

Independent Electricity Market Operator

Ontario Demand Forecast
from January 2003 to June 2004



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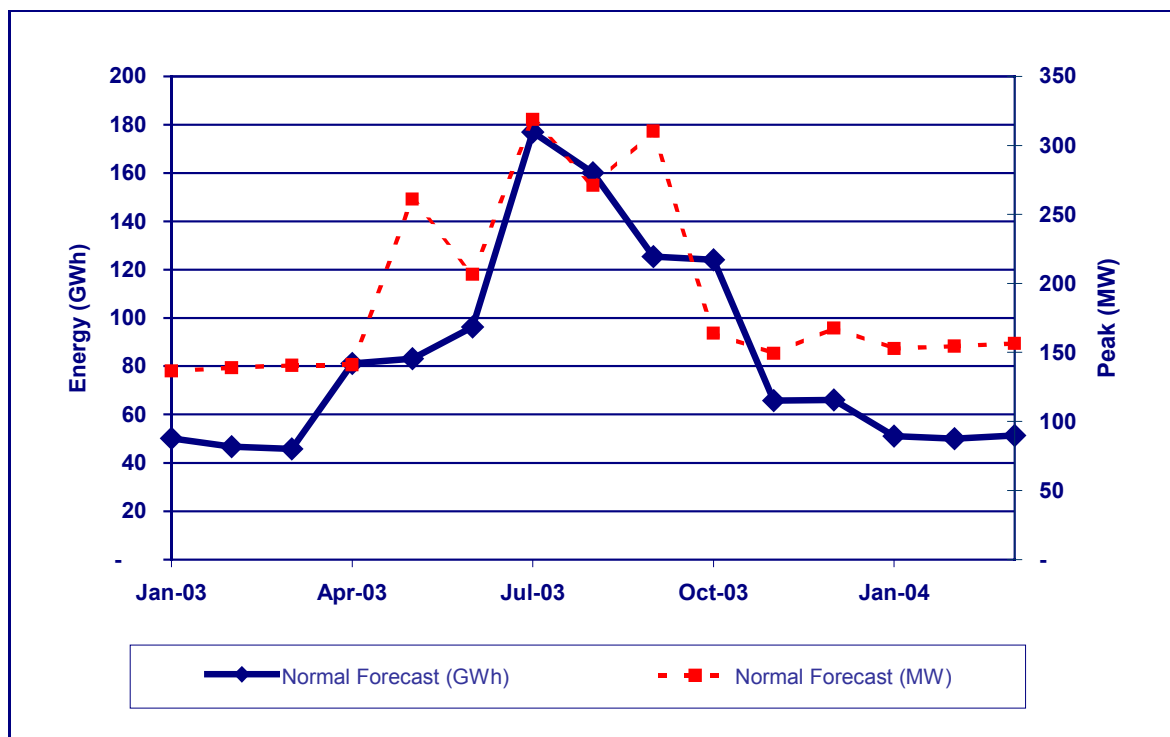
Executive Summary

This 18-Month forecast is an update to and supercedes the 18-Month demand forecast released September 24, 2002. No structural or methodological changes have been made to the forecasting system since the previous forecast. The forecasting system has been updated to reflect actual economic, demand and weather data through to the end of September 2002. The economic forecast was also updated to reflect the most current outlook for the Ontario economy. Incorporating the strong actual demand values for the third quarter of 2002 have increased the model's sensitivity to hot weather and economic activity. Therefore, despite a marginally weaker economic outlook for 2003 and 2004, the forecast for energy and peak demand have increased modestly since the last forecast. The energy demand forecast for 2003 is 152.1 TWh, representing a 0.6% increase over the expected weather corrected total for 2002. The forecasted energy demand for 2003 is 1.1 TWh higher than the previous forecast.

The peak demand forecast for both the winter and summer of 2003 are higher than the previous forecast due to the model's increased sensitivity to hot weather and economic activity. The Normal peak demand for the winter of 2003 is expected to reach 23,890 MW and the Extreme peak demand will exceed 25,600MW. For the summer of 2003, the Normal weather peak is expected to top 23,670 MW and the Extreme weather peak to near 26,385 MW.

Figure 1 shows the difference between the current and previous demand forecasts over their common time frame. The difference is calculated as the current less the previous forecast, with negative values indicating that the current forecast is lower.

Figure 1 Difference in Monthly Peak and Energy Demand – Current Forecast Vs Previous



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1.0 Introduction

1.1 Outlook Documents

The Ontario Electricity Market Rules (Chapter 5 Section 7.1) require that the Independent Electricity Market Operator (IMO) produce and publish demand forecasts on a quarterly basis for the next 18 months. This Ontario Demand Forecast covers the 18-Month period from January 2003 to June 2004 and supercedes the previous forecast from October 2002 to March 2004, dated September 24, 2002.

1.2 Demand Forecast Document

This document provides an 18-Month forecast of electricity demand for Ontario, based on the stated assumptions, and using the described methodology in the document “Methodology to Perform Long Term Assessments “(IMO_REP_0044). Readers may envision other possible scenarios, recognizing the uncertainties associated with various input assumptions, and are encouraged to use their own judgement in considering possible future scenarios. This forecast provides a base upon which changes in assumptions can be considered.

The Ontario Demand is the sum of coincident loads plus the losses on the IMO-controlled grid. This demand forecast was based on actual demand, weather and economic data as of September 2002.

Section 2.0 describes the assumptions used in this forecast of electricity demand. Section 3.0 looks at historical demand, Section 4.0 presents the forecast and Appendices A through C contain additional demand forecast details and analysis.

Readers are invited to provide comments on this report or to give suggestions as to the content of future reports. To do so, please call the IMO Help Centre at 905-403-6900 or 1-888-448-7777 or send an email to helpcentre@theIMO.com. Copies of the forecast, by hour and zone, are available upon request.

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2.0 Forecasting Inputs and Assumptions

A detailed description of the demand forecasting methodology can be found in the document [Methodology to Perform Long Term Assessments \(IMO_REP_0044\)](#). In addition to the methodology described in the document, the forecast of electricity demand requires inputs and/or assumptions with respect to economic activity and weather. This section describes these inputs.

Consumption of energy is modeled using three sets of forecast drivers: calendar variables, weather effects and economic conditions. Each of these drivers is embedded in the forecasting system and each plays a role in shaping the results. Appendix C, Analytical Factors Affecting Demand, summarizes the relative impacts on energy and peak demand for the driver variables.

Calendar variables are relatively static and are not addressed here. For a more detailed discussion the reader is encouraged to look at the [Methodology](#) document.

Weather effects include measures of temperature, cloud cover, wind speed and dew point. Both energy and peak demand are weather sensitive. The length and severity of a season's weather contributes to the level of energy consumed and severe weather conditions usually underpin the seasonal peaks.

For purposes of the demand forecast "Normal" weather - based on historical data - is utilized rather than forecast weather. Normal weather is calculated by ranking the weather within each historical week, then taking the average of each of the ranked days. In this way, the Normal weather for each week reflects both hotter and colder days. An Extreme weather scenario is also based on historical weather but uses minimums and maximums rather the average in the Normal weather scenario. It is interesting to note that the Extreme scenario is essentially built of a series of 1 in 30-year events. The possibility of this occurring every week is very remote, however the possibility of having at least one week with a 1 in 30 years event is significant. Hence the need for the Extreme scenario. A more detailed explanation of how the Extreme and Normal weather scenarios are generated is contained in the [Methodology](#) document.

