PUBLIC

REPORT

Power to Ontario.
On Demand.

Lennox GS Deregistration Analysis

Independent Electricity System Operator

Issue 2.0

Final REPORT

Project: Lennox GS Reliability Must Run Contract
Period: October 2006 to September 2007

Transmission Assessments & Performance Department

November 29, 2006

Disclaimer

The posting of documents on this Web site is done for the convenience of *market participants* and other interested visitors to the *IESO* Web site. Please be advised that, while the *IESO* attempts to have all posted documents conform to the original, changes can result from the original, including changes resulting from the programs used to format the documents for posting on the Web site as well as from the programs used by the viewer to download and read the documents. The *IESO* makes no representation or warranty, express or implied, that the documents on this Web site are exact reproductions of the original documents listed. In addition, the documents and information posted on this Web site are subject to change. The *IESO* may revise, withdraw or make final these materials at any time at its sole discretion without further notice. It is solely your responsibility to ensure that you are using up-to-date documents and information.

This document may contain a summary of a particular *market rule*. Where provided, the summary has been used because of the length of the *market rule* itself. The reader should be aware, however, that where a *market rule* is applicable, the obligation that needs to be met is as stated in the "Market Rules". To the extent of any discrepancy or inconsistency between the provisions of a particular *market rule* and the summary, the provision of the *market rule* shall govern.

Document ID	Lennox GS Deregistration Analysis
Document Name	Lennox GS Deregistration Analysis
Issue	Issue 2.0
Reason for Issue	Support Lennox RMR for period Oct 2006 to Sep 2007
Effective Date	November 29, 2006

Document Change History

Issue	Reason for Issue	Date
1.0	First release (Internal draft)	May 25, 2006
2.0	Second release (Public)	November 29, 2006

Related Documents

Document ID	Document Title

Table of Contents

List of Figures

List of Tables

Table of Changes

Reference (Section and Paragraph)	Description of Change
Document	Format to IESO standard.

1. Lennox Deregistration Analysis – summary

Ontario Power Generation (OPG) has requested that operation of Lennox Thermal Generation Station (TGS) be discontinued for economic reasons. This study covers the period October 2006 to September 2007 period and was performed to identify the impact of deregistering Lennox TGS units on reliability of supply to the Ottawa Zone, and the IESO-controlled grid by and large..

Lennox TGS is geographically located near Kingston, Ontario. Electrically this TGS represents over 50% of the total generation capacity in the East zone - 2200MW out of 4396MW - (based on the ten zone model of the Ontario system, as illustrated in the 18-Month Outlook published on Mar 24, 2006 - see Figure 1). Lennox TGS provides a variety of benefits to the IESO Controlled Grid:

- Generation capacity on the load side of the congested transmission lines converging from west towards Toronto (interface FETT – Flow East To Toronto).
- Dynamic voltage control for the GTA.
- Reliable supply to the Ottawa zone.

Analysis of 2005 data shows that all four units at Lennox were simultaneously in service for over 550 hours. During this time, the plant was close to full capacity (over 2000MW) for about 200 hours. Also, it was determined that units at Lennox went in service to compensate for reduced hydro-electric generation in Northern Ontario, for units at Pickering taken out of service for maintenance, and for high load in Ottawa zone.

This analysis is based on the demand forecast for winter 2006 – 2007 and summer 2007, updated hydro-electric generation availability and generator outage plans registered with the IESO as of Apr 24/06. It shows that all 4 units at Lennox are required to operate the system reliably during the period Oct 2006 to Sep 2007. The new generation capacity at Goreway, scheduled to go in service in mid Jun 2007 may reduce the number of units required at Lennox to three. However, the total generation at Goreway expected to go on line by the summer 2007 represents only 485MW, less than one Lennox unit. It should also be recognized that any project delay would push the in service date of this new capacity beyond the first potential period of hot weather in summer 2007. In this regard, it is prudent to contract the fourth unit at Lennox at least until the end of summer 2007 for insurance purposes (e.g., to provide support for any single element contingency during the summer peak).

Under the present limit structure, during winter time the Flow into Ottawa (FIO) is limited to 1900MW with no Lennox units in service. FIO limit can be increased to 1975MW by operating one Lennox unit and even further by arming load rejection in the zone and operating the remaining units at Lennox. It was determined that during winter 2006-2007 extreme weather conditions, the FIO can go as high as 1965MW which requires at least one Lennox unit in service to ensure appropriate pre-contingency reserve. There are no planned or proposed major transmission reinforcements in the Ottawa that will materialize within the study period, other than the direct current interconnection with Hydro Quebec, which is not scheduled to go in service during this study time period.

– End of Section –

2. Conclusions and Recommendations

2.1 Conclusions

Lennox TGS is located at the heart of an area with a deficit of generation:

- The combined peak load of East and Ottawa zones is almost twice the available total generation, including Lennox.
- Lennox represents 50% of the installed generation capacity east of GTA, and taking this facility out of service would reduce the generation resources east of Toronto to about one quarter of the total peak load of this area.
- To compensate for this reduction, most of the energy must come from the west, from the other side of the GTA – the major load center of the province – increasingly stressing the Flow East To Toronto (FETT) and Flow Into Burlington (FIB) interfaces that are already congested.

The Flow Into Ottawa (FIO) is approaching the transmission transfer limit during peak periods:

- The units at Lennox are providing the transfer capability to supply Ottawa in a reliable manner.
- The new DC connection with Hydro Quebec originally expected to go in service in May 2003 didn’t materialize yet and other transmission reinforcement plans for Ottawa zone are far from completion.
- If Lennox units were taken permanently out of service, without adequate replacement resources or transmission reinforcement, almost all the flexibility to supply Ottawa provided by the existing load rejection scheme is lost, and the FIO transfer limit is expected to be insufficient to supply the Ottawa area needs.

The results of this study show that:

- Three units at Lennox are required to provide sufficient pre-contingency reserve
- The fourth unit is needed to provide support for any single element contingency, during the summer peak.
- Decommissioning one 550MW Lennox unit in advance based on the assumption that the new Goreway 485MW generation station will replace it, can have adverse reliability consequences for summer 2007 if Goreway is late.
- Although the very high system demand is unlikely during the first half of June, the planned outage of a fossil unit scheduled to end Jun 09/07 reduces the available generation east of FETT by over 200MW until 4 days before Goreway is planned to go into service. Any

delay in bringing that unit back would virtually offset the overall contribution of Goreway by about 50%.

2.2 Recommendation

All factors mentioned in section 2.1 support the need for retaining all units at Lennox. It is recommended to contract all four units at Lennox for now until at least reliable information is available to determine if Goreway can reliably replace one Lennox unit.

– End of Section –

3. Introduction

3.1 Purpose

This study was performed to identify the impact of retiring Lennox GS units on the reliability of supply to the Ottawa Zone and the overall IESO-controlled grid.

3.2 Scope

The study assessed the need and identified the benefits of retaining Lennox GS for the period Oct 2006 to Sep 2007. This document outlines the technical considerations of this study, the benefits of Lennox TGS for the local area reliability and in controlling congestion over the already congested interfaces FETT (Flow East To Toronto) and FIB (Flow Into Burlington), the role of Lennox GS in providing reactive support and reliable supply to the Ottawa area load.

The study was based mostly on historical information collected during summer 2005 and forecast data as published in the IESO 18 Month Outlook.

3.3 Assumptions and Limitations

This study was performed under the following condition:

- Maximum demand forecast for winter 2006-2007 and summer 2007 under normal and extreme weather conditions (per the IESO 18-Month Outlook published on Mar 24, 2006).
- All existing and committed generation and transmission projects in service.
- Generator outage plans as registered with the IESO to date.
- Hydro-electric generation availability forecast as per the IESO 18-Month Outlook published on Mar 24, 2006.
- Typical FETT limit of 4900 MW during the summer (reduced from 5700MW to account for transmission outages)

– End of Section –

4. Purpose and Major Assumptions

This study was performed to identify the impact of retiring Lennox GS units on the local area reliability. The study covers the period Oct 2006 to Sep 2007, under the following condition:

- Maximum demand forecast for winter 2006-2007 and summer 2007 under extreme weather conditions (per the IESO 18-Month Outlook published on Mar 24, 2006).
- All existing and committed generation and transmission in service.
- Generator outage plans as registered with the IESO to date.
- Hydro-electric generation availability forecast as per the IESO 18-Month Outlook published on Mar 24, 2006.

Typical FETT limit of 4900 MW during the summer - reduced from 5700MW to account for transmission outages.

Ontario was modeled as a ten-area system, as shown in Figure 1 (Ontario Zones, Interfaces and Interconnections).

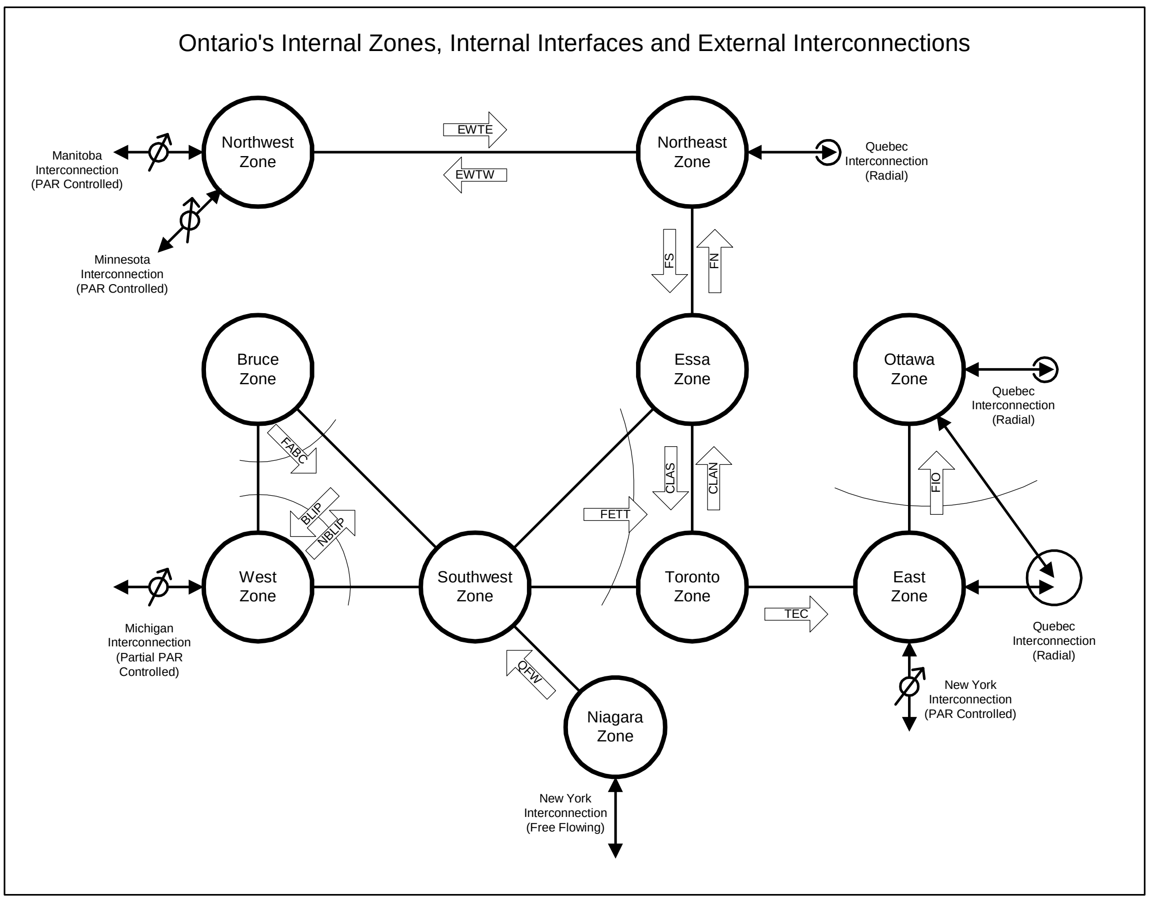


Figure 1: Ontario Zones, Interfaces and Interconnections

During the last few years the highest demand in Ontario, which generally coincides with the highest demand in the GTA, was reached during summer. Analysis was performed to determine if Lennox units are required to improve transfer limits and control flows such that forecast load can be supplied without security violations. Simulations performed with summer peak extreme weather loads, with zero imports into Eastern Ontario and zero flow in at St. Lawrence were used to identify flows and corresponding limits along the congested transmission path west of Toronto (interface FETT and FIB). With all elements in service the pre-contingency flows were checked against continuous ratings and post-contingency flows against long-time emergency and interface ratings. With any one element out of service the pre-contingency flows were checked against long-time emergency ratings, and post contingency flows against short-time emergency ratings.

