to be returned to service. Restoration of the outaged circuit could take from less than 30 minutes or up to a few days depending upon the problem, system conditions and pre-contingency loading.

Risk Exposure Analysis

NYR is a summer peaking area with a very flat peak load profile. As illustrated in Figure 1, the load begins to increase at roughly 7:00 am, levels off around 11:00 am, and doesn't decline until close to 8:00 pm. This means that any measure to be implemented must to be able to address the full duration of peak load in order to be effective. For example, if a controller must open the bus-tie breakers because the load exceeds the voltage stability limit, then the breakers will generally remain open all day until the load begins to decline.

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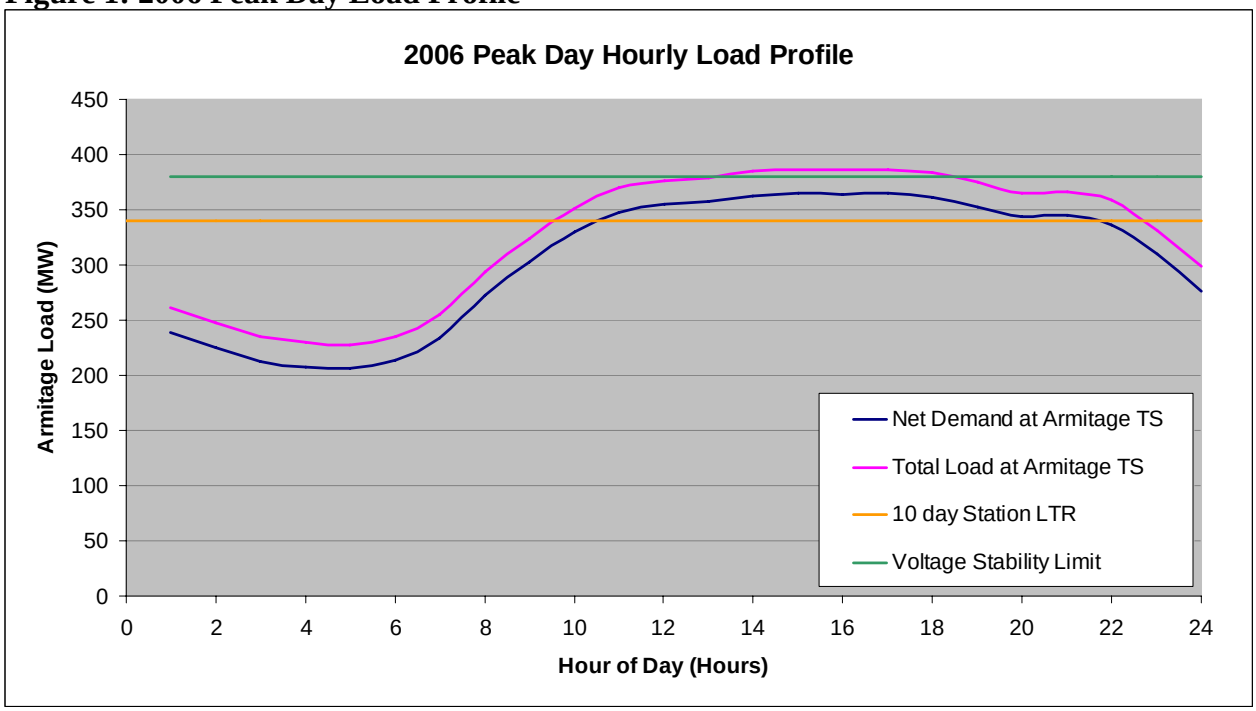
Figure 1: 2006 Peak Day Load Profile



Source: OPA / IESO

The flat characteristic of the load at Armitage TS means that, generally, exposure is not just for a single hour, but rather a full day. An assessment of the forecast risk exposure was performed for both normal and extreme weather conditions. The load pattern was based on a typical year of hourly load, and then annual load growth was added. Any hour beyond the voltage stability limit or 10 day LTR was then counted as exposed. Table 8 summarizes the number of days where load is forecast to be above the voltage stability limit of 380 MW, necessitating the opening of the bus-tie breakers. Table 9 indicates the amount of time the load is forecast to be beyond the station LTR of 340 MW.