Load Forecast Uncertainty (LFU) is a measure of the uncertainty in demand due to weather variations. LFU represents the variation in peak demand due to one standard deviation in the weather elements underpinning the peak demand. This information is valuable in determining a distribution of potential outcomes under various weather conditions. It should be recognized that for resource adequacy assessments, the "Normal" weather forecast is used in conjunction with LFU to consider a range of peak demands that can occur with various weather conditions with varying probability of occurrence.

Economic conditions contribute to the growth in both peak and energy demand. To produce a demand forecast an economic forecast of various drivers is required. A consensus of four major, publicly available provincial forecasts was utilized to generate the economic drivers used in the model. Table 2.1 summarizes the key economic drivers for energy and peak demand on the IMO-controlled grid.

In general, the economic outlook for Ontario sees moderate growth for both 2003 and 2004. In comparison to the previous demand forecast the growth expectations are marginally lower for both 2003 and 2004.

Table 2.1 Ontario Economic Drivers

Year	Ontario Employment		Ontario Housing Starts	
	Thousands	Annual Growth (%)	Thousands	Annual Growth (%)
1995	5,128	2.0	31.9	(23.3)
1996	5,175	0.9	39.5	23.9
1997	5,298	2.4	50.0	26.5
1998	5,476	3.4	50.1	0.2
1999	5,672	3.6	62.9	25.6
2000	5,856	3.2	67.4	7.1
2001	5,962	1.8	70.3	4.2
2002 (f)	6,051	1.5	79.8	13.6
2003 (f)	6,169	2.0	70.4	(11.7)
2004 (f)	6,274	1.7	66.5	(5.6)

Notes to Table 2.1:

(f) indicates a forecasted value.

3.0 Historical Demand

This section looks at historical energy and peak demand and the factors affecting them. Energy demand represents the total consumption of electricity during a specified period of time, be it an hour, day, week, month, season or year. Peak demand represents the maximum requirement for electricity at a specific point in time. Ontario measures peak demand over the course of an hour. Peaks can be considered on a daily, weekly, monthly, seasonal or annual basis.

Table 3.1 shows the actual annual energy and peak demand, on a calendar basis, for the period 1984-2002.

Table 3.1 Ontario Annual Energy and Peak Demand

Calendar Year	Annual Demand					
	Actual Energy (TWh)	Annual Growth (%)	Winter Peak (MW)	Annual Growth (%)	Summer Peak (MW)	Annual Growth (%)
1984	112.3		18,783		15,787	
1985	116.0	3.3%	20,393	8.6%	16,007	1.4%
1986	120.6	3.9%	20,586	0.9%	16,882	5.5%
1987	126.5	4.9%	20,448	-0.7%	18,502	9.6%
1988	134.4	6.3%	22,933	12.2%	19,454	5.1%
1989	140.8	4.7%	23,491	2.4%	20,025	2.9%
1990	136.7	-2.9%	22,272	-5.2%	20,408	1.9%
1991	137.0	0.2%	23,046	3.5%	21,121	3.5%
1992	134.4	-1.9%	23,463	1.8%	19,939	-5.6%
1993	133.5	-0.7%	21,964	-6.4%	20,883	4.7%
1994	134.9	1.0%	23,857	8.6%	20,918	0.2%
1995	137.0	1.6%	22,812	-4.4%	21,674	3.6%
1996	137.4	0.3%	22,072	-3.2%	21,378	-1.4%
1997	138.4	0.7%	22,030	-0.2%	21,613	1.1%
1998	139.9	1.1%	21,984	-0.2%	22,403	3.7%
1999	144.1	3.0%	23,150	5.3%	23,433	4.6%
2000	146.9	2.0%	23,301	0.7%	23,160	-1.2%
2001	146.9	0.0%	22,432	-3.7%	25,239	9.0%
2002			22,623	0.9%	25,414	0.7%
Average Growth	1.6%		1.0%		2.7%	

Notes to Table 3.1:

Bold indicates the annual peak.

3.1 Historical Energy Demand

Actual primary energy demand has averaged annual growth of 1.6% over the historic period of 1984 to 2001. Energy demand is affected by the three classes of drivers but to varying degrees. On an annual basis, all years would be equal in terms of calendar effects except for leap years, which would have an additional day. Weather will impact annual energy consumption, however not to the degree that peak values are weather sensitive. This is due to the fact that throughout the course of the year, the variability of weather will mean that highs and lows tend to offset each other. The growth in energy demand is highly influenced by the economic class of drivers, which includes both economic activity and demographic factors.

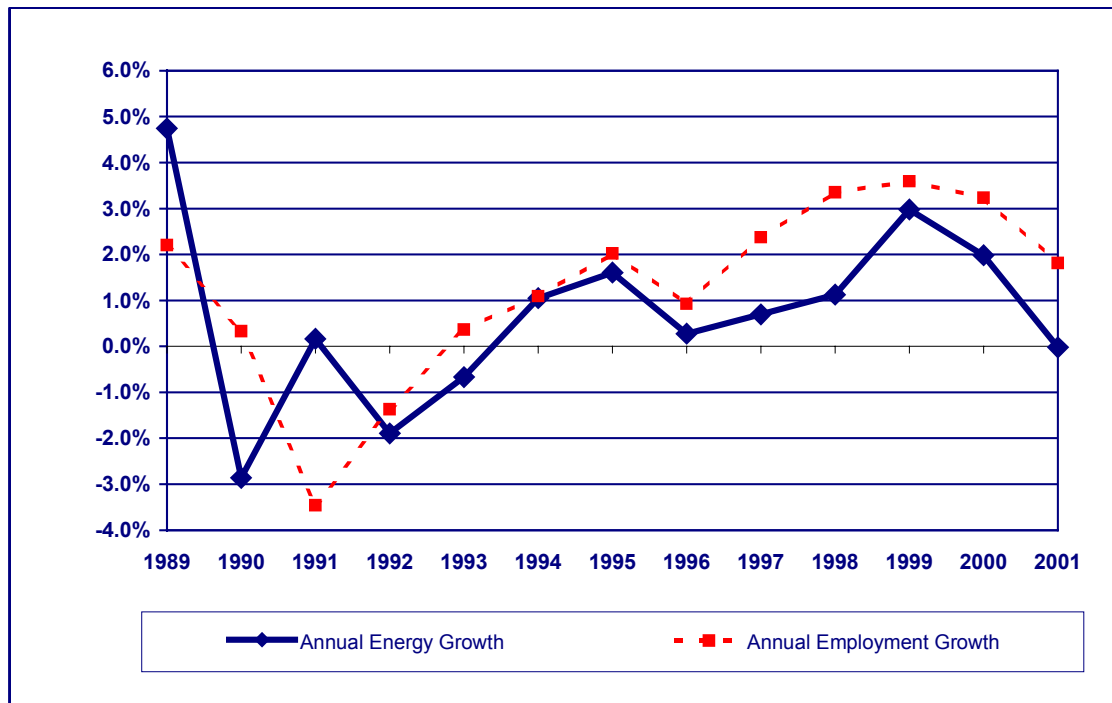
Table 3.2 shows the weather corrected annual energy demand. The actual energy demand is adjusted to reflect the Normal weather that underpins the forecast. This table will not match similar tables in earlier documents as the model to calculate weather corrected values has been updated and will give slightly different results. The weather correction for each of the years is less than 1%, reinforcing that variations in weather throughout the year tend to mitigate each other. It is also interesting to note that weather corrections have lowered the value in 4 of the 7 years shown. However, this recent trend has not influenced this forecast any more than the previous 20 years of historical data, since the forecasting methodology employed does not attempt to include cyclical effects of weather, which occur with various frequencies.