Ottawa zone reaches the highest demand during the winter season. To asses the impact of retiring Lennox units upon Ottawa zone electricity supply, simulations were performed for the winter peak demand under extreme weather conditions, with zero imports into Eastern Ontario, zero flow at St. Laurence and zero imports from New York at Niagara. With all elements in service the pre-contingency flows were compared against continuous ratings and interface limits – which, for Flow into Ottawa (FIO), under the current limit structure is a function of the number of Lennox units in service – and post-contingency flows against long-time emergency ratings. With any one element out of service the pre-contingency flows were checked against long-time emergency ratings and post-contingency flows against the short-time emergency ratings.

– End of Section –

5. Assessment

The following tests were performed:

5.1 Capacity for Congestion Control – Interface FETT (Flow East To Toronto) and FIB (Flow Into Burlington)

Based on the summer 2007 load forecast, the load in each zone was brought up to (as close as practicable) the following values:

Table 1: Summer 2007 Extreme Coincident Peak Demand Forecast

2007 Summer Peak	Bruce	East	Essa	Niagara	NorthEast	NorthWest	Ottawa	SouthWest	Toronto	West	Ontario
Extreme Coincident	56	2,192	1,060	1,076	1,411	894	1,913	5,373	10,315	3,445	27,736

For the summer 2007 hydro-electric generation in each zone was dispatched as follows:

Table 2: Hydro-Electric Generation Dispatch for Summer 2007

Zone	Generation (MW)
NorthWest	485
NorthEast	1658
Essa	424
East	1370
Niagara	1715
Ontario	5652

Table 3: Major Unit Status, summer 2007

	MW gen	MW max	%
Bruce NGS	4926	4926	100.0
Pickering NGS	3246	3252	99.8
Darlington NGS	3600	3744	96.2
Lambton TGS	2000	2000	100.0
Nanticoke TGS	4021	4052	99.2
Beck GS	1561	2018	77.4

R.H. Saunders GS	710	938	75.8
Chats Falls GS*	78	194	40.3
Chenaux GS	95	123	77.2
Des Joachims GS	395	435	90.8
Otto Holden GS	178	243	73.3
Barett Chute GS	140	178	78.7
Stewartsville GS	133	178	74.6
Arnprior GS	67	85	79.7

*Chatts Falls GS "MW max" represents the total capacity of the station, half of it is normally connected to Quebec.

Main GS's station services consumption - 900MW.

Imports from New York were zero for extreme winter weather, 1500MW for extreme summer weather conditions. Also no imports were assumed from Quebec.

For extreme weather conditions scenario the simulation was performed with one Lennox unit in service at full capacity. A valid solution could not be reached with zero Lennox units in service. Even with one Lennox unit at full capacity the FETT was as high as 5031MW, which is over the expected FETT summer limit. A second unit at Lennox reduced this flow to 4522MW, which only leaves 378MW pre-contingency reserve, insufficient to compensate for the loss of a single Pickering unit.

This shows that a minimum of two Lennox units are required during the summer peak for extreme weather conditions.

The comparison of simulation results with historical operations data, carried out over section 5.1.1 to 5.1.3. below, indicates to the need for additional capacity and energy from Lennox:

5.1.1 Hydro-electric generation in Northern and Eastern Ontario.

Based on 2007 availability forecast, the hydro-electric generation in each zone can vary between a minimum and a maximum value. The following graph shows the percentage of maximum generation forecast for each zone used:

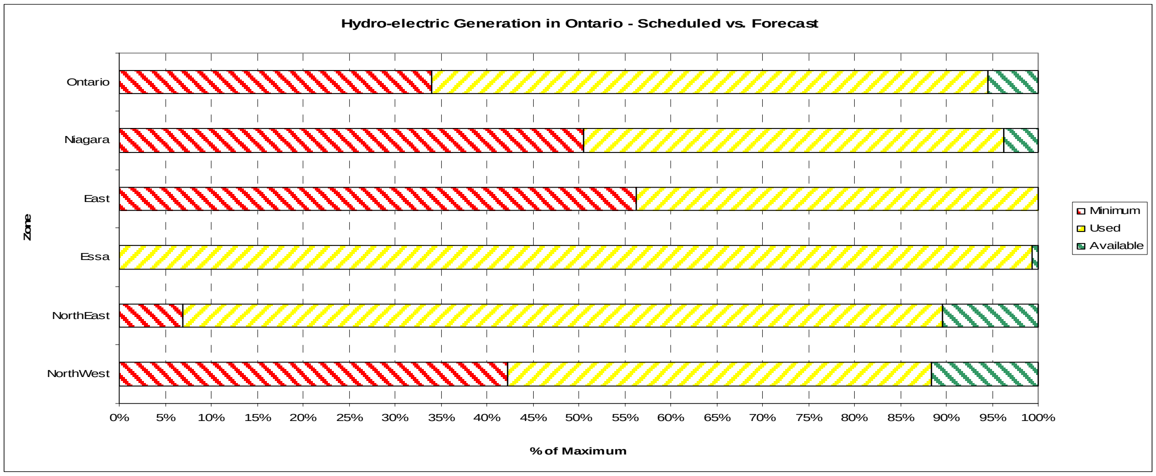


Figure 2: Hydro-electric generation in Ontario - Scheduled vs. Forecast

5.1.1.1 Flow South (FS)

In the study, the hydro-electric generation in Northern Ontario (Northeast and Northwest) was scheduled in such a way as to obtain a Flow South (FS) for a little over 1000MW. During the summer 2005 the actual highest hourly FS values recorded are:

Table 4: Flow South (FS) summer 2005 peak values:

Month	Max (MW)
Jun-05	1006
Jul-05	1030
Aug-05	518

1000MW value used for the study is close to the maximum FS during summer 2005, work days, 07:00 to 20:00, as illustrated below:

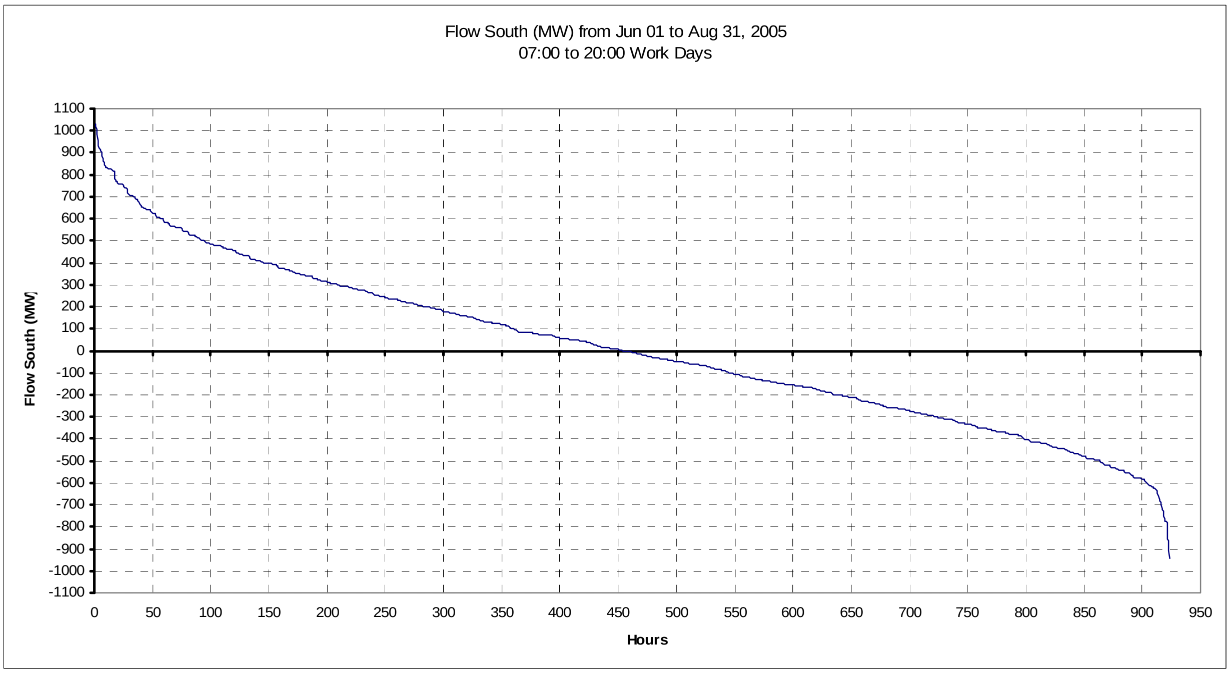


Figure 3: Flow South (MW) from Jun 01 to Aug 31, 2005 - load duration plot

Flow south can only be maintained at 1000MW for a short time due to limited hydro-electric storage. Also, because the water reserves are recovering at a slower rate over hot consecutive summer days with no rain, the generation in Northern Ontario cannot continuously supply the same quantity for several days in a row. The following graph shows that FS (daily peak in MW) has a tendency* to decrease for several days after reaching a peak value:

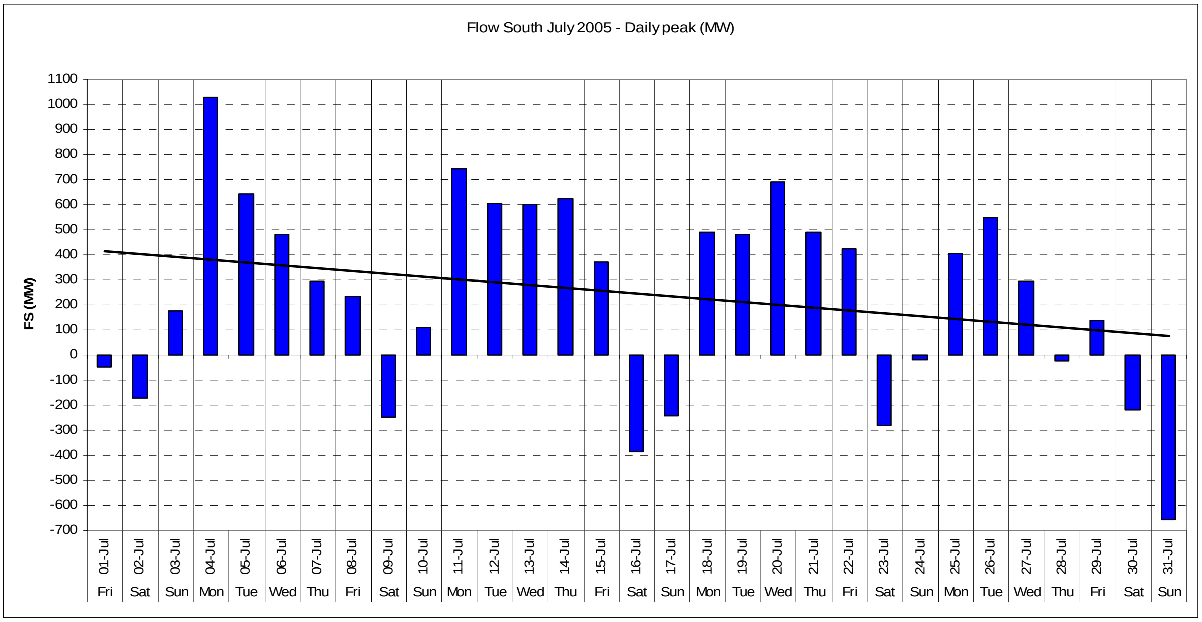


Figure 4: Flow South (FS) daily peak (MW) - Jul 2005

Energy quantities received from Northern Ontario (through FS) show a very similar pattern and tendency*:

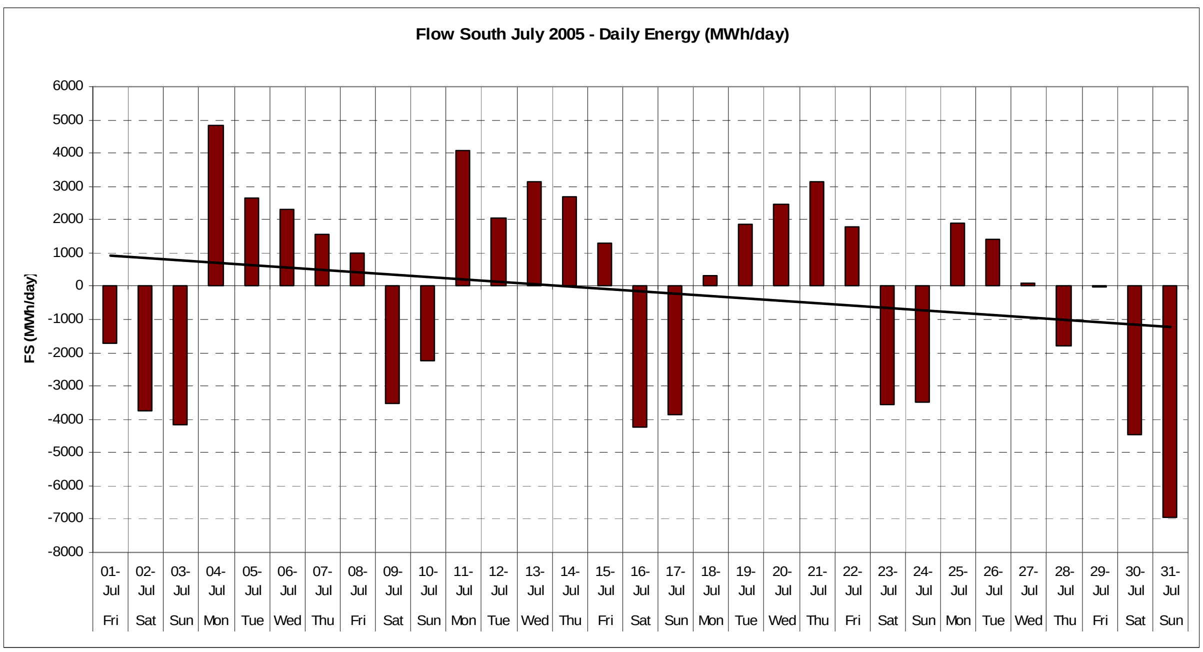


Figure 5: Flow South (FS) daily energy (MWh/day) - July 2005

* July 2005 was used in this example because it is the month of the summer peak and also of the FS peak.

The trend lines show that overall FS decreases as the summer progresses. The 1000MW value on Jul 04 was never reached again for the rest of the month (and summer) and the second highest value was around 700MW. Each day when the FS was above 700MW was followed by at least one or two days with flows below 500MW.

It is reasonable to assume that during a period of extreme summer weather conditions flow south would be anywhere between 500 and 600 MW. Under this assumption one additional Lennox unit (or equivalent import from Quebec) is required to compensate for the difference.

5.1.1.2 Hydro-electric generation in East and Essa

In the simulation, the hydro-electric generation in East and Essa was brought to the maximum forecast level. The values are: 1370MW in East and 424MW in Essa which would add up to 1794MW of hydro-electric generation east of Toronto (east of FETT). The minimum forecast for East for the same time period is 774MW, for Essa is 0MW, so we can certainly count on 774MW. The actual output can be anywhere between the min and max values. Assuming that 75% of maximum East and Essa generation is available results in the need for an additional 448MW that must be compensated by one Lennox unit in service or equivalent import from Quebec.

The conditions described in 5.1.1.1 and 5.1.1.2 may happen simultaneously or one at a time. Assuming one at a time, in addition to the two Lennox units mentioned at the end of section 5.1 a third unit a Lennox should be in service to ensure appropriate pre-contingency flows. If it is assumed that both conditions happen at the same time a fourth unit at Lennox should be available for service.

5.1.2 Pickering NGS and Darlington NGS

With all units at Pickering at Darlington in service, the calculated FETT was over the operating limit. Considering no other contingency, to compensate for the loss of one Pickering unit we need one additional Lennox unit in service. For the loss of one Darlington unit two additional Lennox units must go in service. Import from Quebec went up to a maximum of 800MW during the summer 2005. In this context, the imports from Quebec would account for the equivalent of two Lennox units, one operating at about 60% capacity. The requirement still remains for one additional Lennox unit in order to compensate for the loss of one Darlington. For sufficient transmission spare in preparation for any single element contingency on the Niagara to Toronto path, another Lennox unit is required for reserve.

During summer 2005, out of a total of 2208 hours Pickering had 2 units only in service for 41 hours, 3 for 866, 4 for 627 and 5 for 674:

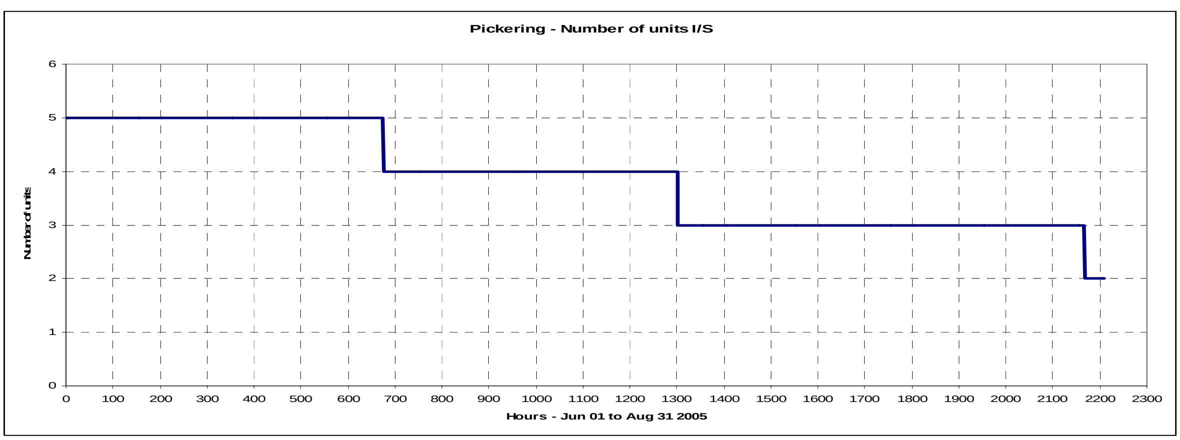


Figure 6: Pickering NGS - Number of units in service from Jun 01 to Aug 31, 2005

From Jun 01/05 to Aug 31/05 the 6th unit was not in service. It came in service on Nov 03/05 (based on the Revenue Metering data). From Nov 03 to Dec 31, 2005, all 6 units were simultaneously in service for 8 hours only.

For summer 2005, Darlington had all 4 units in service for 2202 hours, 3 units only for 6 hours.

It is more likely to have 2 Pickering units out of service simultaneously than one Darlington. Considering that 2 Pickering units add up to 1084MW while one Darlington unit at full output generates 936MW, if these units were out of service, a minimum of 3 Lennox units are required to supply the forecast demand without security violations.

5.1.3 Imports from New York

In order to supply loads with the assumed study generation dispatch in Ontario, 1500MW were imported from New York (west of FETT). The TLTG analysis revealed that the most limiting element is one of the Q23BM and Q25BM transmission lines into Burlington TS.

For any single contingency:

```
TOTAL                                   PRE- RATING
TRANS  <---------- LIMITING ELEMENT ---------->   DISTR.   SHIFT BAS/CNT
CAPAB  <----- FROM -----> <------ TO ------>CKT   FACTOR     MW    A/A  <CONTINGENCY DESCRIPTION>
………………………………….
-1103.8  81537 BURL J25 220 81598 NEALJQ25 220 1   0.08990  -616.0  580.8 CONTINGENCY Q23BM
-1104.0  81537 BURL J25 220 81598 NEALJQ25 220 1   0.09338  -617.3  580.8 CONTINGENCY M572T
-1245.1  81536 BURL J23 220 81597 NEALJQ23 220 1   0.09331  -613.4  590.1 CONTINGENCY M572T
…………………………………..
-1275.9  81516 PA27 REG 230 79592 NIAGAR2W 230 1   0.26966  -325.3  399.6 CONTINGENCY PA302
-1276.3  81516 PA27 REG 230 79592 NIAGAR2W 230 1   0.26957  -325.2  399.6 CONTINGENCY PA301
-1280.1  81500 BECK2 DK 220 81516 PA27 REG 230 27  0.26966  -324.6  400.0 CONTINGENCY PA302
-1280.5  81500 BECK2 DK 220 81516 PA27 REG 230 27  0.26957  -324.5  400.0 CONTINGENCY PA301
……………………………….
```

For any double contingency:

```
TOTAL                                   PRE- RATING
TRANS  <---------- LIMITING ELEMENT ---------->   DISTR.   SHIFT BAS/CNT
CAPAB  <----- FROM -----> <------ TO ------>CKT   FACTOR     MW    A/B  <CONTINGENCY DESCRIPTION>
…………………………………..
-1402.3  81516 PA27 REG 230 79592 NIAGAR2W 230 1   0.19747  -380.3  459.6 CONTINGENCY B560+61+2BR
-1420.2  81516 PA27 REG 230 79592 NIAGAR2W 230 1   0.26966  -346.5  459.6 CONTINGENCY BK2_DT302
-1421.3  81516 PA27 REG 230 79592 NIAGAR2W 230 1   0.26957  -346.2  459.6 CONTINGENCY BK2_DT301
-1446.9  81516 PA27 REG 230 79592 NIAGAR2W 230 1   0.26943  -339.4  459.6 CONTINGENCY BK2_L28T301
-1498.9 *81516 PA27 REG 230 79592 NIAGAR2W 230 1   0.24994  -335.1  459.6 CONTINGENCY BK2_KL76
…………………………….
```