Table 8: Risk Exposure Analysis – Open Bus Tie Breaker (380 MW Limit)

Exposure	2005 Actual	2006 Actual	2007 Actual	2008 Forecast		2009 Forecast	
				Normal Weather	Extreme Weather	Normal Weather	Extreme Weather
Days	0	1	0	0	0	0	1
Hours	0	1	0	0	0	0	3

Source: OPA

Table 9: Risk Exposure Analysis – Above Station LTR (340 MW Limit)

Exposure	2005 Actual	2006 Actual	2007 Actual	2008 Forecast		2009 Forecast	
				Normal Weather	Extreme Weather	Normal Weather	Extreme Weather
Days	18	5	7	1	13	7	23
Hours	76	27	28	3	58	29	124

Source: OPA

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Security Analysis

The rare event of an outage to the double-circuit 230 kV supply line to Armitage will interrupt the total station load at Armitage TS. For the loss of the Armitage tap section, the load will not be restored until the line is repaired. Because there is no switching on the line between Claireville TS and Brown Hill TS, for the loss of the section between Claireville and Holland Junction, no load at Armitage TS can be restored until a crew could be sent out to manually isolate the failed line section. This could take several hours. After the faulted line section is isolated, about 150 MW could be restored; the remainder of the Armitage load would be unsupplied until the line is repaired. For failure on the Holland Marsh Junction to Brown Hill TS section, all Armitage TS load would be interrupted until the fault has been isolated, then all load could be restored. The repair time for a major outage of this nature could be up to a week.

THE PLAN FOR REMEDIAL ACTION

In order to help augment the area's supply capability and reduce the risk exposure for summers 2008 and 2009, several measures are proposed for NYR. These items can be separated into two categories: pre-contingency measures and post-contingency measures.

Pre-Contingency Measures

Maintenance

Hydro One plans to continue with stringent maintenance and inspection procedures at Armitage TS in both 2008 and 2009. For example, transformer oil testing at Armitage will be on a six month cycle rather than the normal two year cycle. The spare transformer will also remain on site, which should reduce the time required for replacement if a transformer is to fail.

Conservation

There are a number of Conservation initiatives under way in Northern York Region.

Rodan is targeting an additional 4.5 MW of DR for summer 2008, to bring the total capacity to 20 MW. Estimates have not been provided for 2009, but the maximum capacity allowed to be achieved under contract is 30 MW and it is expected that incremental capacity will be available.

The OPA is planning to operate 29 Conservation programs in 2008 – 19 existing programs and 10 new initiatives. These programs are broken out into Mass Market, commercial/institutional, industrial, and customer-based generation. The mass market programs include Cool Savings, which provides rebates to consumers having their air conditioners tuned by a certified technician, and Every Kilowatt Counts which provides financial incentives to install products such as energy efficient lighting and ceiling fans. The commercial/institutional programs include the Electricity Retrofit Incentive Program (ERIP) and the Agricultural Energy Efficiency Program (AEEP). ERIP encourages commercial, industrial and institutional energy users to undertake energy efficiency retrofit projects. AEEP facilitates awareness and implementation of energy efficiency in dairy, swine, poultry, and greenhouse operations. Industrial market programs include several demand response programs, as well as an Industrial Process and Technology program to improve energy efficiency in the industrial sector. Customer-based Generation Programs include the

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Clean Energy Standard Offer Program and the Renewable Energy Standard Offer Program which simplify participation in the supply sector for small distributed generation resources. These planned programs, and others, are described in more detail in the OPA's IPSP, EB-2007-0707 in Exhibit D-4-1 on pages 21 to 31.

The portfolio of programs for 2009 is not yet finalized, but will evolve from the existing planned 2008 programs.

It is the OPA's expectation, based on conversations with LDC staff, that each of the three LDCs will participate fully in the OPA-funded LDC Conservation programs in the summer of 2008 and 2009. The OPA plans to work with NYR LDCs to develop a more comprehensive plan for Conservation for the summers of 2008 and 2009. The OPA will update the Board when this information is available.