Table 3.2 Ontario Annual Energy Demand, Actual and Weather Corrected

Calendar Year	Annual Energy				
	Actual Energy (TWh)	Annual Growth (%)	Weather Corrected Energy (TWh)	Annual Growth (%)	Economic Index Growth (%)
1995	137.0	1.6%	135.7		
1996	137.4	0.3%	136.6	0.6%	0.9%
1997	138.4	0.7%	138.1	1.1%	1.8%
1998	139.9	1.1%	140.3	1.6%	2.3%
1999	144.1	3.0%	143.3	2.2%	2.5%
2000	146.9	2.0%	147.1	2.6%	2.4%
2001	146.9	0.0%	147.1	0.0%	1.7%

Figure 3.1 graphically shows employment and annual energy demand. It is easy to see that the strong correlation between employment and annual energy demand over the course of recent history.

Figure 3.1 Annual Energy Demand and Employment



3.2 Historical Peak Demand

Historically, Ontario’s electricity peak demand has occurred during the winter, usually in the months of December through February and between the hours of 5 p.m. to 7 p.m. Exceptions to this were in 1998, 1999, 2001 and potentially 2002, when the annual peak demand occurred during the afternoon of July and August. Peak demand is affected by the three classes of drivers but to varying degrees.

Calendar variables, in conjunction with weather, have a large impact on peak demand. Weekly or monthly peak demands rarely occur on a weekend or holiday. Since 1985 only 4 of the 204 monthly peaks have occurred on a weekend and none of those were summer or winter peaks.

In conjunction with calendar impacts, weather plays the biggest role in determining peak values. Severe weather conditions underpin peak demand, particularly so if those weather conditions persist over several days.

Over the course of a season, weather can exhibit great variability. For example, a winter that is generally mild will have a lower than normal energy demand, but can still give rise to a higher than normal peak demand due to a short cold spell. These severe weather episodes are captured in the IMO’s analysis in the LFU and the Extreme weather scenario. Using the LFU allows a probability to be assigned to these weather events.

Table 3.3 shows the actual summer and winter peaks from 1990 through to 2002. Unlike energy demand, which shows a generally smooth upward trend, peak demand shows the variability more closely associated with the weather underpinning that day’s peak.

Table 3.3 Actual Historical Peak Demand and Temperature

Seasonal Year	Winter Peak (MW)	Winter Peak Day Temperature (°C)	Summer Peak (MW)	Summer Peak Day Temperature (°C)
1990	23,491	(8.9)	20,408	35.0
1991	23,046	(13.5)	21,121	30.3
1992	23,463	(12.8)	19,939	30.3
1993	21,964	(11.9)	20,883	34.0
1994	23,857	(19.0)	20,918	32.6
1995	22,812	(15.4)	21,674	31.9
1996	22,613	(8.9)	21,378	29.7
1997	22,030	(14.2)	21,613	33.9
1998	21,494	(0.8)	22,403	31.3
1999	23,150	(18.0)	23,433	34.7
2000	23,301	(15.1)	23,160	29.0
2001	23,126	(8.6)	25,239	37.2
2002	22,263	(10.0)	25,414	33.4

Notes to Table 3.3:

The winter season is from November through March. Therefore, in the case of 1996, the winter spans November 1995 through to March 1996. Spring consists of April and May, summer of June through August and fall September and October. The temperature is the afternoon minimum or maximum for the peak day as recorded at Toronto Pearson.

As with energy demand, peak demand can be adjusted to reflect Normal weather rather than the actual weather underpinning it. The results of this correction are shown in Table 3.4. By comparing this table with the previous one it is possible to discern those seasons where the peak weather conditions were above or below the Normal weather.

Table 3.4 Weather Corrected Historical Peak Demand

Seasonal Year	Winter Peak (MW)	Summer Peak (MW)	Winter Peak Correction Factor (MW)	Summer Peak Correction Factor (MW)
1995	22,219	20,790	-593	-884
1996	22,042	20,472	-571	-906
1997	21,652	20,617	-378	-996
1998	21,890	21,637	396	-766
1999	22,284	21,690	-866	-1,743
2000	22,539	22,101	-762	-1,059
2001	23,062	22,609	-64	-2,630
2002	23,320	24,450	1,057	-964

4.0 Demand Forecast

The demand forecast is split into two separate parts, the energy demand forecast and the 60-minute peak demand forecast. In this section the discussion focuses on Ontario demand, however more detailed information on the individual zones can be found in Appendices A and B.

4.1 Energy Demand Forecast

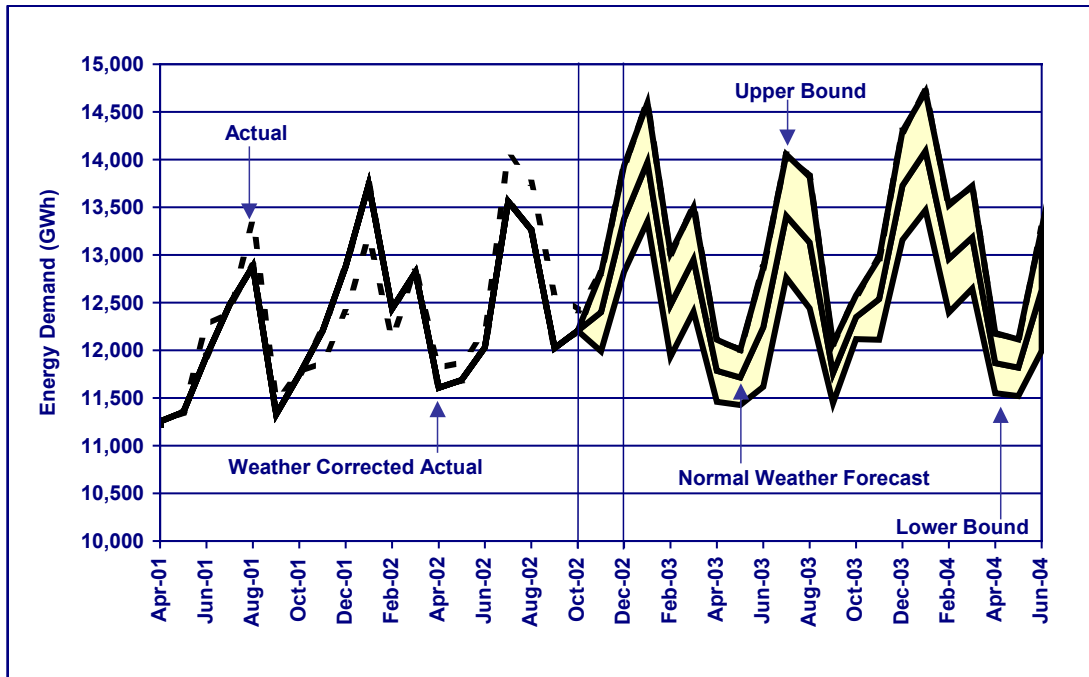
The predicted monthly energy demand for the system for the timeframe January 2003 through to June 2004 is contained in Table 4.1. This table contains the forecast of energy demand under both the Normal and Extreme weather scenarios. Figure 4.1 shows the monthly energy demand. Energy demand is expected to exhibit average annual growth of 0.6% in 2003 and 1.5% in 2004. Growth in demand is driven by changes in economic activity, the number of end-users and the penetration of electric powered devices.

A forecast of zonal energy demand by week is provided in Appendix A. Energy demand growth varies across the zones as they are subject to different economic forces.