Due to this element, the import capacity from New York is limited to 1200MW under extreme weather conditions and for any single element contingency (compared against long time emergency ratings) in order to ensure appropriate conditions for the second single contingency, and to 1400MW for a double element contingency (compared against short-time emergency ratings). There are also other elements along the path that are limiting the imports from New York through the Beck interface to values below 1500MW. The difference must come from generators located east of (Burlington) Toronto, so it would require the fourth Lennox unit in service or equivalent import from Quebec

5.2 Dynamic Voltage Control for GTA

Analysis of 2005 data shows that at least one, and up to a maximum of 4 Lennox units were in service for reactive support for 1350 out of 2208 hours (61% of the time) between Jun 01 and Aug 31, 2005. During this time they were used to generate or consume reactive, as needed:

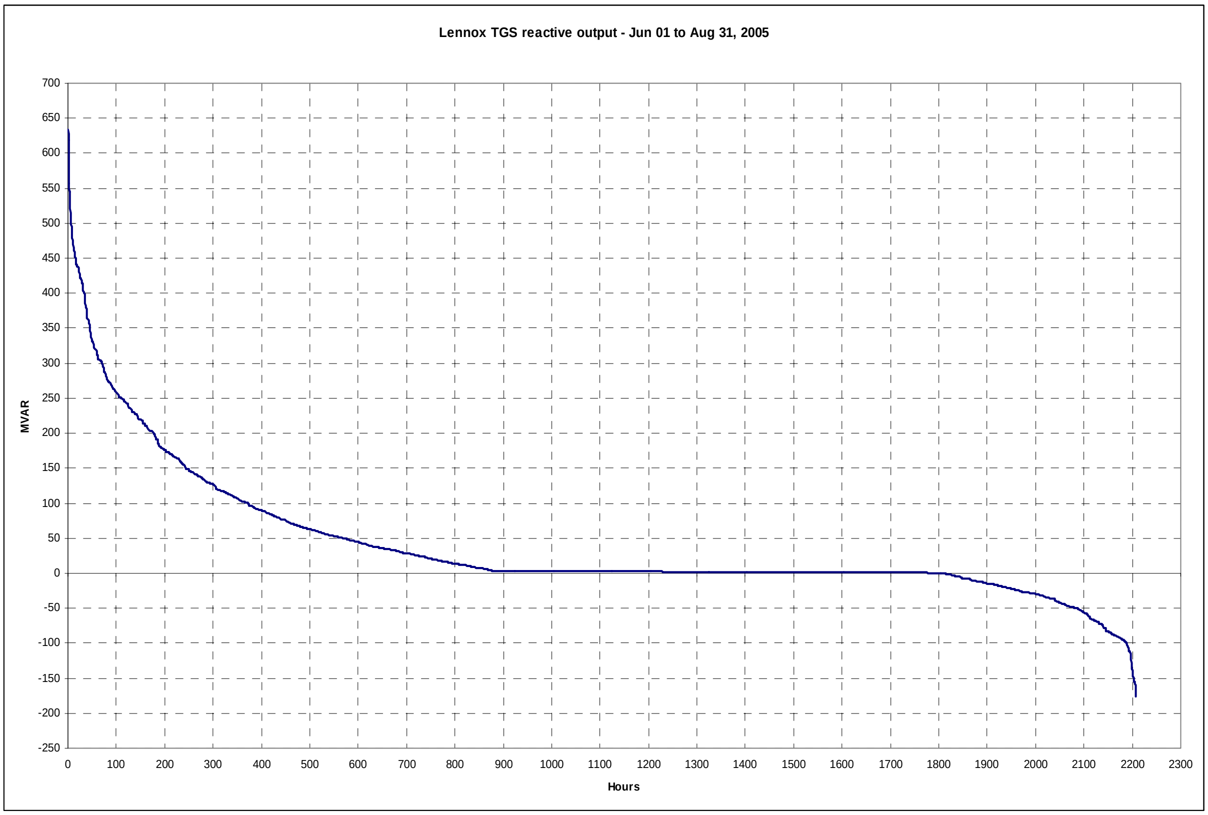


Figure 7: Lennox Mvar output during summer 2005

Each unit can operate to almost 200 Mvar leading (under-excited), and 250Mvar lagging (overexcited). The chart above shows that three units were providing reactive support for short periods of time.

The following graph shows the correlation between Lennox reactive output and system primary demand:

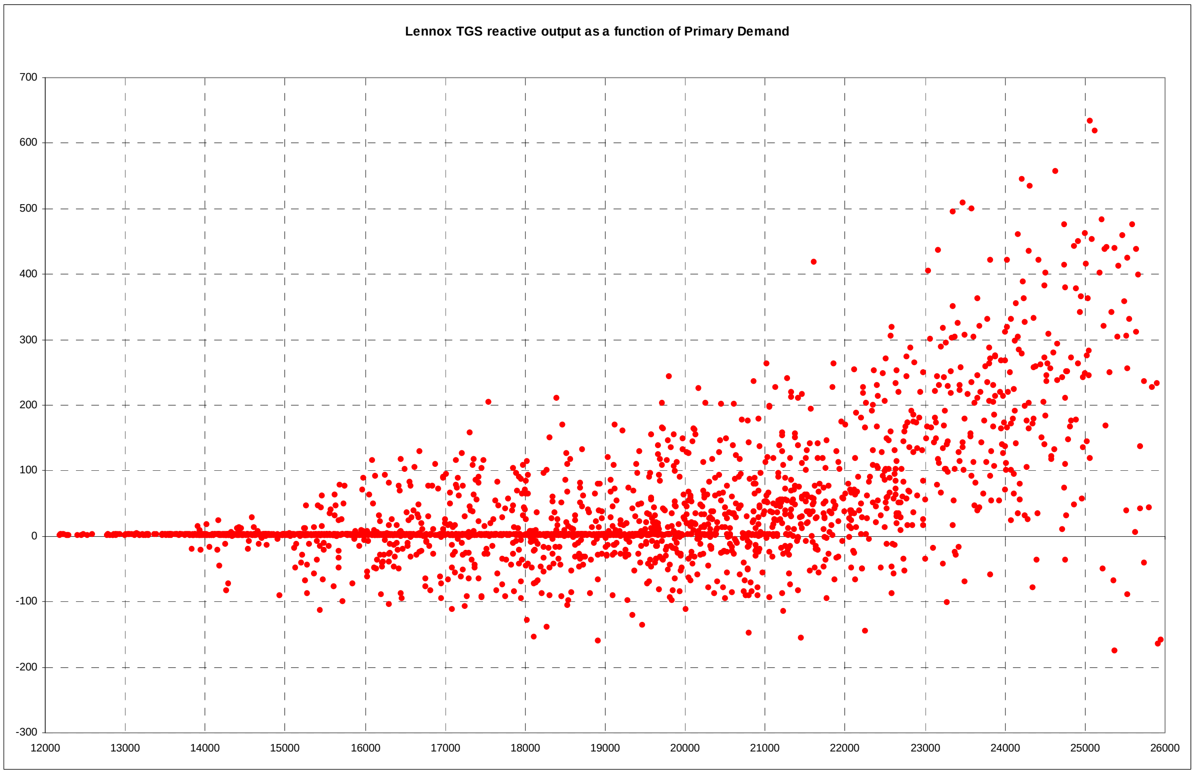


Figure 8: Lennox GS reactive output as a function of primary demand

The Lennox GS contribution increased proportionally with the Primary Demand, exceeding the capacity of two units for some hours.

The 2007 extreme weather simulations were done with one Lennox unit in service and two Lennox units in service:

Table 5: Lennox reactive support

		One Lennox Unit			Two Lennox Units		
	Max	Mvar	%	Spare	Mvar	%	Spare
Pickering NGS	1661.4	1198.9	72.2%	462.6	1064.3	64.1%	597.1
Darlington NGS	1919.6	1890.5	98.5%	29.1	1660.5	86.5%	259.1
Lennox TGS	1000.0	294.2	29.4%	705.8	460.7	46.1%	539.3
R.H. Saunders GS	418.4	139.4	33.3%	279.0	109.2	26.1%	309.2
Chenaux GS	59.3	24.9	42.0%	34.4	21.3	36.0%	37.9
Barett Chute GS	75.0	47.9	63.8%	27.1	39.0	52.0%	36.0
Stewartsville GS	75.8	56.8	75.0%	19.0	55.2	72.8%	20.6
Total	**5303.7**	**3672.8**	**69.2%**	**1630.9**	**3426.8**	**64.6%**	**1876.9**

With a second Lennox unit operating, the reactive loading on the generators at Pickering and Darlington, and also the major hydro-electric units east of Toronto can be reduced, creating spare reactive to more effectively respond to contingencies under peak conditions.

5.3 Reliable supply to Ottawa

Based on the winter 2006-2007 demand forecast, the load in each zone was brought up to the following values in the simulations:

Table 6: Winter 2006-2007 Extreme Coincident Peak Demand Forecast

2006-2007 Winter Peak	Bruce	East	Essa	Niagara	NorthEast	NorthWest	Ottawa	SouthWest	Toronto	West	Ontario
Extreme Coincident	70	2,589	1,225	863	1,888	1,024	2,201	5,007	8,444	2,651	25,963

For the winter 2006-2007 the hydro-electric generation in each zone was scheduled as follows:

Table 7 - Hydro-Electric Generation Dispatch for Winter 2006-2007

Zone	Generation (MW)
NorthWest	533
NorthEast	1772
Essa	376
East	1506
Niagara	1711
Ontario	5898

Table 8: Major Unit Status, winter 2006-2007

	MW gen	MW max	%
Bruce NGS	4926	4926	100.0
Pickering NGS	3246	3252	99.8
Darlington NGS	3600	3744	96.2
Lambton TGS	2000	2000	100.0
Nanticoke TGS	3725	4052	91.9
Beck GS	1557	2018	77.2
R.H. Saunders GS	781	938	83.3
Chats Falls GS*	86	194	44.3
Chenaux GS	104	123	84.9
Des Joachims GS	346	435	79.6
Otto Holden GS	190	243	78.3

Barett Chute GS	154	178	86.5
Stewartsville GS	146	178	82.0
Arnprior GS	74	85	87.7

*Chatts Falls GS "MW max" represents the total capacity of the station, half of it is normally connected to Quebec.

Main GS's station services consumptions = 900MW.

Zero imports from New York and Quebec.

One simulation for extreme weather conditions was performed with one Lennox unit in service that was providing mostly reactive support to maintain acceptable voltage levels in Ottawa zone. A valid solution could not be found with zero Lennox units in service due to voltage control problems. To supply the forecast load in Ottawa resulted in a FIO of 1965MW. With all elements in service, one Lennox unit is required to support this high a flow.