The LDCs in NYR are also planning several Conservation initiatives, for which they likely will be seeking funding from the OPA. Although funding agreements have not been signed to date, the following is a description of expected potential.

PowerStream anticipates an additional 0.5 MW of savings in 2008 and 2009 from its enerShift™ demand response program. The peaksaver™ program is expected to contribute savings of an additional 0.2 MW in Aurora in 2008 and 0.4 MW in 2009. The Business Incentive program is expected to yield savings of 0.3 MW in both 2008 and 2009. PowerStream has also identified the potential for roughly 3.5 MW of generation from a water pumping station in Aurora, which could be included in area DR programs for use during peak or emergency conditions. PowerStream has successfully secured a 3-year exemption from the Ministry of Energy to allow the municipality to generate power. PowerStream anticipates that 2.5 MW will be commissioned and in-service for 2008, and a further 1 MW will be available in 2009. Therefore, PowerStream expects roughly 3.5 MW of additional Conservation in 2008 and 2.2 MW more in 2009.

Newmarket Hydro expects an additional 0.5 MW of DR capacity in 2008 and 2009 from the peaksaver™ program.

Hydro One is continuing to actively seek new participants in the peaksaver™ load control program and the Electricity Retrofit Incentive program (continuing from its efforts on the previous PowerSaver Business Incentive program). In addition, Hydro One has submitted applications to the OPA to expand its Double Return demand response program to transmission customers and demand-billed distribution customers. Hydro One also plans to submit applications for other custom programs to the OPA later this year.

The IESO is also continuing to investigate with Emergency Load Reduction Program participants whether they have any load in the NYR. To date, no load has been identified.

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Post-Contingency Measures

Operational Measures

No additional operational measures have been put in place, however roughly 40 MW of existing load transfer between DESNs at Armitage will be available.

Capital Plans and New Facilities

PowerStream is completing installation of two additional 28 kV feeders from Southern York Region into Aurora for emergency use. These feeders will serve as a backup supply to Aurora when the supply from Armitage is constrained, such as following equipment outages. Each of these feeders will be able to provide 10 MW of additional post-contingency relief, within about 30 minutes. The first of these feeders is expected to be available in 2008 and the second will be in-service for 2009.

The Gap – After Remedial Action

After summing the contribution of each of the measures described above, it can be seen in Table 10 that an additional 8.5 MW of relief is expected in 2008 and a further 2.7 MW in 2009. There will also be an additional 10 MW of post-contingency relief provided in both 2008 and 2009. Table 11 provides a forecast for 2008 and 2009 after accounting for these remedial actions.

Table 10: Contribution of Remedial Actions

Measure	2008	2009
Pre-Contingency Measures:		
Additional DR (Rodan)	4.5	-
CDM (PowerStream)	3.5	2.2
CDM (Newmarket)	0.5	0.5
Total Pre-Contingency Measures:	**8.5**	**2.7**
Post-Contingency Measures:		
Post contingency feeder transfer	10.0	10.0
Total Post-Contingency Measures:	**10.0**	**10.0**

Source: OPA

Table 11: Load Forecast with Remedial Actions

Entity	2005 Actual (MW)	2006 Actual (MW)	2007 Actual (MW)	2008 Forecast		2009 Forecast	
				Normal Weather	Extreme Weather	Normal Weather	Extreme Weather
Armitage TS Loading	**389**	**404**	**397**	**413**	**438**	**428**	**454**
Load Transfers	-17	-17	-17	-30	-30	-30	-30
Keele Valley Generation	-23	-22	-19	-19	-19	-19	-19
Conservation - 2007	-	-	-2.2	-17.7	-17.7	-17.7	-17.7
Remedial Measures - 2008	-	-	-	-8.5	-8.5	-8.5	-8.5
Remedial Measures - 2009	-	-	-	-	-	-2.7	-2.7
Net Demand	**349**	**365**	**359**	**338**	**363**	**350**	**376**