Table 4.1 Ontario Monthly Energy Demand, Normal & Extreme Weather

Month	Energy Demand - Normal Weather	Energy Demand - Extreme Weather
	(GWh)	(GWh)
Jan-03	13,973	15,118
Feb-03	12,477	13,663
Mar-03	12,952	14,013
Apr-03	11,785	12,437
May-03	11,715	12,644
Jun-03	12,243	13,661
Jul-03	13,408	14,779
Aug-03	13,130	14,669
Sep-03	11,760	12,614
Oct-03	12,348	12,837
Nov-03	12,537	13,372
Dec-03	13,728	14,950
Jan-04	14,090	15,233
Feb-04	12,959	14,191
Mar-04	13,186	14,228
Apr-04	11,865	12,488
May-04	11,818	12,793
Jun-04	12,633	14,056

Figure 4.1 Monthly System Energy Demand – Normal Weather

**Notes to Figure 4.1:**

The Upper and Lower Bounds represent one standard deviation in the weather elements.

4.2 Peak Demand Forecast

The forecast of monthly peak demand is contained in Table 4.2. This table contains the forecast under both the Normal and Extreme weather scenarios. A forecast of zonal weekly peak demand (both coincident and non-coincident) is contained in Appendix B. The coincident peak represents the peak Ontario Demand and the corresponding zonal values at the time of the system peak. The non-coincident peak values are the individual peaks for each of the zones. The forecast non-coincident peaks may or may not occur at the same time.

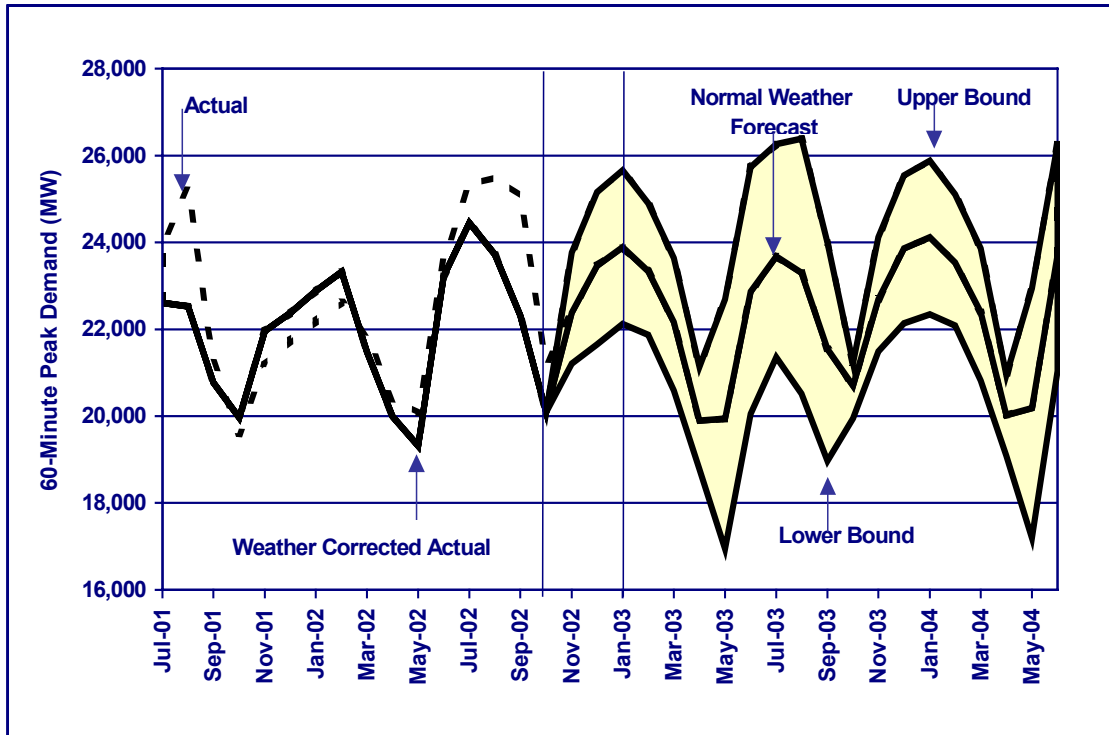
The Normal weather winter peak for 2003 is expected to be 23,890 MW, increasing to 24,110 MW for winter 2004. The Normal weather summer peak for 2003 is projected to be 23,670 MW. These values represent the combination of the forecast of economic activity and the Normal weather scenario. Figure 4.2 displays the forecast of weekly system peaks for both the Normal and Extreme weather scenarios. The Extreme weather peaks are forecasted to be 25,660 MW for the winter of 2003, 26,385 MW for the summer of 2003 and 25,875 MW for the winter of 2004.

The resource adequacy assessments described in the companion document, “An Assessment of the Reliability of the IMO-Controlled Grid”, take into consideration the full range of possible weather conditions on a probabilistic basis. Results are presented assuming Normal weather as a base. Allowance for the probability of demand being higher than those assumed in the base case is made in the calculation of the required reserve level. This assessment is based on the assumption that between 0 MW and 300 MW of demand is price responsive.

Table 4.2 Forecast of Monthly Peak Demand – Normal & Extreme Weather

Month	Normal Weather Peak Demand	Extreme Weather Peak Demand
	(M W)	(M W)
Jan-03	23,891	25,657
Feb-03	23,333	24,900
Mar-03	22,172	23,638
Apr-03	19,899	21,135
May-03	19,939	22,688
Jun-03	22,864	25,732
Jul-03	23,672	26,262
Aug-03	23,306	26,385
Sep-03	21,545	23,996
Oct-03	20,702	21,226
Nov-03	22,692	24,122
Dec-03	23,860	25,536
Jan-04	24,112	25,878
Feb-04	23,538	25,105
Mar-04	22,400	23,865
Apr-04	20,026	20,944
May-04	20,186	22,935
Jun-04	23,711	26,257

Figure 4.2 Forecast of Weekly System Peak Demand



4.3 Comparison of Current Forecast to Previous Forecasts

The most recent forecast with which this 18-Month forecast can be compared is the one published September 24, 2002, covering the period October 2002 to March 2004. The current forecast is primarily an update to the previous one. The forecasting system was re-estimated based on actual economic, weather and demand data through to the end of September 2002. In addition to the re-estimation of the model an updated economic forecast was fed into the system. Higher demand from June to September has increased the model's sensitivity to economic activity and hot weather.

The economic outlook sees a marginally weaker 2003-2004 as compared to the previous forecast. The increased sensitivity of the model means a higher forecast of peak and energy demand, despite the slightly lower economic outlook. Energy demand is forecasted to be 152.1 TWh versus 150.9 TWh in the previous document.

The peak values are higher overall due to the increased sensitivity to economic activity. However, the increases are not proportional as the summer months peaks have increased more than the other seasons. This is a result of incorporating the demand and weather data of the summer of 2002 into the model. The previous forecast predicted a 2003 winter Normal peak of just over 23,755 MW and this forecast is predicts a higher 23,891 MW. The current forecast predicts a 2003 summer Normal peak of 23,672 MW as opposed to 23,354 MW previously. The Extreme weather winter peak for 2003 is higher than the previous forecast (25,657 MW vs. 25,470 MW). The Extreme weather summer peak for 2003 tops 26,385 MW, up significantly from the 26,000 MW Extreme previously forecasted.