For some transmission outage conditions, the limit can go as low as 1500MW. This limit can be improved by 300MW if all units at Lennox are in service and at least 375MW of load rejection is armed in Ottawa. The resulting 1800MW is still insufficient for the highest expected FIO. Further improvement can be achieved by importing the difference from Quebec.

– End of Section –

Appendix A: 2007 forecast

The following information was used to produce the base cases used during this study:

A.1 Hydro-electric generation forecast

Table 9: Hydro-electric generation forecast

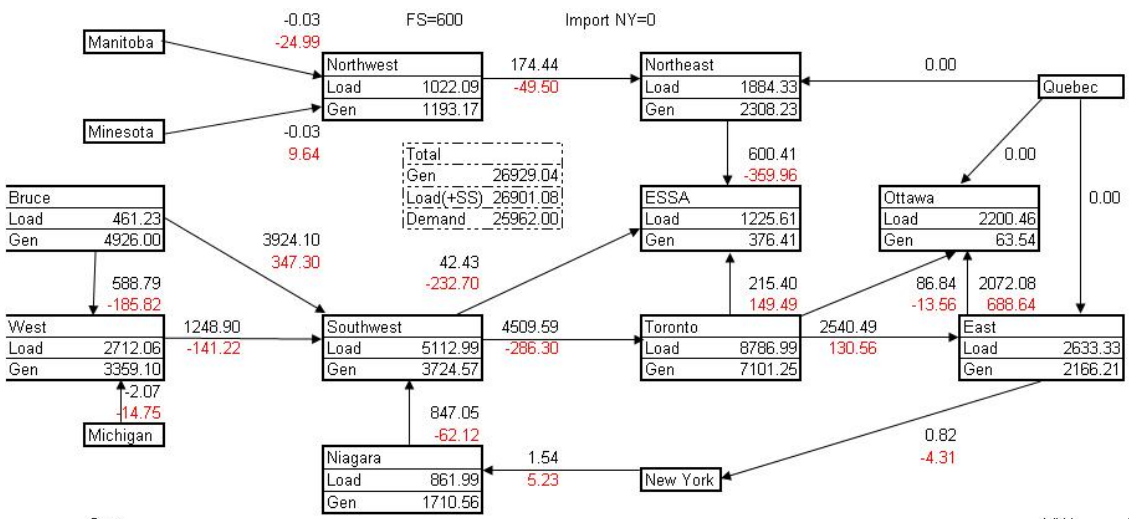
	EFFECTIVE DATE	UNIT NAME	MINIMUM	MAXIMUM (MW)	ENERGY (MWh)
* NW HYDRO:					
@	JAN2007	'NWHYDR'	242.1	545	381871
@	FEB2007	'NWHYDR'	244.3	624	344942
@	MAR2007	'NWHYDR'	245.7	581	361678
@	APR2007	'NWHYDR'	234.5	452	301594
@	MAY2007	'NWHYDR'	220.4	589	303795
@	JUN2007	'NWHYDR'	231.7	549	320045
@	JUL2007	'NWHYDR'	251.7	310	358478
@	AUG2007	'NWHYDR'	232.1	445	330875
@	SEP2007	'NWHYDR'	222.6	314	306558
* NE HYDRO:					
@	JAN2007	'NEHYDR'	167	2050	684453
@	FEB2007	'NEHYDR'	167.3	2177	614322
@	MAR2007	'NEHYDR'	167.7	1884	654293
@	APR2007	'NEHYDR'	165.6	1848	801901
@	MAY2007	'NEHYDR'	164.3	2260	1139776
@	JUN2007	'NEHYDR'	163.3	1844	873021
@	JUL2007	'NEHYDR'	130.4	1629	719744
@	AUG2007	'NEHYDR'	127.5	1850	596636
@	SEP2007	'NEHYDR'	128.4	1839	520087
* EAST HYDRO:					
@	JAN2007	'EHYDRO'	617	1513	698197
@	FEB2007	'EHYDRO'	665	1449	651500
@	MAR2007	'EHYDRO'	695	1581	760647
@	APR2007	'EHYDRO'	766	1695	820600
@	MAY2007	'EHYDRO'	784	1481	871600
@	JUN2007	'EHYDRO'	787	1229	789600
@	JUL2007	'EHYDRO'	774	1370	732600
@	AUG2007	'EHYDRO'	771	1100	696000
@	SEP2007	'EHYDRO'	767	1252	662300

* ESSA HYDRO:					
@	JAN2007	'ESSAHD'	0	419	201200
@	FEB2007	'ESSAHD'	0	423	180300
@	MAR2007	'ESSAHD'	0	419	180500
@	APR2007	'ESSAHD'	0	400	185300
@	MAY2007	'ESSAHD'	0	427	247000
@	JUN2007	'ESSAHD'	0	418	190600
@	JUL2007	'ESSAHD'	0	414	157300
@	AUG2007	'ESSAHD'	0	427	129500
@	SEP2007	'ESSAHD'	0	331	121500
* OTTAWA HYDRO:					
@	JAN2007	'OTTHYD'	0	0	31500
@	FEB2007	'OTTHYD'	0	0	24100
@	MAR2007	'OTTHYD'	0	0	33300
@	APR2007	'OTTHYD'	0	0	54800
@	MAY2007	'OTTHYD'	0	0	43700
@	JUN2007	'OTTHYD'	0	0	22600
@	JUL2007	'OTTHYD'	0	0	9300
@	AUG2007	'OTTHYD'	0	0	5300
@	SEP2007	'OTTHYD'	0	0	4900
* NIAGARA HYDRO:					
@	JAN2007	'NIAHYD'	1000	1778	1065800
@	FEB2007	'NIAHYD'	1000	1735	972900
@	MAR2007	'NIAHYD'	1000	1649	1078900
@	APR2007	'NIAHYD'	900	1607	1007000
@	MAY2007	'NIAHYD'	900	1320	1074100
@	JUN2007	'NIAHYD'	900	1656	1028700
@	JUL2007	'NIAHYD'	900	1752	1028400
@	AUG2007	'NIAHYD'	900	1781	1008900
@	SEP2007	'NIAHYD'	900	1312	964000

– End of Section –

Appendix B: Ontario Flows winter 2006-2007 and summer 2007, extreme weather.

B.1 Winter 2006-2007:



Gen	MW	%Max	Mvar	%Max
Bruce	4926.00	1.00	1417.60	0.55
Pickering	3246.00	1.00	778.34	0.47
Darlington	3600.00	0.96	1664.52	0.87
Lennox	400.00	0.18	432.47	0.73
Lambton	2000.00	1.00	559.44	0.58
Nanticoke	3724.57	0.92	1154.46	0.56
Beck	1557.39	0.77	635.52	0.60

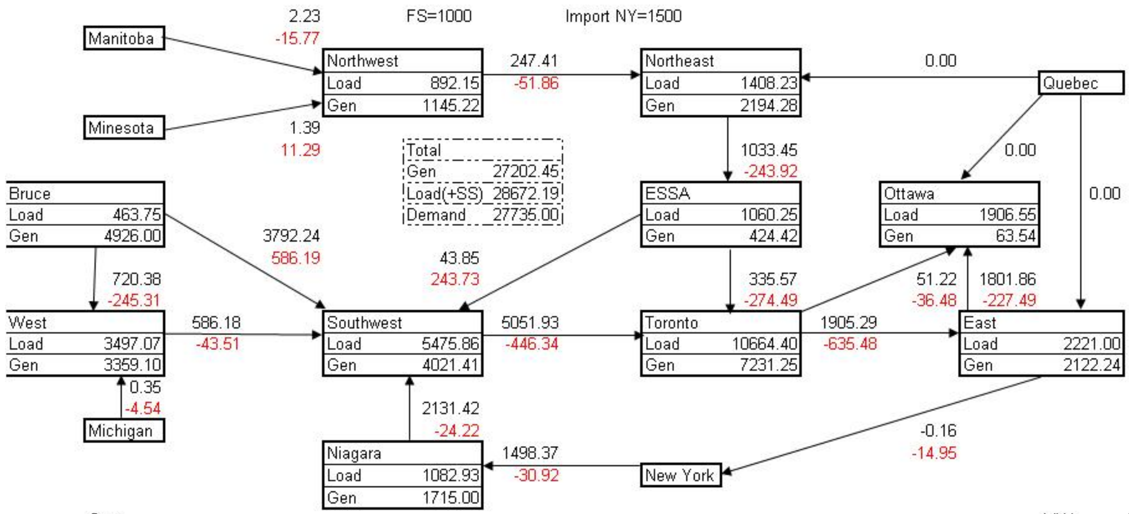
Gen	MW	%Max	Mvar	%Max
Saunders	780.86	0.83	235.86	0.56
Chats	85.78	0.44	15.21	0.37
Chenaux	104.12	0.85	38.89	0.66
D.Joachim	346.34	0.80	-28.10	-0.16
Ot Holden	190.20	0.78	30.83	0.33
Barett Ch	153.99	0.87	69.90	0.93
Stewartsv	146.11	0.82	49.57	0.65
Arnprior	74.16	0.88	23.85	0.70

	MW	MVAr
FIO	1965.13	907.86
TEC	2540.49	130.56
CLAN	215.40	149.49
FETT	4552.02	-519.01
FS	600.41	-359.96
EWTE	174.44	-49.50
QFW	847.05	-62.12
NBLIP	660.11	44.60
FABC	4512.89	161.48

Figure 9: Ontario flows and major generation winter 2006-2007

B.2 Summer-2007:

One unit at Lennox:



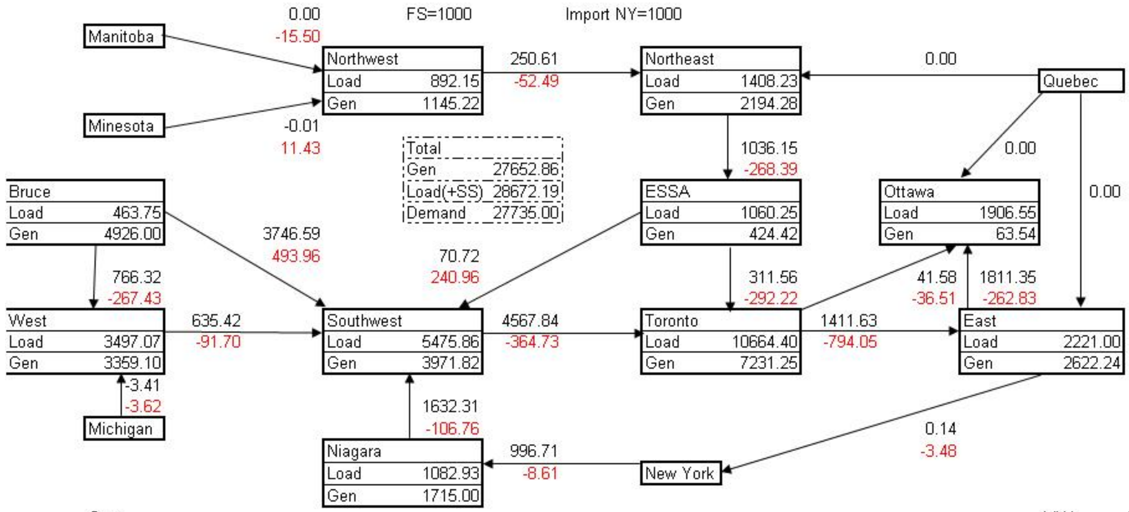
Gen	MW	%Max	Mvar	%Max
Bruce	4926.00	1.00	1622.91	0.63
Pickering	3246.00	1.00	1198.88	0.72
Darlington	3600.00	0.96	1890.52	0.98
Lennox	500.00	0.23	294.23	1.00
Lambton	2000.00	1.00	715.44	0.74
Nanticoke	4021.41	0.99	1622.31	0.79
Beck	1561.41	0.77	913.51	0.87