Source: OPA

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The remedial measures expected in 2008 and 2009 change the system supply capability for both normal and extreme weather, reducing the number of MW that could require curtailment under an outage situation. As indicated in Table 12 and Table 13, no load would go unsupplied immediately following either a transformer or circuit contingency for normal or extreme weather with remedial actions in place. There is, however, still a risk of unsupplied load during sustained post-contingency operation for a circuit outage. Roughly 10 MW would be unsupplied for normal weather in 2009. For the extreme weather scenario, 23 MW would have to be curtailed in 2008 and 36 MW in 2009.

Table 12: Supply Gap at Armitage TS for Normal Weather - After Remedial Action

Year	Outage	Forecast Net Demand on Armitage TS (MW)	Immediately following contingency		Sustained post-contingency operation	
			Capability (MW)	Unsupplied Load (MW)	Capability (MW)	Unsupplied Load (MW)
2008	Transformer Outage	338	380	0	340 + 40	0
	Circuit Outage (N-1)		380	0	340	0
2009	Transformer Outage	350	380	0	340 + 40	0
	Circuit Outage (N-1)		380	0	340	10

Source: OPA

Table 13: Supply Gap at Armitage TS for Extreme Weather - After Remedial Action

Year	Outage	Forecast Net Demand on Armitage TS (MW)	Immediately following		Sustained post-	
			Capability (MW)	Unsupplied Load (MW)	Capability (MW)	Unsupplied Load (MW)
2008	Transformer Outage	363	380	0	340 + 40	0
	Circuit Outage (N-1)		380	0	340	23
2009	Transformer Outage	376	380	0	340 + 40	0
	Circuit Outage (N-1)		380	0	340	36

Source: OPA

Risk Exposure Analysis

As shown in Table 14, the risk exposure for opening the bus-tie breaker is reduced to zero hours with remedial measures. As well, the number of exposure hours above station LTR is reduced with remedial action, as indicated in Table 15.

Table 14: Risk Exposure Analysis After Remedial Action – Open Bus Tie Breaker

Exposure	2005 Actual	2006 Actual	2007 Actual	2008 Forecast		2008 with Remedial Action		2009 Forecast		2009 with Remedial Action	
				Normal Weather	Extreme Weather	Normal Weather	Extreme Weather	Normal Weather	Extreme Weather	Normal Weather	Extreme Weather
Days	0	1	0	0	0	0	0	0	1	0	0
Hours	0	1	0	0	0	0	0	0	3	0	0

Source: OPA

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Table 15: Risk Exposure Analysis After Remedial Action – Above Station LTR

Exposure	2005 Actual	2006 Actual	2007 Actual	2008 Forecast		2008 with Remedial Action		2009 Forecast		2009 with Remedial Action	
				Normal Weather	Extreme Weather	Normal Weather	Extreme Weather	Normal Weather	Extreme Weather	Normal Weather	Extreme Weather
Days	18	5	7	1	13	0	8	7	23	3	16
Hours	76	27	28	3	58	0	32	29	124	6	70

Source: OPA

CONCLUSION

Supply concerns remain in NYR. There is an urgent need to implement the recommended plan as detailed in the 2005 report to the OEB and further described in EB-2007-0707, Exhibit E-5-1. A review of summer 2007 found that the supply situation was managed and no load was lost. In part, this was due to cooler weather than experienced in previous summers. An assessment of summer 2008 and summer 2009 found that the supply situation is expected to be tight, but just manageable due to the planned mitigation measures that are, or will be, in place. Most notably during this period are two feeders to transfer roughly 30 MW of load to Brown Hill TS, approximately 26-29 MW of Conservation, 30 MW of post-contingency relief through back-up feeders from PowerStream, and the location of a spare transformer on-site at Armitage TS to shorten the restoration time should a transformer fail. Recent developments indicate that Holland Junction TS should be in-service in 2009. This will go a long way to providing relief to some of the area supply constraints; however, the construction of gas-fired generation and a second new transformer station is required to provide further relief.

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