Appendix A - Energy Demand Forecast Details

Table A1 Weekly Zonal Energy Forecast, Normal Weather

Week Ending	(GWh)										
	Northwest	Northeast	East	Essa	Ottawa	Toronto	Niagara	Bruce	Southwest	West	Total System
05-Jan-03	157	233	228	191	189	961	114	8	550	314	2,944
12-Jan-03	168	243	243	205	205	1,042	126	8	602	343	3,187
19-Jan-03	167	243	242	204	203	1,034	126	8	600	342	3,169
26-Jan-03	167	241	240	203	200	1,029	126	9	598	341	3,153
02-Feb-03	167	241	242	205	202	1,039	126	9	604	343	3,179
09-Feb-03	165	239	240	204	200	1,039	126	9	603	342	3,167
16-Feb-03	166	237	237	200	196	1,029	126	9	598	340	3,138
23-Feb-03	164	233	230	195	190	1,010	125	9	587	333	3,075
02-Mar-03	164	231	229	194	190	1,014	125	9	584	332	3,072
09-Mar-03	162	226	224	192	185	994	124	9	573	327	3,017
16-Mar-03	159	223	220	192	181	979	123	9	568	325	2,981
23-Mar-03	156	219	214	190	176	957	122	8	560	321	2,924
30-Mar-03	152	214	207	187	168	923	121	8	546	314	2,839
06-Apr-03	151	219	197	172	168	935	118	6	542	313	2,820
13-Apr-03	153	215	198	165	163	927	118	7	537	313	2,795
20-Apr-03	150	208	195	165	152	887	115	7	518	303	2,698
27-Apr-03	147	202	193	167	149	890	116	6	521	305	2,697
04-May-03	147	194	192	168	146	883	114	6	519	303	2,672
11-May-03	146	191	189	167	145	879	113	6	518	300	2,653
18-May-03	144	190	189	163	145	879	113	6	517	300	2,645
25-May-03	141	192	188	158	144	862	112	6	502	297	2,603
01-Jun-03	142	190	188	158	151	904	115	6	517	310	2,681
08-Jun-03	143	190	178	146	171	969	121	6	537	343	2,803
15-Jun-03	143	187	181	148	176	993	122	6	560	344	2,860
22-Jun-03	143	184	182	150	177	1,006	124	7	576	339	2,888
29-Jun-03	142	183	183	152	178	1,024	125	7	587	331	2,913
06-Jul-03	138	182	187	155	184	1,053	127	7	600	332	2,966
13-Jul-03	138	183	189	156	191	1,072	129	6	600	347	3,010
20-Jul-03	139	185	189	158	194	1,084	129	5	588	363	3,034
27-Jul-03	139	185	185	156	192	1,064	127	5	574	377	3,003
03-Aug-03	140	184	184	155	192	1,065	127	6	575	379	3,006
10-Aug-03	141	189	180	150	188	1,043	127	6	565	375	2,963
17-Aug-03	142	191	181	151	190	1,051	128	6	572	378	2,991
24-Aug-03	143	197	180	149	189	1,046	128	6	571	376	2,986
31-Aug-03	144	202	181	149	190	1,053	130	7	575	381	3,012
07-Sep-03	135	198	182	145	164	947	119	7	535	333	2,765
14-Sep-03	141	199	178	140	166	952	119	8	536	328	2,766
21-Sep-03	144	199	172	131	168	939	116	7	527	318	2,721
28-Sep-03	146	200	170	128	171	936	114	7	524	313	2,710

Notes to Table A1:

Figures may not add due to rounding.

Table A1 – continued

Week Ending	(GWh)										Total System
	Northwest	Northeast	East	Essa	Ottawa	Toronto	Niagara	Bruce	Southwest	West	
05-Oct-03	149	203	173	130	173	934	115	7	520	312	2,715
12-Oct-03	150	208	182	142	173	938	116	7	526	311	2,750
19-Oct-03	149	214	188	151	170	919	114	7	523	308	2,743
26-Oct-03	150	217	198	162	172	944	118	7	542	316	2,827
02-Nov-03	151	218	192	156	170	951	118	8	539	319	2,821
09-Nov-03	155	220	204	167	176	958	122	9	549	324	2,884
16-Nov-03	157	222	211	174	182	980	122	9	559	329	2,945
23-Nov-03	158	225	217	181	183	991	123	9	566	330	2,982
30-Nov-03	158	227	222	186	185	999	123	9	576	332	3,017
07-Dec-03	164	231	231	195	191	1,021	124	9	590	337	3,092
14-Dec-03	163	233	235	199	194	1,026	124	9	595	338	3,117
21-Dec-03	164	236	240	204	197	1,037	125	9	601	342	3,154
28-Dec-03	152	227	235	202	194	994	119	8	575	332	3,037
04-Jan-04	158	233	232	196	191	985	118	8	564	323	3,009
11-Jan-04	168	242	246	209	206	1,053	128	8	609	348	3,216
18-Jan-04	168	241	244	207	204	1,044	127	9	606	346	3,196
25-Jan-04	167	239	242	206	201	1,039	127	9	605	345	3,181
01-Feb-04	168	240	245	209	203	1,049	128	9	611	348	3,208
08-Feb-04	166	237	243	207	201	1,048	128	9	610	347	3,195
15-Feb-04	166	235	239	204	197	1,039	127	9	605	344	3,166
22-Feb-04	165	231	232	198	190	1,019	126	9	594	338	3,103
29-Feb-04	164	230	232	198	191	1,024	127	9	591	337	3,103
07-Mar-04	162	225	226	195	186	1,005	126	9	580	332	3,047
14-Mar-04	160	222	222	195	182	990	125	9	575	330	3,011
21-Mar-04	157	217	217	193	176	968	124	8	567	326	2,954
28-Mar-04	153	213	209	190	169	934	122	8	553	319	2,869
04-Apr-04	152	217	204	182	170	947	121	7	554	320	2,873
11-Apr-04	154	214	198	163	162	923	117	7	535	313	2,785
18-Apr-04	151	208	199	170	157	919	119	7	536	314	2,780
25-Apr-04	148	202	195	170	151	905	117	6	530	310	2,734
02-May-04	147	195	194	170	148	897	116	6	526	308	2,706
09-May-04	146	190	192	169	147	894	114	6	527	305	2,690
16-May-04	144	190	191	166	146	893	114	6	525	305	2,681
23-May-04	143	189	191	164	148	900	116	6	524	307	2,689
30-May-04	141	192	192	160	147	888	115	7	511	306	2,658
06-Jun-04	143	190	182	150	171	979	122	6	542	347	2,833
13-Jun-04	143	188	183	150	179	1,013	125	6	568	353	2,908
20-Jun-04	143	185	184	151	181	1,025	126	7	584	349	2,935
27-Jun-04	143	184	185	154	181	1,043	127	7	596	341	2,960

Notes to Table A1:

Figures may not add due to rounding.