Gen	MW	%Max	Mvar	%Max
Saunders	710.36	0.76	139.41	0.33
Chats	78.04	0.40	40.96	1.00
Chenaux	94.72	0.77	24.90	0.42
D.Joachim	395.00	0.91	-14.20	-0.08
Ot Holden	177.98	0.73	20.18	0.21
Barett Ch	140.09	0.79	47.86	0.64
Stewartsv	132.92	0.75	56.84	0.75
Arnprior	67.46	0.80	-23.08	-0.68

	MW	MVAr
FIO	1688.66	195.69
TEC	1905.29	-635.48
CLAS	335.57	-274.49
FETT	5031.60	-616.69
FS	1033.45	-243.92
EWTE	247.41	-51.86
QFW	2131.42	-24.22
BLIP	134.19	-288.82
FABC	4512.62	340.88

Figure 10: Ontario flows and major generation summer 2007 (one Lennox)

Two units at Lennox:



Gen	MW	%Max	Mvar	%Max
Bruce	4926.00	1.00	1500.01	0.59
Pickering	3246.00	1.00	1064.30	0.64
Darlington	3600.00	0.96	1660.52	0.87
Lennox	1000.00	0.45	460.72	0.78
Lambton	2000.00	1.00	693.78	0.72
Nanticoke	3971.82	0.98	1517.11	0.74
Beck	1561.41	0.77	800.12	0.76

Gen	MW	%Max	Mvar	%Max
Saunders	710.36	0.76	109.24	0.26
Chats	78.04	0.40	40.96	1.00
Chenaux	94.72	0.77	21.35	0.36
D.Joachim	395.00	0.91	-25.01	-0.14
Ot Holden	177.98	0.73	16.53	0.18
Barett Ch	140.09	0.79	38.95	0.52
Stewartsv	132.92	0.75	55.20	0.73
Arnprior	67.46	0.80	-23.08	-0.68

	MW	MVAr
FIO	1684.20	185.73
TEC	1411.63	-794.05
CLAS	311.56	-292.22
FETT	4522.43	-545.02
FS	1036.15	-268.39
EWTE	250.61	-52.49
QFW	1632.31	-106.76
BLIP	130.90	-359.12
FABC	4512.91	226.53

Figure 11: Ontario flows and major generation summer 2007 (two Lennox)

Note: imports from New York reduced by 500MW to account for the second unit at Lennox in service.

– End of Section –

Appendix C: TLTG analysis results

```
..........................................................................................................
. PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E   THU, MAY 18 2006  11:57   PAGE 1 .
.                                                                                        .
.                   2006 SUMMER MEN/VEM BASE CASE - TRIAL 3 VERSION 2                            .
.                   MARKET DISPATCH BY PJM AND MISO - 1/27/06                                .
.                                                                                        .
.                  *** TLTG IMPORT LIMIT OUTPUT FOR BASE CASE              ***                   .
..........................................................................................................

DISTRIBUTION FACTOR FILE:     D:\Cases\RMRLennox07\Case\summer_07_extreme_1_Lennox_1500US_caps.dfx
SUBSYSTEM DESCRIPTION FILE:   D:\Cases\RMRLennox07\Case\LennoxRMR.sub
MONITORED ELEMENT FILE:       D:\Cases\RMRLennox07\Case\LennoxRMR.mon
CONTINGENCY DESCRIPTION FILE: D:\Cases\RMRLennox07\Case\LennoxRMR.con

                           PRE-SHIFT    DELTA  POST-SHIFT
STUDY SYSTEM MW GENERATION:      27202.4    -100.0   27102.4
OPPOSING SYSTEM MW GENERATION:    3726.7     100.0    3826.7
STUDY SYSTEM NET INTERCHANGE:    -1495.6    -100.0   -1595.6

<------------- STUDY SYSTEM ------------->  <----------- OPPOSING SYSTEM ------------>
               <---- GENERATOR MW ---->                 <---- GENERATOR MW ---->
  BUS   BUS NAME      BASE   SHIFT  CHANGE    BUS   BUS NAME      BASE   SHIFT  CHANGE
80908 PIC A G124.0   540.0   523.3   -16.7          74700 AK 3     22.0   350.0   362.7    12.7
80909 PIC A G424.0   540.0   523.3   -16.7          78964 BETH STM18.0   325.0   345.8    20.8
80913 PIC B G524.0   542.0   525.3   -16.7          76640 DUNKGEN313.8    60.0    66.2     6.2
80914 PIC B G624.0   542.0   525.3   -16.7          76641 DUNKGEN413.8    85.0    89.8     4.8
80911 PIC B G724.0   542.0   525.3   -16.7          79940 GINNA 1919.0   550.0   555.4     5.4
80912 PIC B G824.0   540.0   523.3   -16.7          75523 KINTIG2424.0   550.0   564.3    14.3
                                                     77953 OSWGO 6G22.0   750.0   761.8    11.8
                                                     79539 POLETSTG18.0   150.0   156.2     6.2
                                                     74190 ROSE GN124.0   586.7   593.7     7.0
                                                     77969 SITH-S5 18.0   160.0   165.4     5.4
                                                     77970 SITH-S6 18.0   160.0   165.4     5.4


LOADINGS AT OR ABOVE 100.0 %                  <------------- BASE CASE ------------->
OF RATING ARE MARKED WITH '*'              TOTAL         PRE-   POST-   LIMIT
                                   TRANS RATING  SHIFT   SHIFT    CASE    DISTR.
<----- FROM -----> <------ TO ------> CKT   CAPAB    A      MW      MW      MW     FACTOR
82761 CRAWJ 4E 118 82735 KEITH KP 118  1  >99999.   210  -218.3* -218.3* -217.2*  0.00001
     INTERFACE FETT                    -1327.9  5000  5167.0* 5266.5* ******* -0.99561
81516 PA27 REG 230 79592 NIAGAR2W 230  1  -1767.3   400  -346.5  -366.2  22102.*  0.19677
81500 BECK2 DK 220 81516 PA27 REG 230  27 -1773.5   400  -345.3  -365.0  22104.*  0.19677
81537 BURL J25 220 81598 NEALJQ25 220  1  -2306.1   584  -518.1  -526.2  8757.1*  0.08130

81500 BECK2 DK 220 81595 HANONJ24 220  1  -2332.7   511   381.4   396.9  -17276* -0.15477
```

81500 BECK2 DK 220 81596 HANONJ29 220 1 -2395.4 519 382.4 397.6 -16936* -0.15180
81536 BURL J23 220 81597 NEALJQ23 220 1 -2451.3 593 -515.2 -523.4 8767.6* 0.08137
81500 BECK2 DK 220 80313 N WEST25 220 1 -2615.4 503 336.6 351.5 -16616* -0.14859
80123 HANONJ25 220 80313 N WEST25 220 1 -2648.1 503 -331.7 -346.5 16627.* 0.14865

80122 HANONJ23 220 80312 N WEST23 220 1 -2650.4 499 -329.1 -343.8 16459.* 0.14715
81500 BECK2 DK 220 80312 N WEST23 220 1 -2670.4 507 334.0 348.8 -16461* -0.14721
81500 BECK2 DK 220 81630 DONOJQ32 220 1 -2733.0 591 424.1 437.6 -14966* -0.13490
80123 HANONJ25 220 81598 NEALJQ25 220 1 -2797.8 523 329.4 344.3 -16630* -0.14865
81515 BP76 REG 230 76665 PACKARD2 230 1 -2838.9 478 -248.9 -266.0 19207.* 0.17053

81500 BECK2 DK 220 81515 BP76 REG 230 76 -2840.1 478 -248.7 -265.8 19207.* 0.17053

81484 ALANJQ30 220 81615 MIDDLDK1 220 1 -2858.1 393 220.7 233.3 -14207* -0.12646
80122 HANONJ23 220 81597 NEALJQ23 220 1 -2876.2 530 326.8 341.6 -16462* -0.14715
INTERFACE QFW -2980.7 3615 2131.4 2231.3 ******* -0.99900
81490 BEACH 220 81596 HANONJ29 220 1 -2991.7 643 -475.7 -486.9 12278.* 0.11179
INTERFACE NIAG -3015.7 3018 1499.4 1599.3 ******* -0.99904

80519 ERINJR19 220 80541 HANLNJ19 220 1 -3032.8 501 361.9 371.0 -9959.* -0.09046
80518 ERINJR21 220 80542 HANLNJ21 220 1 -3046.0 501 360.8 369.8 -9959.* -0.09045
80142 ALANBGR2 118 81680 ALLANB60 118 R2 -3150.6 210 175.1 177.2 -2204.* -0.02085
81482 ALANBQ26 220 81500 BECK2 DK 220 1 -3395.2 591 -358.4 -370.6 13612.* 0.12245
81508 BECK B 345 79584 NIAG 345 345 1 -3450.9 1070 -452.1 -483.7 35600.* 0.31600

81500 BECK2 DK 220 81501 BECK2PA2 220 1 -3452.1 1070 -451.7 -483.3 35600.* 0.31600
81509 BECK A 345 79584 NIAG 345 345 1 -3453.5 1070 -451.8 -483.4 35571.* 0.31574
81500 BECK2 DK 220 81502 BECK2PA1 220 1 -3455.0 1070 -451.3 -482.9 35572.* 0.31575
81537 BURL J25 220 81535 BURLINGT 220 1 -3455.4 584 424.7 432.8 -8851.* -0.08130
INTERFACE NY -3556.5 3558 1499.1 1599.0 ******* -0.99904

81490 BEACH 220 81595 HANONJ24 220 1 -3593.8 643 -464.9 -473.4 9217.8* 0.08487
81536 BURL J23 220 81535 BURLINGT 220 1 -3612.1 593 420.8 428.9 -8861.* -0.08136
81496 BEA RD18 220 81535 BURLINGT 220 1 -3878.8 501 257.4 267.6 -11404* -0.10221
81508 BECK B 345 81501 BECK2PA2 220 02 -3938.5 1224 452.0 483.6 -35600* -0.31600
81509 BECK A 345 81502 BECK2PA1 220 01 -3941.5 1224 451.7 483.3 -35571* -0.31574

81484 ALANJQ30 220 81500 BECK2 DK 220 1 -3985.3 643 -348.0 -359.9 13169.* 0.11848
INTERFACE FIB -3990.9 4083 2943.8 2989.5 -49140* -0.45652
80518 ERINJR21 220 80731 TRAFALGA 220 1 -3993.8 670 -444.1 -453.1 9874.7* 0.09045
81630 DONOJQ32 220 81615 MIDDLDK1 220 1 -4017.7 591 243.6 257.3 -15472* -0.13775
80519 ERINJR19 220 80731 TRAFALGA 220 1 -4022.8 670 -441.4 -450.4 9878.7* 0.09046

80006 CHERRYWD 500 80468 CHERYDK3 220 14 -4106.3 803 489.8 501.8 -13199* -0.11998
80520 ERINJR14 220 80731 TRAFALGA 220 1 -4174.7 670 -427.8 -436.8 9887.1* 0.09041
80521 ERINJR17 220 80731 TRAFALGA 220 1 -4177.6 670 -427.5 -436.5 9888.6* 0.09042
81482 ALANBQ26 220 81615 MIDDLDK1 220 1 -4201.9 591 232.6 245.9 -14875* -0.13242
80006 CHERRYWD 500 80467 CHERYDK2 220 16 -4292.3 803 467.8 479.8 -13207* -0.11986

```
80520 ERINJR14 220 80725 TOMKJR14 220  1  -4452.6   501   233.6   242.7  -10082* -0.09042
80521 ERINJR17 220 80730 TOMKJR17 220  1  -4456.6   501   233.3   242.3  -10083* -0.09042
81496 BEA RD18 220 81490 BEACH    220  1  -4503.8   630  -322.6  -332.8  11337.*  0.10220
81600 HORNJM27 220 81615 MIDDLDK1 220  1  -4613.5   530  -389.2  -393.7  4762.4*  0.04515
81601 HORNJM28 220 81615 MIDDLDK1 220  1  -4613.7   530  -389.2  -393.7  4763.5*  0.04516

81495 BEA RD20 220 81490 BEACH    220  1  -4695.0   643  -318.8  -328.9  11243.*  0.10134
80006 CHERRYWD 500 80469 CHERYDK1 220  15 -4695.0   847   465.0   477.0  -13156* -0.11939
81535 BURLINGT 220 80125 PAL JT37 220  1  -4937.6   670   276.8   288.3  -12755* -0.11423
81535 BURLINGT 220 80124 PAL JT36 220  1  -4939.8   670   276.7   288.1  -12753* -0.11421
81535 BURLINGT 220 80589 LANTZJ39 220  1  -5136.0   670   254.7   266.1  -12760* -0.11407



.........................................................................................................................
.                        PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E   THU, MAY 18 2006  11:57          PAGE 206 .
.                                                                                                                       .
.                            2006 SUMMER MEN/VEM BASE CASE - TRIAL 3 VERSION 2                                    .
.                            MARKET DISPATCH BY PJM AND MISO - 1/27/06                                     .
.                                                                                                                       .
.                             *** TLTG IMPORT LIMIT OUTPUT FOR SUBSYSTEM ONT_IMP_PIC  ***                              .
.........................................................................................................................

SOLUTION OF 573 SYSTEM CONDITIONS ATTEMPTED    573 INSOLUBLE SYSTEM CONDITIONS

  TOTAL                                              PRE- RATING
  TRANS  <---------- LIMITING ELEMENT ---------->   DISTR.   SHIFT BAS/CNT
  CAPAB  <----- FROM -----> <------ TO ------>CKT   FACTOR     MW    A/A  <--------------- CONTINGENCY DESCRIPTION -------
-------->
-658.8       INTERFACE FETT                   -0.99561  5833.1 5000.0 CONTINGENCY 1-DARL
 -723.4  81537 BURL J25 220 81598 NEALJQ25 220 1   0.11518  -672.9  584.0 CONTINGENCY Q24+29HM
 -731.7  81536 BURL J23 220 81597 NEALJQ23 220 1   0.11183  -678.4  593.0 CONTINGENCY Q25BM+29HM
 -746.3  81537 BURL J25 220 81598 NEALJQ25 220 1   0.08865  -650.4  584.0 CONTINGENCY M572T+573T
 -752.9  80142 ALANBGR2 118 81680 ALLANB60 118 R2 -0.02415   227.5  209.6 CONTINGENCY Q25BM+30M
 -780.4  80476 CLAIRVIL 220 80041 CLAIRVIL 500 13  0.02622  -828.8  810.0 CONTINGENCY W4L551
 -804.9       INTERFACE FETT                   -0.86283  5595.9 5000.0 CONTINGENCY 1-PICK
 -814.2  80142 ALANBGR2 118 81680 ALLANB60 118 R2 -0.02345   225.6  209.6 CONTINGENCY Q25BM+Q26A
 -822.8       INTERFACE FETT                   -0.86207  5580.0 5000.0 CONTINGENCY L18L30
 -824.9       INTERFACE FETT                   -0.86279  5578.7 5000.0 CONTINGENCY L15L31
 -826.7 *      INTERFACE FETT                  -0.86280  5577.1 5000.0 CONTINGENCY KL32
 -834.0  81536 BURL J23 220 81597 NEALJQ23 220 1   0.11521  -669.2  593.0 CONTINGENCY Q24+29HM

 -892.1 *81537 BURL J25 220 81598 NEALJQ25 220 1   0.08538  -635.5  584.0 CONTINGENCY B560+61+2BR
 -895.2  81536 BURL J23 220 81597 NEALJQ23 220 1   0.08863  -646.2  593.0 CONTINGENCY M572T+573T
 -902.7 *80142 ALANBGR2 118 81680 ALLANB60 118 R2 -0.02080   221.9  209.6 CONTINGENCY MIDD_L1L30
-1039.2 *81536 BURL J23 220 81597 NEALJQ23 220 1   0.08540  -632.0  593.0 CONTINGENCY B560+61+2BR
-1086.3  81600 HORNJM27 220 81615 MIDDLDK1 220 1   0.07929  -562.5  530.0 CONTINGENCY V586M+M585M
-1086.9  81601 HORNJM28 220 81615 MIDDLDK1 220 1   0.07930  -562.4  530.0 CONTINGENCY V586M+M585M
-1148.2  81516 PA27 REG 230 79592 NIAGAR2W 230 1   0.19751  -468.6  400.0 CONTINGENCY B560+61+2BR
-1154.4  81500 BECK2 DK 220 81516 PA27 REG 230 27  0.19750  -467.4  400.0 CONTINGENCY B560+61+2BR
```

-1192.8 81537 BURL J25 220 81535 BURLINGT 220 1 -0.11921 620.1 584.0 CONTINGENCY V586M+M585M
-1229.3 81516 PA27 REG 230 79592 NIAGAR2W 230 1 0.26965 -471.8 400.0 CONTINGENCY BK2_DT301
-1233.8 81500 BECK2 DK 220 81516 PA27 REG 230 27 0.26965 -470.6 400.0 CONTINGENCY BK2_DT301
-1242.6 81516 PA27 REG 230 79592 NIAGAR2W 230 1 0.26973 -468.2 400.0 CONTINGENCY BK2_DT302
-1247.2 81500 BECK2 DK 220 81516 PA27 REG 230 27 0.26974 -467.0 400.0 CONTINGENCY BK2_DT302
-1269.3 81516 PA27 REG 230 79592 NIAGAR2W 230 1 0.26953 -461.0 400.0 CONTINGENCY BK2_L28T301
-1273.9 81500 BECK2 DK 220 81516 PA27 REG 230 27 0.26952 -459.8 400.0 CONTINGENCY BK2_L28T301
-1307.1 *81516 PA27 REG 230 79592 NIAGAR2W 230 1 0.26974 -450.9 400.0 CONTINGENCY PA302
-1311.6 *81500 BECK2 DK 220 81516 PA27 REG 230 27 0.26974 -449.6 400.0 CONTINGENCY PA302
-1317.0 81536 BURL J23 220 81535 BURLINGT 220 1 -0.11884 614.2 593.0 CONTINGENCY V586M+M585M
-1336.8 81490 BEACH 220 81595 HANONJ24 220 1 0.13806 -664.9 643.0 CONTINGENCY Q25BM+29HM
-1365.7 81500 BECK2 DK 220 81595 HANONJ24 220 1 -0.21452 538.9 511.0 CONTINGENCY Q25BM+29HM
-1374.1 81490 BEACH 220 81596 HANONJ29 220 1 0.17265 -664.0 643.0 CONTINGENCY Q23BM+24HM
-1392.7 81500 BECK2 DK 220 81596 HANONJ29 220 1 -0.20769 540.4 519.0 CONTINGENCY Q23BM+24HM
-1398.3 80518 ERINJR21 220 80542 HANLNJ21 220 1 -0.10825 511.5 501.0 CONTINGENCY L19L22
-1402.1 80519 ERINJR19 220 80541 HANLNJ19 220 1 -0.10637 510.9 501.0 CONTINGENCY L20L21
-1457.9 80518 ERINJR21 220 80542 HANLNJ21 220 1 -0.10945 505.1 501.0 CONTINGENCY R19T
-1458.0 80519 ERINJR19 220 80541 HANLNJ19 220 1 -0.10945 505.1 501.0 CONTINGENCY R21T
-1458.9 80518 ERINJR21 220 80542 HANLNJ21 220 1 -0.10942 505.0 501.0 CONTINGENCY A2L19
-1459.0 80519 ERINJR19 220 80541 HANLNJ19 220 1 -0.10942 505.0 501.0 CONTINGENCY A2L21
-1459.0 80519 ERINJR19 220 80541 HANLNJ19 220 1 -0.10942 505.0 501.0 CONTINGENCY A2L21
-1459.6 80518 ERINJR21 220 80731 TRAFALGA 220 1 0.10825 -673.9 670.0 CONTINGENCY L19L22
-1464.6 80519 ERINJR19 220 80731 TRAFALGA 220 1 0.10635 -673.3 670.0 CONTINGENCY L20L21
-1483.1 *80519 ERINJR19 220 80541 HANLNJ19 220 1 -0.13846 502.7 501.0 CONTINGENCY R14T+17T
-1491.4 80518 ERINJR21 220 80542 HANLNJ21 220 1 -0.13843 501.6 501.0 CONTINGENCY R14T+17T
-1518.6 80518 ERINJR21 220 80731 TRAFALGA 220 1 0.10941 -667.5 670.0 CONTINGENCY R19T
-1518.8 80519 ERINJR19 220 80731 TRAFALGA 220 1 0.10944 -667.5 670.0 CONTINGENCY R21T
-1519.6 80518 ERINJR21 220 80731 TRAFALGA 220 1 0.10941 -667.4 670.0 CONTINGENCY A2L19
-1519.8 80519 ERINJR19 220 80731 TRAFALGA 220 1 0.10943 -667.4 670.0 CONTINGENCY A2L21
-1519.8 80519 ERINJR19 220 80731 TRAFALGA 220 1 0.10943 -667.4 670.0 CONTINGENCY A2L21
-1533.3 *80518 ERINJR21 220 80542 HANLNJ21 220 1 -0.11735 496.6 501.0 CONTINGENCY V586M+M585M
-1534.4 81537 BURL J25 220 81535 BURLINGT 220 1 -0.11511 579.5 584.0 CONTINGENCY Q24+29HM
-1535.1 81490 BEACH 220 81595 HANONJ24 220 1 0.10304 -638.9 643.0 CONTINGENCY Q23+25BM
-1592.4 81500 BECK2 DK 220 81630 DONOJQ32 220 1 -0.16194 575.3 591.0 CONTINGENCY Q26+28A
-1595.5 INTERFACE FIB -0.66601 4016.5 4083.0 CONTINGENCY V586M+M585M
-1619.3 80518 ERINJR21 220 80731 TRAFALGA 220 1 0.10421 -657.1 670.0 CONTINGENCY HL38
-1619.4 *80518 ERINJR21 220 80731 TRAFALGA 220 1 0.10419 -657.1 670.0 CONTINGENCY H1H2
-1619.5 *80519 ERINJR19 220 80731 TRAFALGA 220 1 0.10422 -657.1 670.0 CONTINGENCY HL21
-1635.8 81500 BECK2 DK 220 81596 HANONJ29 220 1 -0.20359 490.5 519.0 CONTINGENCY Q23+25BM
-1642.4 81500 BECK2 DK 220 81595 HANONJ24 220 1 -0.21071 480.1 511.0 CONTINGENCY Q23+25BM
-1653.4 81536 BURL J23 220 81535 BURLINGT 220 1 -0.11548 574.8 593.0 CONTINGENCY Q24+29HM
-1686.8 81500 BECK2 DK 220 81595 HANONJ24 220 1 -0.20061 472.6 511.0 CONTINGENCY Q25BM+30M
-1686.9 81535 BURLINGT 220 81601 HORNJM28 220 1 0.07927 -529.8 545.0 CONTINGENCY V586M+M585M
-1687.4 81535 BURLINGT 220 81600 HORNJM27 220 1 0.07929 -529.8 545.0 CONTINGENCY V586M+M585M
-1689.5 81500 BECK2 DK 220 81596 HANONJ29 220 1 -0.19786 480.6 519.0 CONTINGENCY Q25BM+30M
-1707.6 81500 BECK2 DK 220 81595 HANONJ24 220 1 -0.18272 472.3 511.0 CONTINGENCY M20D+Q29HM
-1728.2 81500 BECK2 DK 220 80313 N WEST25 220 1 -0.20157 456.1 503.0 CONTINGENCY Q24+29HM
-1736.8 80520 ERINJR14 220 80731 TRAFALGA 220 1 0.10812 -643.9 670.0 CONTINGENCY L17L21
-1737.8 *81500 BECK2 DK 220 81595 HANONJ24 220 1 -0.18205 466.9 511.0 CONTINGENCY Q29HM