Appendix B - Peak Demand Forecast Details

Table B1 Weekly Zonal Coincident Peak Demand Forecast, Normal Weather

Week Ending	60-Minute Coincident Peak Demand (MW)											Load Forecast Uncertainty
	Northwest	Northeast	East	Essa	Ottawa	Toronto	Niagara	Bruce	Southwest	West	System	
05-Jan-03	998	1,459	1,674	1,701	1,389	6,919	820	55	3,987	2,224	21,226	776
12-Jan-03	1,067	1,550	1,867	1,894	1,609	7,891	903	60	4,530	2,520	23,891	883
19-Jan-03	1,058	1,542	1,848	1,867	1,589	7,804	900	60	4,495	2,504	23,668	979
26-Jan-03	1,050	1,527	1,838	1,851	1,576	7,741	893	61	4,468	2,466	23,471	871
02-Feb-03	1,049	1,526	1,851	1,853	1,581	7,791	897	62	4,495	2,472	23,578	608
09-Feb-03	1,035	1,509	1,823	1,812	1,551	7,741	893	63	4,459	2,449	23,333	729
16-Feb-03	1,034	1,495	1,799	1,772	1,528	7,688	888	63	4,424	2,422	23,113	801
23-Feb-03	1,025	1,473	1,751	1,708	1,488	7,545	879	64	4,340	2,376	22,649	851
02-Mar-03	1,032	1,459	1,693	1,727	1,450	7,478	868	64	4,289	2,382	22,442	827
09-Mar-03	1,018	1,435	1,675	1,719	1,426	7,376	862	63	4,235	2,361	22,172	793
16-Mar-03	999	1,412	1,649	1,702	1,390	7,246	856	61	4,185	2,333	21,834	751
23-Mar-03	979	1,387	1,615	1,675	1,348	7,111	849	58	4,127	2,303	21,453	733
30-Mar-03	954	1,360	1,576	1,642	1,305	6,907	841	55	4,041	2,266	20,947	688
06-Apr-03	925	1,352	1,393	1,413	1,240	6,728	801	40	3,842	2,166	19,899	560
13-Apr-03	953	1,389	1,426	1,340	1,210	6,619	812	48	3,804	2,184	19,786	469
20-Apr-03	934	1,360	1,448	1,361	1,166	6,508	815	45	3,758	2,154	19,550	448
27-Apr-03	915	1,319	1,415	1,335	1,111	6,399	801	43	3,709	2,114	19,161	403
04-May-03	926	1,260	1,361	1,347	1,048	6,244	783	41	3,673	2,110	18,793	373
11-May-03	884	1,138	1,250	1,243	1,087	6,387	772	41	3,605	2,152	18,559	1,237
18-May-03	878	1,141	1,282	1,266	1,124	6,547	797	41	3,664	2,228	18,967	1,663
25-May-03	873	1,145	1,344	1,313	1,180	6,778	822	42	3,737	2,300	19,534	1,410
01-Jun-03	862	1,203	1,363	1,311	1,174	7,015	843	43	3,782	2,342	19,939	1,497
08-Jun-03	877	1,191	1,357	1,343	1,389	7,727	921	40	4,067	2,733	21,645	1,364
15-Jun-03	876	1,185	1,417	1,415	1,446	8,093	945	47	4,334	2,780	22,539	1,372
22-Jun-03	880	1,179	1,428	1,445	1,448	8,216	963	52	4,483	2,770	22,864	1,237
29-Jun-03	880	1,173	1,423	1,458	1,454	8,211	967	52	4,526	2,671	22,815	1,452
06-Jul-03	847	1,164	1,467	1,525	1,492	8,533	991	53	4,678	2,719	23,468	1,333
13-Jul-03	850	1,160	1,483	1,542	1,540	8,607	999	49	4,651	2,791	23,672	1,158
20-Jul-03	855	1,168	1,472	1,549	1,545	8,584	995	42	4,526	2,867	23,603	1,039
27-Jul-03	857	1,167	1,443	1,546	1,535	8,498	984	41	4,428	3,012	23,509	1,007
03-Aug-03	860	1,159	1,410	1,511	1,518	8,346	964	42	4,375	2,965	23,150	1,131
10-Aug-03	870	1,170	1,414	1,501	1,527	8,395	975	44	4,398	2,995	23,290	1,266
17-Aug-03	878	1,206	1,409	1,471	1,531	8,357	980	45	4,387	3,004	23,269	1,026
24-Aug-03	883	1,236	1,400	1,437	1,527	8,311	974	47	4,371	2,969	23,153	1,271
31-Aug-03	889	1,263	1,398	1,416	1,523	8,374	988	49	4,399	3,008	23,306	1,393
07-Sep-03	847	1,234	1,380	1,332	1,305	7,721	918	54	4,117	2,638	21,545	1,287
14-Sep-03	866	1,192	1,310	1,263	1,322	7,494	887	55	4,008	2,572	20,971	923
21-Sep-03	877	1,183	1,209	1,144	1,307	7,157	843	53	3,846	2,412	20,032	1,379
28-Sep-03	888	1,175	1,159	1,088	1,303	6,987	816	51	3,763	2,322	19,552	1,392

Notes to Table B1:

Load Forecast Uncertainty (LFU) is one standard deviation in system peak demand due to variations in weather.

Table B1 - continued

Week Ending	60-Minute Coincident Peak Demand (MW)											Load Forecast Uncertainty
	Northwest	Northeast	East	Essa	Ottawa	Toronto	Niagara	Bruce	Southwest	West	System	
05-Oct-03	839	1,155	1,455	1,512	1,479	8,462	983	52	4,639	2,696	23,272	356
12-Oct-03	838	1,144	1,464	1,522	1,519	8,491	986	49	4,588	2,753	23,354	358
19-Oct-03	844	1,152	1,453	1,529	1,525	8,472	982	41	4,467	2,829	23,294	392
26-Oct-03	846	1,152	1,425	1,526	1,515	8,390	972	40	4,372	2,974	23,212	438
02-Nov-03	850	1,145	1,393	1,493	1,500	8,246	952	41	4,323	2,930	22,873	378
09-Nov-03	860	1,155	1,397	1,483	1,509	8,292	963	44	4,344	2,958	23,005	564
16-Nov-03	867	1,192	1,392	1,454	1,513	8,256	968	45	4,335	2,968	22,990	432
23-Nov-03	872	1,222	1,383	1,420	1,509	8,213	963	46	4,320	2,934	22,882	593
30-Nov-03	878	1,248	1,382	1,399	1,506	8,276	977	48	4,348	2,973	23,035	601
07-Dec-03	835	1,216	1,360	1,313	1,286	7,610	905	52	4,058	2,600	21,235	874
14-Dec-03	848	1,209	1,281	1,218	1,283	7,423	884	51	3,948	2,535	20,680	732
21-Dec-03	865	1,168	1,194	1,129	1,291	7,065	832	52	3,797	2,381	19,774	931
28-Dec-03	878	1,161	1,145	1,075	1,287	6,901	806	51	3,717	2,293	19,314	743
04-Jan-04	934	1,246	1,206	1,172	1,274	6,544	790	45	3,676	2,147	19,034	751
11-Jan-04	920	1,277	1,317	1,241	1,291	6,632	791	45	3,714	2,134	19,362	883
18-Jan-04	923	1,303	1,382	1,325	1,285	6,703	798	43	3,787	2,156	19,705	979
25-Jan-04	921	1,329	1,441	1,402	1,280	6,754	804	46	3,848	2,179	20,004	871
01-Feb-04	942	1,350	1,392	1,351	1,304	7,113	813	50	3,953	2,270	20,538	608
08-Feb-04	978	1,373	1,543	1,504	1,378	7,257	864	61	4,115	2,361	21,434	729
15-Feb-04	1,000	1,387	1,595	1,566	1,423	7,405	875	62	4,185	2,402	21,900	801
22-Feb-04	1,010	1,423	1,659	1,640	1,465	7,523	884	60	4,253	2,425	22,342	851
29-Feb-04	1,012	1,432	1,690	1,682	1,474	7,534	889	64	4,328	2,438	22,543	827
07-Mar-04	1,043	1,467	1,772	1,780	1,541	7,721	899	65	4,473	2,478	23,239	793
14-Mar-04	1,041	1,480	1,799	1,816	1,558	7,732	899	66	4,506	2,478	23,375	751
21-Mar-04	1,043	1,499	1,829	1,852	1,570	7,803	907	66	4,547	2,510	23,626	733
28-Mar-04	1,042	1,509	1,848	1,876	1,579	7,825	909	64	4,524	2,517	23,693	688
04-Apr-04	975	1,499	1,752	1,778	1,464	7,126	830	57	4,139	2,278	21,898	700
11-Apr-04	1,063	1,524	1,877	1,910	1,603	7,919	911	60	4,554	2,539	23,960	469
18-Apr-04	1,054	1,517	1,855	1,882	1,582	7,828	907	61	4,519	2,522	23,727	448
25-Apr-04	1,044	1,502	1,846	1,867	1,568	7,761	899	62	4,490	2,485	23,524	403
02-May-04	1,043	1,500	1,857	1,868	1,573	7,811	903	62	4,518	2,491	23,626	373
09-May-04	1,029	1,483	1,830	1,827	1,543	7,760	899	64	4,482	2,467	23,384	1,237
16-May-04	1,027	1,470	1,806	1,788	1,519	7,704	894	63	4,449	2,441	23,161	1,663
23-May-04	1,021	1,448	1,760	1,727	1,479	7,560	885	63	4,366	2,394	22,703	1,410
30-May-04	1,027	1,436	1,707	1,752	1,439	7,500	874	65	4,316	2,400	22,516	1,497
06-Jun-04	1,013	1,411	1,683	1,734	1,420	7,408	868	65	4,262	2,379	22,243	1,364
13-Jun-04	995	1,389	1,654	1,715	1,385	7,274	862	59	4,209	2,352	21,894	1,372
20-Jun-04	975	1,363	1,622	1,689	1,341	7,136	856	58	4,153	2,322	21,515	1,237
27-Jun-04	952	1,336	1,584	1,658	1,300	6,942	848	55	4,068	2,286	21,029	1,452

Notes to Table B1:

Load Forecast Uncertainty (LFU) is one standard deviation in system peak demand due to variations in weather.

Table B2 Weekly Zonal Non-Coincident Peak Demand Forecast, Normal Weather

Week Ending	60-Minute Non-Coincident Peak Demand (MW)										
	Northwest	Northeast	East	Essa	Ottawa	Toronto	Niagara	Bruce	Southwest	West	Total
05-Jan-03	1,045	1,605	1,733	1,701	1,421	6,955	820	57	4,021	2,235	21,594
12-Jan-03	1,079	1,610	1,907	1,894	1,622	7,891	903	60	4,530	2,520	24,016
19-Jan-03	1,071	1,604	1,875	1,867	1,600	7,804	900	60	4,495	2,504	23,779
26-Jan-03	1,064	1,580	1,846	1,851	1,580	7,741	893	61	4,468	2,466	23,550
02-Feb-03	1,067	1,566	1,851	1,853	1,581	7,791	897	62	4,495	2,472	23,635
09-Feb-03	1,054	1,549	1,823	1,824	1,551	7,741	893	63	4,459	2,449	23,404
16-Feb-03	1,054	1,540	1,799	1,802	1,528	7,688	888	64	4,424	2,427	23,213
23-Feb-03	1,046	1,520	1,751	1,751	1,488	7,545	879	64	4,340	2,390	22,775
02-Mar-03	1,041	1,509	1,723	1,727	1,482	7,512	876	65	4,289	2,382	22,607
09-Mar-03	1,031	1,487	1,683	1,719	1,457	7,376	865	64	4,235	2,361	22,279
16-Mar-03	1,015	1,467	1,649	1,702	1,419	7,246	856	61	4,185	2,333	21,934
23-Mar-03	998	1,442	1,615	1,675	1,376	7,111	849	58	4,127	2,303	21,556
30-Mar-03	974	1,412	1,576	1,642	1,332	6,907	841	55	4,041	2,270	21,049
06-Apr-03	952	1,420	1,455	1,501	1,255	6,728	817	52	3,844	2,178	20,203
13-Apr-03	971	1,406	1,426	1,340	1,210	6,678	821	52	3,804	2,184	19,894
20-Apr-03	954	1,379	1,448	1,361	1,166	6,583	827	49	3,758	2,159	19,685
27-Apr-03	937	1,342	1,415	1,346	1,116	6,500	814	46	3,709	2,130	19,358
04-May-03	934	1,289	1,388	1,347	1,083	6,407	807	44	3,673	2,110	19,082
11-May-03	930	1,300	1,323	1,306	1,087	6,418	780	46	3,605	2,152	18,947
18-May-03	919	1,294	1,308	1,287	1,124	6,573	803	45	3,664	2,228	19,247
25-May-03	906	1,282	1,344	1,313	1,180	6,802	828	63	3,737	2,300	19,755
01-Jun-03	906	1,278	1,379	1,337	1,193	7,015	843	49	3,793	2,344	20,137
08-Jun-03	901	1,259	1,357	1,343	1,389	7,739	925	43	4,067	2,733	21,756
15-Jun-03	894	1,248	1,417	1,415	1,446	8,107	950	48	4,334	2,780	22,639
22-Jun-03	895	1,231	1,428	1,445	1,448	8,242	969	52	4,483	2,770	22,962
29-Jun-03	898	1,223	1,423	1,458	1,454	8,241	973	52	4,526	2,671	22,919
06-Jul-03	896	1,219	1,468	1,525	1,492	8,561	996	53	4,678	2,719	23,607
13-Jul-03	875	1,224	1,484	1,542	1,540	8,619	1,004	50	4,651	2,791	23,780
20-Jul-03	883	1,242	1,472	1,549	1,545	8,589	999	45	4,526	2,867	23,717
27-Jul-03	879	1,254	1,443	1,546	1,535	8,498	987	43	4,428	3,012	23,624
03-Aug-03	892	1,241	1,410	1,511	1,518	8,350	967	43	4,375	2,965	23,273
10-Aug-03	897	1,251	1,414	1,501	1,527	8,406	979	46	4,398	2,995	23,415
17-Aug-03	899	1,285	1,409	1,471	1,531	8,373	985	45	4,387	3,004	23,390
24-Aug-03	903	1,313	1,400	1,437	1,527	8,334	979	47	4,371	2,969	23,279
31-Aug-03	912	1,334	1,398	1,416	1,523	8,404	994	49	4,399	3,008	23,437
07-Sep-03	896	1,336	1,393	1,358	1,330	7,721	918	55	4,120	2,639	21,767
14-Sep-03	911	1,340	1,310	1,263	1,322	7,522	896	55	4,008	2,572	21,199
21-Sep-03	926	1,353	1,219	1,144	1,307	7,179	851	53	3,846	2,412	20,291
28-Sep-03	934	1,354	1,214	1,114	1,303	6,999	823	52	3,766	2,322	19,880