-1744.6 81500 BECK2 DK 220 81596 HANONJ29 220 1 -0.19915 469.4 519.0 CONTINGENCY Q25BM+Q26A
-1748.7 81500 BECK2 DK 220 81630 DONOJQ32 220 1 -0.17547 546.6 591.0 CONTINGENCY Q25BM+30M
-1749.5 80521 ERINJR17 220 80731 TRAFALGA 220 1 0.10630 -643.0 670.0 CONTINGENCY L14L5
-1752.3 80123 HANONJ25 220 80313 N WEST25 220 1 0.20165 -451.2 503.0 CONTINGENCY Q24+29HM
-1752.8 80122 HANONJ23 220 80312 N WEST23 220 1 0.19964 -447.6 499.0 CONTINGENCY Q24+29HM
-1763.4 80122 HANONJ23 220 80312 N WEST23 220 1 0.19787 -446.0 499.0 CONTINGENCY Q25BM+29HM
-1767.4 81500 BECK2 DK 220 80312 N WEST23 220 1 -0.19788 453.2 507.0 CONTINGENCY Q25BM+29HM
-1767.7 81500 BECK2 DK 220 80312 N WEST23 220 1 -0.19971 452.7 507.0 CONTINGENCY Q24+29HM
-1772.1 81490 BEACH 220 81596 HANONJ29 220 1 0.12863 -607.4 643.0 CONTINGENCY M27+28B
-1782.3 *81500 BECK2 DK 220 81596 HANONJ29 220 1 -0.17778 468.0 519.0 CONTINGENCY M21D+Q24HM
-1784.8 81490 BEACH 220 81596 HANONJ29 220 1 0.15867 -597.1 643.0 CONTINGENCY Q23+25BM
-1789.8 80520 ERINJR14 220 80731 TRAFALGA 220 1 0.10941 -637.8 670.0 CONTINGENCY A1L17
-1789.8 80521 ERINJR17 220 80731 TRAFALGA 220 1 0.10941 -637.8 670.0 CONTINGENCY A1L14
-1791.2 80521 ERINJR17 220 80731 TRAFALGA 220 1 0.10938 -637.7 670.0 CONTINGENCY R14T
-1791.2 80520 ERINJR14 220 80731 TRAFALGA 220 1 0.10936 -637.7 670.0 CONTINGENCY R17T
-1795.0 81500 BECK2 DK 220 80313 N WEST25 220 1 -0.20363 442.0 503.0 CONTINGENCY Q23BM+24HM
-1800.2 81537 BURL J25 220 81535 BURLINGT 220 1 -0.08866 557.0 584.0 CONTINGENCY M572T+573T

```
...................................................................................................................................
.                        PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E   THU, MAY 18 2006  12:00          PAGE 214 .
.                                                                                                                                  .
.                            2006 SUMMER MEN/VEM BASE CASE - TRIAL 3 VERSION 2                                          .
.                            MARKET DISPATCH BY PJM AND MISO - 1/27/06                                         .
.                                                                                                                                  .
.                             *** TLTG IMPORT LIMIT OUTPUT FOR SUBSYSTEM ONT_IMP_PIC  ***                               .
...................................................................................................................................

SOLUTION OF 573 SYSTEM CONDITIONS ATTEMPTED    573 INSOLUBLE SYSTEM CONDITIONS

 TOTAL                                          PRE- RATING
 TRANS  <---------- LIMITING ELEMENT ---------->   DISTR.   SHIFT BAS/CNT
 CAPAB  <----- FROM -----> <------ TO ------>CKT   FACTOR     MW    A/B  <--------------- CONTINGENCY DESCRIPTION -------
-------->
-1224.3  81537 BURL J25 220 81598 NEALJQ25 220 1   0.09487  -725.7  700.0 CONTINGENCY Q23BM+24HM
-1327.9       INTERFACE FETT                   -0.99561  5167.0 5000.0 BASE CASE
-1382.0  81537 BURL J25 220 81598 NEALJQ25 220 1   0.11908  -713.5  700.0 CONTINGENCY V586M+M585M
-1451.8  81516 PA27 REG 230 79592 NIAGAR2W 230 1   0.26965  -471.8  460.0 CONTINGENCY BK2_DT301
-1452.0  81516 PA27 REG 230 79592 NIAGAR2W 230 1   0.19751  -468.6  460.0 CONTINGENCY B560+61+2BR
-1465.1  81516 PA27 REG 230 79592 NIAGAR2W 230 1   0.26973  -468.2  460.0 CONTINGENCY BK2_DT302
-1491.9  81516 PA27 REG 230 79592 NIAGAR2W 230 1   0.26953  -461.0  460.0 CONTINGENCY BK2_L28T301
-1515.4  81536 BURL J23 220 81597 NEALJQ23 220 1   0.11875  -708.6  711.0 CONTINGENCY V586M+M585M
-1529.5 *81516 PA27 REG 230 79592 NIAGAR2W 230 1   0.26974  -450.9  460.0 CONTINGENCY PA302
-1730.5  81537 BURL J25 220 81598 NEALJQ25 220 1   0.11518  -672.9  700.0 CONTINGENCY Q24+29HM
-1773.5  81500 BECK2 DK 220 81516 PA27 REG 230 27  0.19677  -345.3  400.0 BASE CASE
-1786.9  81536 BURL J23 220 81597 NEALJQ23 220 1   0.11183  -678.4  711.0 CONTINGENCY Q25BM+29HM
-1836.6  80142 ALANBGR2 118 81680 ALLANB60 118 R2 -0.02415   227.5  235.8 CONTINGENCY Q25BM+30M
-1850.5  81500 BECK2 DK 220 81595 HANONJ24 220 1  -0.21452   538.9  615.0 CONTINGENCY Q25BM+29HM
-1858.3  81536 BURL J23 220 81597 NEALJQ23 220 1   0.11521  -669.2  711.0 CONTINGENCY Q24+29HM
-1898.2  81500 BECK2 DK 220 81596 HANONJ29 220 1  -0.20769   540.4  624.0 CONTINGENCY Q23BM+24HM
-1929.6  81537 BURL J25 220 81598 NEALJQ25 220 1   0.11766  -648.9  700.0 CONTINGENCY MIDD_T6L23
-1930.1  80142 ALANBGR2 118 81680 ALLANB60 118 R2 -0.02345   225.6  235.8 CONTINGENCY Q25BM+Q26A
-2024.7  80519 ERINJR19 220 80541 HANLNJ19 220 1  -0.13846   502.7  576.0 CONTINGENCY R14T+17T
-2033.2  80518 ERINJR21 220 80542 HANLNJ21 220 1  -0.13843   501.6  576.0 CONTINGENCY R14T+17T
-2043.1  81515 BP76 REG 230 76665 PACKARD2 230 1   0.22158  -370.7  492.0 CONTINGENCY BK2_DL27
-2054.9 *81537 BURL J25 220 81598 NEALJQ25 220 1   0.08865  -650.4  700.0 CONTINGENCY M572T+573T
-2091.1  80518 ERINJR21 220 80542 HANLNJ21 220 1  -0.10825   511.5  576.0 CONTINGENCY L19L22
-2103.9  81490 BEACH    220 81596 HANONJ29 220 1   0.17265  -664.0  769.0 CONTINGENCY Q23BM+24HM
-2107.2  80519 ERINJR19 220 80541 HANLNJ19 220 1  -0.10637   510.9  576.0 CONTINGENCY L20L21
-2112.4 *80142 ALANBGR2 118 81680 ALLANB60 118 R2 -0.02320   221.4  235.8 CONTINGENCY Q32A
-2122.4  81515 BP76 REG 230 76665 PACKARD2 230 1   0.21658  -356.3  492.0 CONTINGENCY BK2_TL26L27
-2135.9  81500 BECK2 DK 220 81595 HANONJ24 220 1  -0.21071   480.1  615.0 CONTINGENCY Q23+25BM
-2139.6  81515 BP76 REG 230 76665 PACKARD2 230 1   0.22586  -346.5  492.0 CONTINGENCY BK2_DT301
-2143.2  80518 ERINJR21 220 80542 HANLNJ21 220 1  -0.10945   505.1  576.0 CONTINGENCY R19T
-2143.3  80519 ERINJR19 220 80541 HANLNJ19 220 1  -0.10945   505.1  576.0 CONTINGENCY R21T
-2144.3  80518 ERINJR21 220 80542 HANLNJ21 220 1  -0.10942   505.0  576.0 CONTINGENCY A2L19
-2144.4  80519 ERINJR19 220 80541 HANLNJ19 220 1  -0.10942   505.0  576.0 CONTINGENCY A2L21
-2144.4 *80519 ERINJR19 220 80541 HANLNJ19 220 1  -0.10942   505.0  576.0 CONTINGENCY A2L21
```

-2148.3 81515 BP76 REG 230 76665 PACKARD2 230 1 0.22592 -344.5 492.0 CONTINGENCY BK2_DT302
-2151.6 81500 BECK2 DK 220 81596 HANONJ29 220 1 -0.20359 490.5 624.0 CONTINGENCY Q23+25BM

– End of Section –

References

Document Name	Document ID

– End of Document –