Table B2 - continued

60-Minute Non-Coincident Peak Demand (MW)											
Week Ending	Northwest	Northeast	East	Essa	Ottawa	Toronto	Niagara	Bruce	Southwest	West	Total
05-Oct-03	952	1,323	1,264	1,182	1,308	6,609	797	48	3,709	2,167	19,360
12-Oct-03	950	1,342	1,328	1,252	1,302	6,691	802	47	3,746	2,172	19,633
19-Oct-03	947	1,369	1,393	1,336	1,296	6,760	806	48	3,819	2,182	19,957
26-Oct-03	944	1,397	1,453	1,414	1,290	6,810	811	48	3,880	2,198	20,245
02-Nov-03	962	1,415	1,467	1,362	1,331	7,171	819	58	3,984	2,288	20,856
09-Nov-03	991	1,453	1,592	1,514	1,393	7,306	869	62	4,142	2,377	21,699
16-Nov-03	1,009	1,479	1,648	1,576	1,439	7,456	881	62	4,214	2,418	22,181
23-Nov-03	1,021	1,492	1,710	1,651	1,477	7,574	890	62	4,281	2,441	22,598
30-Nov-03	1,022	1,516	1,745	1,693	1,486	7,585	894	64	4,357	2,454	22,817
07-Dec-03	1,056	1,541	1,821	1,797	1,552	7,775	906	66	4,505	2,495	23,513
14-Dec-03	1,053	1,562	1,851	1,828	1,569	7,786	906	66	4,537	2,495	23,652
21-Dec-03	1,057	1,579	1,882	1,865	1,583	7,859	914	65	4,578	2,528	23,910
28-Dec-03	1,058	1,587	1,903	1,889	1,595	7,881	915	63	4,557	2,535	23,982
04-Jan-04	1,062	1,595	1,788	1,791	1,501	7,213	874	59	4,170	2,361	22,413
11-Jan-04	1,082	1,601	1,928	1,921	1,624	7,970	916	61	4,581	2,554	24,238
18-Jan-04	1,073	1,592	1,900	1,893	1,603	7,878	912	61	4,546	2,537	23,995
25-Jan-04	1,066	1,572	1,869	1,878	1,582	7,811	905	62	4,518	2,500	23,763
01-Feb-04	1,068	1,559	1,869	1,879	1,584	7,864	909	63	4,547	2,507	23,848
08-Feb-04	1,055	1,543	1,842	1,851	1,554	7,811	904	63	4,510	2,482	23,615
15-Feb-04	1,055	1,534	1,818	1,828	1,530	7,757	900	64	4,477	2,460	23,423
22-Feb-04	1,049	1,514	1,771	1,780	1,490	7,612	890	65	4,394	2,423	22,988
29-Feb-04	1,044	1,504	1,752	1,763	1,482	7,587	889	65	4,345	2,416	22,847
07-Mar-04	1,034	1,482	1,707	1,746	1,460	7,460	878	65	4,290	2,394	22,516
14-Mar-04	1,018	1,463	1,665	1,726	1,424	7,325	868	62	4,237	2,367	22,153
21-Mar-04	1,001	1,437	1,632	1,700	1,378	7,186	861	59	4,180	2,336	21,772
28-Mar-04	979	1,407	1,594	1,669	1,336	6,990	853	56	4,094	2,302	21,280
04-Apr-04	957	1,410	1,563	1,647	1,289	6,854	848	53	4,045	2,292	20,957
11-Apr-04	975	1,403	1,435	1,356	1,223	6,758	831	52	3,859	2,221	20,114
18-Apr-04	958	1,380	1,465	1,383	1,178	6,655	836	50	3,816	2,195	19,917
25-Apr-04	946	1,338	1,431	1,366	1,121	6,567	826	47	3,766	2,166	19,575
02-May-04	933	1,291	1,406	1,364	1,091	6,481	818	45	3,732	2,146	19,306
09-May-04	938	1,300	1,338	1,325	1,095	6,509	794	46	3,659	2,190	19,194
16-May-04	924	1,292	1,324	1,309	1,131	6,657	812	45	3,719	2,265	19,479
23-May-04	914	1,279	1,363	1,340	1,188	6,887	837	46	3,791	2,338	19,983
30-May-04	912	1,278	1,401	1,361	1,199	7,104	854	64	3,851	2,380	20,405
06-Jun-04	908	1,270	1,372	1,364	1,407	7,860	938	46	4,132	2,817	22,114
13-Jun-04	900	1,259	1,436	1,440	1,468	8,251	966	47	4,377	2,845	22,990
20-Jun-04	899	1,248	1,451	1,466	1,480	8,371	983	51	4,522	2,831	23,302
27-Jun-04	902	1,233	1,439	1,480	1,473	8,369	987	52	4,595	2,729	23,260

Appendix C - Analytical Factors Affecting Demand

Table C1 Approximate Analytical Factors Affecting Demand

Factors Affecting Daily Energy Demand			
Variable Class	Variable	Change in Variable	Impact On Daily Energy Demand (MWh)
Weather	Daily Avg Temperature > 16° C 10°C > and < 16° C < 10°C	1°C Increase	6,370 MWh Increase
		1°C Increase	390 MWh Increase
		1°C Decrease	2,580 MWh Increase
	Daily Avg Humidity - Dewpoint > 16° C 10°C > and < 16° C < 10°C	1°C Increase	2,450 MWh Increase
		1°C Increase	140 MWh Increase
		1°C Decrease	940 MWh Increase
	Wind	Summer 1 km/hr Decrease	280 MWh Increase
		Winter 1 km/hr Increase	230 MWh Increase
	Cloud	Summer Decrease of 1 on Scale	1,210 MWh Increase
		Winter Increase of 1 on Scale	1,830 MWh Increase
Economic	Employment	Increase of 1,000 jobs	25 MWh Increase
	Housing Stock	Increase of 1,000 houses	35 MWh Increase
Calendar	Holidays	New Year's Day	65,000 MWh Decrease
		Good Friday	45,000 MWh Decrease
		Victoria Day	49,000 MWh Decrease
		Canada Day	25,000 MWh Decrease
		August Civic Holiday	38,000 MWh Decrease
		Labour Day	54,000 MWh Decrease
		Thanksgiving Day	55,000 MWh Decrease
		Remembrance Day	6,000 MWh Decrease
		Christmas	85,000 MWh Decrease
		Boxing Day	51,000 MWh Decrease
		New Year's Eve	20,000 MWh Decrease
		Week Between Christmas and New Years Eve	38,000 MWh Decrease
		Day of Week	Monday vs Sunday
	Tuesday vs Sunday		46,000 MWh Increase
	Wednesday vs Sunday		47,000 MWh Increase
		Thursday vs Sunday	47,000 MWh Increase
	Friday vs Sunday	43,000 MWh Increase	
	Saturday vs Sunday	11,000 MWh Increase	

Table C1 – continued

Factors Affecting Daily Peak Demand			
Variable Class	Variable	Change in Variable	Impact On Daily Peak Demand (MW)
Weather	Temperature		
	> 16° C	1°C Increase	380 MW Increase
	10°C > and < 16° C	1°C Increase	50 MW Increase
	< 10°C	1°C Decrease	110 MW Increase
	Humidity - Dewpoint		
	> 16° C	1°C Increase	140 MW Increase
	10°C > and < 16° C	1°C Increase	20 MW Increase
	< 10°C	1°C Decrease	40 MW Increase
	Wind		
	Summer	1 km/hr Decrease	10 MW Increase
Winter	1 km/hr Increase	20 MW Increase	
Cloud	Summer	Decrease of 1 on Scale	90 MW Increase
	Winter	Increase of 1 on Scale	80 MW Increase
Economic	Employment	Increase of 1,000 jobs	1 MW Increase
	Housing Stock	Increase of 1,000 houses	2 MW Increase
Calendar	Holidays	New Year's Day	2,900 MW Decrease
		Good Friday	2,000 MW Decrease
		Victoria Day	2,300 MW Decrease
		Canada Day	900 MW Decrease
		August Civic Holiday	1,600 MW Decrease
		Labour Day	2,300 MW Decrease
		Thanksgiving Day	2,500 MW Decrease
		Remembrance Day	300 MW Decrease
		Christmas	4,700 MW Decrease
		Boxing Day	2,400 MW Decrease
		New Year's Eve	1,100 MW Decrease
		Week Between Christmas and New Years Eve	1,500 MW Decrease
		Day of Week	Monday vs Sunday
	Tuesday vs Sunday		2,000 MW Increase
	Wednesday vs Sunday		2,000 MW Increase
	Thursday vs Sunday		1,900 MW Increase
	Friday vs Sunday	1,700 MW Increase	
Saturday vs Sunday	200 MW Increase		